OIL PRICE TRANSMIT TO EMERGING STOCK RETURNS: A CASE STUDY OF PAKISTAN ECONOMY

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Abstract

This study investigates the relationship between oil price and stock market. Granger Causality is applied on daily data during March 1998 to December 2005 to determine the relationship between oil prices and stock returns. The empirical results indicate that no significant effect of oil prices is found on stock returns. The reasons are more use of gas and increase the liquidity in Pakistan. However, we found the positive significant relation of stock prices and volume and gas prices. This study also found no relation between news and stock returns and no day of the week effect.

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Introduction

Pakistan is an emerging stock market, which in spite of its small size has potential importance for global investors. However, Pakistan heavily depends on oil imports for running its economic machinery as a result oil price shocks may have destabilizing effects on domestic financial markets. It implies that changes in oil prices will have an impact on the volatility of stock prices[1]. In other words oil prices affects earnings of companies through which oil is a direct or indirect cost of operation. Hence, an increase in oil prices will cause expected earnings to decline, and this brought about an immediate decrease in stock prices. If the stock market is inefficient, stock returns might be slowly affected. Hence, oil being one of the most important macro economic factors will have strong linkages with financial markets in Pakistan.

The stock market in Pakistan initially reacted positively to the changes in oil prices in 1991-1993, but political instability and an uncertain investment environment have hindered Pakistan's attempts to develop its stock market[2]. Regulatory policies may be needed to reduce the potentially negative effects on the domestic economy[3]. Pakistan also introduced the regulatory polices in 2003 to control the negative impact on Pakistan economy. Pakistan's government changes oil prices for every fifteen days depending upon the changes of prices at world level.

The rest of the paper is organised such that next section discusses review of literature, econometric methodology and described the data in nest section. Section three presents the empirical results. Summary and concluding remarks are given in section four.

Review of Literature

Jones and Kaul (1996) studied the impact of oil price on dividends in U.S., Canada, Japan and U.K. stock markets. They used a cash-flow valuation model showed that all stock markets respond negatively to oil shocks. Sadorsky[4] studies the impact of oil price shocks on stock returns. They used vector auto regressions in U.S. industrial production and short interest rates and reported the evidence of oil shock on aggregate stock returns. However, Huang, Masulis and Stoll[5] for the same economy found different results. Maghyereh, Aktham[6] examined the dynamic linkages between oil price shocks and stock market returns in 22 emerging economies, including Pakistan. They used VAR model on daily data for 1998 to 2004 and found weak evidence about a relationship between the oil price shocks and stock market returns in these emerging economies. Moreover results from impulse analysis revealed the innovations in the oil market, which are slowly transmitted in the emerging stock markets. They suggested in

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1 An increase in oil prices causes an inward shift in short run aggregate supply and puts upward pressure on the price level. It implication would be greatest when a country is (a) a large-scale importer of oil and (b) has many industries that use oil as an essential input in the production process.

2 Ariff, Mohamed, and Ahmed M. Khalid. 2000. Liberalisation, Growth and Asian Financial Crisis: Lessons for Developing and Transitional Economies. London: Edward Elgar Publishing Co. May, 544 p.

3 Gelos, R. Gastan and Sahay, Ratna. 2001. Financial Market Spillover in Transition Economies. Economics of Transition, vol.9 (1), pp. 53-86

4 Sadorsky, Perry. 1999. Oil Price Shocks and Stock Market Activity. Energy Economics vol. 21, 5, pp. 449-69.

5 Huang, R., R. Masulis, and H. Stoll. 1996. Energy Shocks and Financial Markets. Journal of Future Markets, vol 16, 1, pp. 1-27.

6 Maghyereh, Aktham. 2004. Oil Price Shocks and Emerging Stock Markets: A Generalized VAR Approach. International Journal of Applied Econometrics and Quantitative Studies, vol 1-2.

inefficient the transmission of new information of the oil market and do not rationally signal changes in oil prices. Basher and Sadorsky used a multi-factor arbitrage pricing model and found strong evidence that oil price risk impacts returns of emerging stock markets. Driesprong, Jacobsen and Maat[7] reported the evidence that investors in stock markets under react to oil price changes in the short run. As a consequence changes in oil prices predict future stock market returns: a rise in oil prices lowers future, stock market returns. While conflicting with the notion of market efficiency, they argue that-even though oil price changes are public information (i.e. easily and quickly available to all investors) these results are in line with the gradual information diffusion hypothesis proposed by Hong and Stein. Agren[8] studied the volatility spillover from oil prices to stock markets. He applied asymmetric BEKK model using weekly on the aggregate stock markets of Japan, Norway, Sweden, the UK and the US. He found the strong evidence of volatility spillover for all stock market except Sweden, which is found week evidence.

Theoretical Model and Econometric Methodology

This study empirically determines the relationship between stock prices and oil prices to take the volatility clustering into account we use the GARCH model which is developed by Bollerslev with some variations. A GARCH (1, 1) model is a specification that works well for stock returns in Pakistan with capturing the ARCH effect. In actual estimation we proceed by using a consistent general-to-specific modeling approach which is used by Hendry. This ensures that the inferences based on statistical tests are valid throughout, the modeling process. In this methodology, we have amended in the model to ensure the suitability of the model according to the nature of Pakistani stock market. Stock returns is the dependent variable, oil prices are used as independent variable which is the core variable in this study. Another important addition is of KSE turnover or daily trading volume. It is used as proxy variable for GDP, because the daily data on GDP is not available. This variable shows the economic conditions of the country as well as local influences of the market. We incorporate day of the week effect in the model. The reason is that Karachi stock market starts on Monday with a positive sentiment where as the sentiments is mostly negative on Friday due short span of time and Jumma Prayer. Moreover, Pakistan stock returns have these seasonalities (Hussain: 1999 and Mustafa and Nishat: 2003). In last we have taken "Informationally efficient market provides" the basis for efficient market hypothesis in which any new information relevant to the market is spontaneously reflected in the stock prices. This variable fulfils the condition for efficient market hypothesis. After incorporation of the above variables the equation becomes

$$R_t = \alpha_0 + \alpha_1 R_{t-1} + \sum_{i=1}^{n} \alpha_{2i} oilprices_{t-i} + \sum_{i=1}^{n} \alpha_{3i} TV_{t-i} + \alpha_5 News + \alpha_6 Gas + \sum_{i=1}^{5} \alpha_7 D_i + \eta h_t + \mu \quad (1)$$

$$\mu_t = \varepsilon_t h^{1/2}$$

$$h_t = \alpha_0 + \alpha(u_{t-1} - \kappa_1)^2 + \kappa_2 \tau(u_{t-1} - \kappa_1)^2 \beta_1 h_{t-1}$$

$\tau_t = 1$ if $u_{t-1} < \kappa_1$ and zero otherwise.

[7] Driesprong, Gerben, Jacobsen, Benn and Benjamin Maat. 2004. Stock Markets and Oil Prices. Rotterdam School of Management, Erasmus University Rotterdam.

[8] Agren, Martin. 2006. Does Oil Price Uncertainty Transmit to Stock Market ? Working Paper 23, Uppsala University

Where α β κ μ τ and η are parameters. R_{t-1} is the lag returns, which also use to determine the stock returns in short run. To further precede the model, we first apply Granger causality test among main variables then we use GARCH (1,1) model. The general specification of equation 1 is an autorregressive distributed lag model, which allows a number of special features. First: student-t distributed errors (Bollerslev, 1987) are assumed that it can provide a better approximation to residual that are not normally distributed. Second, the variance enters the mean equation.

Data

The data on stock price and trading volume are collected from daily "Business Recorder". The return is calculated from difference between log of two successive KSE-100 indexes. The data on information is collected on daily basis from the headlines of front-page news of daily "Business Recorder". The Business Recorder is business and economic oriented newspaper. The data on oil prices and gas prices are taken form various issues of economic survey. The length of data period is January 01, 1995 to December.31, 2005.

This sample period is interesting in that diverse kinds of information were generated during this period. Three major events that took place during this period had implications for the stock market. First, the nuclear tests of May 28, 1998 by Pakistan; It created deep effect on the financial sector in two ways: (i) the imposition of economic sanctions by foreign countries, (ii) internal handling of affairs by declaration of emergency under article 232 and freezing of foreign currency accounts. Second, the controversy between IPP's (Independent Power Producers) and Government of Pakistan regarding the HUBCO project peaked during this time. The contribution of HUBCO in the total trading volume of KSE is large so is its importance in KSE-100 index. Therefore any factor that affects HUBCO can significantly affect the aggregate activity in stock market. Consequently, any news regarding HUBCO affects the activity of stock exchange. Third, Two political governments have been dissolved which creates uncertainty in the country. Fourth, Military regime came into Power. This resulted in uncertainty in domestic business environment accompanied by further economic sanctions by foreign governments. Furthermore, efforts to increase the tax base of the country by the government but which were opposed by the business also affected the stock market. Fifth, 9/11 event which creates uncertainty in the country.

Empirical Findings

Table 1 shows the descriptive statistic of daily data for returns, volume, oil and Gas. It indicates that the frequency distribution of the return series of returns, volume, oil and Gas are not normal. For normally distributed return series the skewness coefficient is zero and Kurtosis is 3. In a Guassian distribution, it would expect that the kurtosis coefficient would be 3. Kurtosis generally either much higher or lower indicates extreme leptokurtic or extreme platykurtic (Parkinson, 1987). In this study evidence of the coefficient of Kurtosis for return, volume and oil prices are 15.993, 3.279 and 84.645 respectively. The coefficients of Kurtosis are less than 3 in news, and gas prices, which indicates that the series is slim and has long tail. Joruque Berra (JB) test shows more

clearly about the normal distribution of series. If it is zero it indicates that series are normally distributed. All series show positive and higher value of Joruque Berra (JB). Generally, values for skewness zero and kurtosis value 3 and JB zero represent that observed distribution is perfectly normally distributed. So skewness and leptokurtic frequency distribution of series indicate that the distribution is not normal. In other words, the non-normal frequency distributions of the series deviate from the prior condition of random walk model. Table 2 shows the Granger Causality test. It indicates that only volume granger cause the return. Volume is used as proxy of GDP; it implies that if GDP increases the return is also increases. In other words stock market activity based on performance of the economy.

Table 3 shows the regression between stock returns and independent variables. Negative and significant result is found between stock returns and its one year lag which indicates that the market is thin and with wide fluctuation in price about intrinsic value. It implies that the return series of KSE-100 index do not follow random walk. Positive and significant relation is found in case of volume and stock returns, which indicates that stock market activity depends of growth of the economy. The relation between news and stock return is positive and insignificant. We have taken Business Recorder as sources of news. This newspaper is circulated among few selected groups. Moreover, this news paper is more business and economic oriented news papers as compare to political news. Stock market also affected by political news. Due to this two reasons the variable news is not significantly related to stock returns. There is no impact of oil prices on stock returns. There are two impacts i.e. oil and gas is used as substitute goods. It implies that the consumption of gas increases as compare to oil in Pakistan (Economic Survey 2006-05). During the study period the Pakistani people came in Pakistan due to 9/11 events with their capital. They invest in stock market, bullion market and real estate market. These two reasons there is no impact of oil prices on stock market activity. However, the Gas has negative and significant impact of stock returns. The reason is the increase in consumption of gas in Pakistan. There is no incidence found about calendar anomalies i.e. day of the week effect.

Table 4 shows GARCH effect of Karachi stock market. The significance of ARCH effect is relatively large but less than one. It indicates that unconditional variance of excess holding yields do not indicated a fat tailed distribution in return during study period. The sum of the ARCH and GARCH is near about equal to one, which shows the high degree of persistence in conditional variance in returns. The coefficient of GARCH is 0.534, which is highly significant. It indicates that the effect of non-synchronous trading in KSE index.

Concluding Remarks

This study investigates the relationship between oil price and stock market. The daily data during March 1998 to December 2005 are used to determine the relationship between oil prices and stock returns. The empirical results indicate that no significant effect of oil prices is found on stock returns. The reasons are more use of gas and increase the liquidity in Pakistan. However, we found the positive significant relation of stock prices and volume and gas prices. This study also found no relation between news and stock returns and no day of the week effect.

Table 1
Descriptive statistics

	RETURN	VOLUME	News	OIL	GAS
Mean	0.002009	19.43103	-0.003315	3.599121	5.316246
Median	0.002629	19.46427	0.008694	3.608212	5.266930
Maximum	0.158193	20.83882	0.589647	7.804659	5.458180
Minimum	-0.108561	16.45956	-0.636607	3.199489	5.231002
Std. Dev.	0.016298	0.588831	0.188878	0.258810	0.077497
Skewness	0.325018	-0.355161	-0.132880	5.083105	0.796704
Kurtosis	15.99343	3.279370	2.782269	84.64500	2.125711
Jarque-Bera	5902.656	20.31831	4.116480	236077.8	115.2037
Probability	0.000000	0.000039	0.127678	0.000000	0.000000
Observ	837	837	837	837	837

Table 2

Granger Causality Tests

Null Hypothesis:	Obs	F-Statistic	Probability
Volume does not Granger Cause Return	837	7.74096	0.00047
RETURN does not Granger Cause Volume		2.99579	0.05054
News does not Granger Cause Return	837	0.81820	0.44158
RETURN does not Granger Cause News		0.59396	0.55237
OIL does not Granger Cause RETURN	835	0.57845	0.56099
RETURN does not Granger Cause OIL		0.11119	0.89478
GAS does not Granger Cause RETURN	835	0.29725	0.74294
RETURN does not Granger Cause GAS		0.24699	0.78121
News does not Granger Cause Volume	837	0.01133	0.98873
VOLUME does not Granger Cause News		0.20559	0.81421
OIL does not Granger Cause VOLUME	835	0.02300	0.97726
VOLUME does not Granger Cause OIL		1.02413	0.35956
GAS does not Granger Cause Volume	835	0.63317	0.53116
Volume does not Granger Cause GAS		0.51051	0.60038

Table 3
Regression Analysis

	Coefficient	Standard Error	T-values	p-values
RETURN(-1)	-0.068931	0.034591	-1.992760	0.0466
LOG(VOLUME)	0.006003	0.000902	6.656677	0.0000
BUSINESSREC	0.000265	0.002997	0.088585	0.9294
LOG(OIL)	9.65E-05	0.002502	0.038574	0.9692
LOG(GAS)	-0.023511	0.004142	-5.676591	0.0000
MONDAY	0.012195	0.007192	1.695603	0.0903
TUESDAY	0.010763	0.007186	1.497843	0.1346
WEDNESDAY	0.010380	0.007185	1.444695	0.1489
THURSDAY	0.008006	0.007188	1.113908	0.2656
FRIDAY	0.009604	0.007186	1.336443	0.1818
Adjusted R^2	0.048228			
D-Wt	1.986507			
F-statistic	5.68429			
Normality	4663			
ARCH	181.50			
Hetroscedasticity	15.27			
Ramesy Reset	3.704628			

Table 4
GARCH Model

	Coefficient	Standard Error	T-values	p-values
RETURN(-1)	-0.054194	0.044337	-1.222329	0.2216
LOG(VOLUME)	0.004046	0.000586	6.906388	0.0000
BUSINESSREC	0.001925	0.001883	1.022108	0.3067
LOG(OIL)	0.001098	0.001409	0.779263	0.4358
LOG(GAS)	-0.016635	0.003344	-4.974210	0.0000
MONDAY	0.008605	0.012912	0.666374	0.5052
TUESDAY	0.007769	0.012912	0.601704	0.5474
WEDNESDAY	0.009791	0.012922	0.757714	0.4486
THURSDAY	0.008296	0.012890	0.643561	0.5199
FRIDAY	0.008322	0.012923	0.643968	0.5196
ARCH(1)	0.454419	0.054092	8.400908	0.0000
GARCH(1)	0.532432	0.039869	13.35446	0.0000
R^2	0.000047			
F-Statisticas	0.039117			
Normality test	2430			
ARCH	0.039117			