



An Empirical Analysis of the Price-Volume Relationship in Kuwait Stock Exchange

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Abstract:

This paper is an attempt to study the Price-Volume Relationship in Kuwait Stock Exchange, during the period from 2002 to 2005 using daily aggregate data for the seven sectors in the market.

Granger causality test is employed to investigate this relationship. Since this test requires stationary variables, stationarity test was performed on the data, and the results indicate that price index series are first difference stationary, while volume series are stationary in there level. Accordingly, price indices are used in their first difference, while volume series are used in their levels when applying causality test.

Although the results indicate that in general causality runs from price to volume, sub-period analysis shows mixed results from no causality to bidirectional causality, especially on sector-wise analysis. These results reflect the typical features of an emerging stock market in which speculation, and rumors are the dominant factors affecting trading.

1. Introduction:

The relation between stock prices (returns) and volume has been receiving an increasing attention at both theoretical and empirical level. This attention is based on the fact that this relation reflects market characteristics, especially the nature of information dissemination among traders and how they react to it, which ultimately reflects market efficiency. The argument here is that if markets are efficient and absorb the new information quickly, the past volume can not predict current prices, but past prices can predict current volume as

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investors take feedback from past price trend in forming their expectations, otherwise, the market is considered inefficient.

Now, due to differences in the institutional structures between developed and less developed countries, market efficiency will differ between the two groups and consequently the nature of causality between the two variables. Therefore, the current study explores the relationship between stock prices and trading volume in the Kuwait Stock Exchange (KSE) as an example of an emerging market.

The study is organised as follows: the next section is a brief review of related literature; the third section surveyed previous studies on Kuwait and other Gulf Council Cooperative (GCC) countries. The fourth section presents the data used and study methodology. The empirical analysis is offered in section five. The paper ends with a conclusion.

2. Related Literature:

In theory, stock price do react to new information, now, if trading volume is also affected by such new information, then there is a common factor affecting the behaviour of those two variables and make them move together. Accordingly, theoretical and empirical analysis has been focusing on the nature of information flow and its impact on the price-volume relation of traded stocks. In the literature there are two major hypotheses explaining the relationship between stock prices and trading volume.

The first is the "sequential information arrival hypothesis" that is proposed by Copeland (1976) and developed by others (Morse, 1981; Jennings et al., 1981; Jennings and Barry, 1983). This hypothesis implies a positive causal relation between stock prices and trading volume in either direction. The argument here is that once new information is released to the market, it reached investors one at time producing a sequence of temporary equilibrium between stock price and volume combinations before information equilibrium is attained. The sequential arrival of new information to the market generates both

trading volume and price movements. As a result, the lagged of trading volume could have promoted stock returns and the lagged of stock returns could have promoted trading volume. However, previous literature provided evidence that trading volume is likely to be less when traders react pessimistically than when traders react optimistically (Copeland, 1976 and Jennings et al., 1981). It appeared that this model has implications for market efficiency since intertemporal causality from volume to price changes implies informational inefficiency and leads to abnormal returns.

The second hypothesis examined of the relationship between trading volume and stock returns is the "mixture of distribution hypothesis", which is proposed by Clark (1973) and developed by others such as (Epps and Epps, 1976; Tauchen and Pitts, 1983 and Harris, 1986). This hypothesis considers information flow as a latent variable that affects trading volume. It starts from an initial equilibrium position and assumes that the variance per transaction is related to trading volume, which is used as a proxy to measure disagreement among traders to revise their reservation prices. In this condition, the volume of trade will rise with a change in demand and hence prices. Consequently, price changes are accumulated from a mixture of distributions with either the transaction's volume or information arrivals. Therefore, causality runs from price to volume or from volume to price if disagreement among traders arises as they revise their reservation price with the new information.

An additional explanation for the causality relationship between trading volume and stock prices refers to noise traders model (Kelly, 1997). According to this model, price change causes change in volume due to the positive feedback trading strategy of this type of traders who base their trading on past price movements (DeLong *et al.*, 1990).

According to the previous discussion, a positive contemporaneous relation between stock price and volume is expected as both react to a common event represented by the flow of new information. However, the causality between the two variables can go either way depending on the nature of information flow and traders' strategies.

3. Previous Studies:

There is a large body of empirical studies examining the causality between stock prices and trading volume in developed markets (Chan and Tse, 1993; Hiemstra and Jones, 1994; Chordia and Swaminathan, 2000; Lee and Rui, 2002 and Olibe and Cready, 2003). These studies provided evidence that there is a dynamic relationship between stock price and trading volume. However, the evidence provided on the relationship between stock price and trading volume is inconclusive. While Granger and Morgenstern (1963) reported no relation between price changes and volume trading, Smirlock and Starks (1988) and Chan and Tse (1993) reached a positive correlation between price and volume but not vice versa. Chen, *et al.*, (2001) found trading volume contributes some information to the returns process. Hiemstra and Jones (1994) found evidence for bi-directional causality between the price changes and trading volume in the U.S. stock market.

Studies on emerging markets of East Asia, Latin America, and Europe indicate that causality runs from volume to price except for more developed market in Turkey and Russia (Gunduz and Hatemi, 2003; Antoniou *et al.*, 1997).

Concerning GCC markets, little work has been conducted. There are two main works have been published recently. The first one was conducted on financial sector listed on Saudi Arabia Stock Market (Diabi and Al-Zamil, 2001) and the second one was conducted on banking sector listed on KSE (Assaf, 2003).

Diabi and Al-Zamil examined the relationship between stock price and trading volume by using both cointegration analysis and the Granger causality methodology to test the return-volume link. They employed weekly data for eleven securities from financial sector covering the period from 1990-1994. They found that information conveyed by volume couldn't help predict returns in the financial sector, and thus concluded that information efficiency is not yet evident in the Saudi financial sector due to the thinness of the Saudi market.

The second study by Assaf (2003) investigated the relationship between the trading volume and stock price in banking sector on the KSE. The study provided evidence that price changes lead volume in banking sector, but he provided no evidence that volume leads price changes. Assaf concluded that differences in institutions and information flows in the KSE are not sufficient enough to affect the valuation process in order to present similar findings to those taking place in developed markets.

4. Data and Study Methodology:

The study attempted to obtain the available most recent data to make the study outcome of greater relevance for the future. Therefore, the sample covers the period from January 2002 to December 2005 using daily data on volume and price index for the overall market and the seven subsectors. Granger causality test will be used to investigate the price - volume relation.

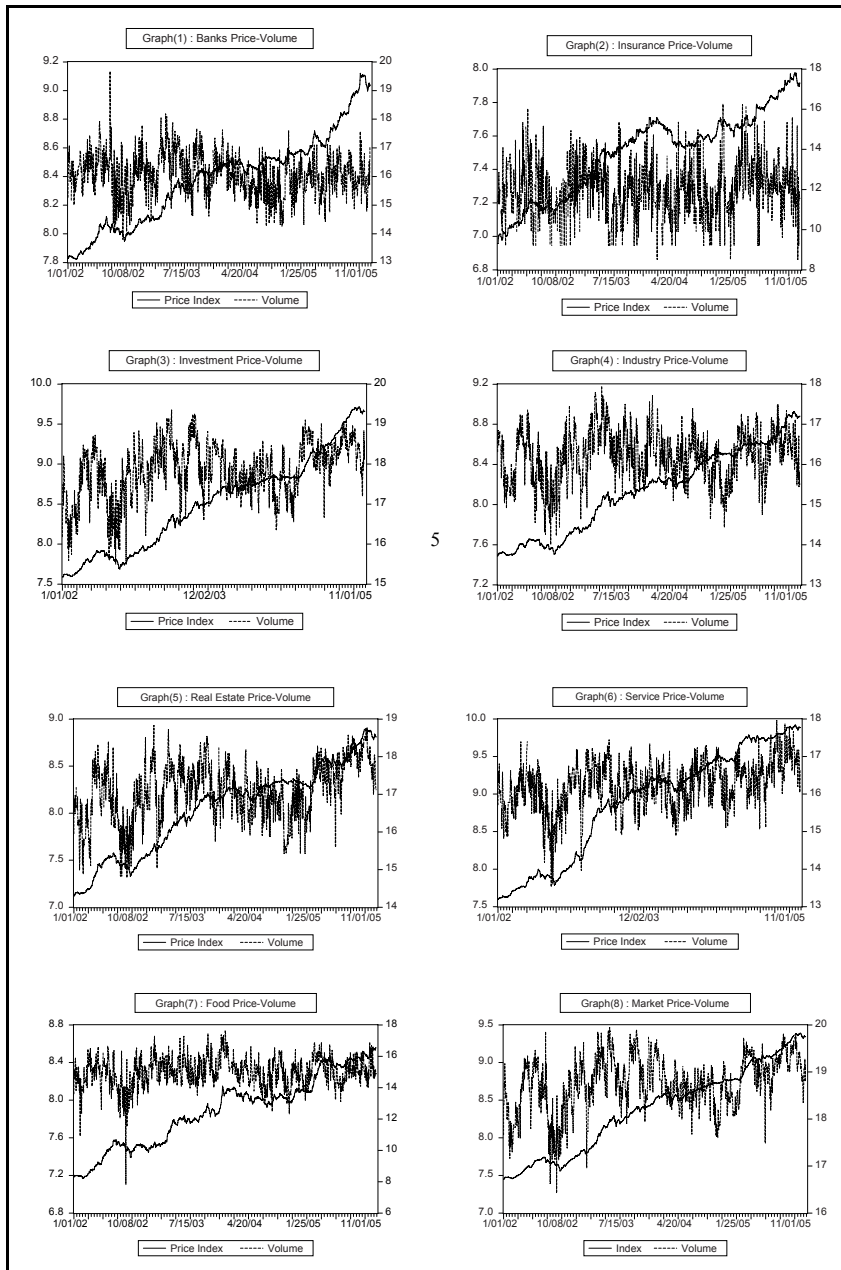
5. Empirical Analysis:

Before proceeding into our empirical investigation, a brief overview of the KSE is worth the while. During the study period KSE has witnessed a noticeable increase in both prices and trade volume, as table (1) shows, where volume increased by 87%, while Price Index increased by 375 %.

Table (1)
Main Indicators of KSE (in million except index)

Year	Volume	Value	# of Trades	Price Index
2002	27.8	6.6	0.52	2375
2003	49.5	16.2	1.08	4790
2004	33.5	15.2	1.05	6410
2005	52.2	28.4	1.95	11445

The data show that volume has been fluctuating, while price index has been increasing. The graphs below show in details the trend of both variables at aggregate and at sectoral level.



5.1. Stationarity Test:

To apply Granger causality test the variables must be used in their stationary form, accordingly all the variables in this study are tested for stationarity using both Dickey- Fuller and Philips-Perron tests.

Table (2)
Stationarity Test Results

Sector	Price Index				Volume	
	ADF		PP		ADF	PP
	Level	1 st D	Level	1 st D	Level	Level
Banks	0.01	-13.8*	0.02	-30.4*	-7.6*	-17.8*
Insurance	-1.1	-16.1*	-1.4	-34.5*	-7.6*	-21.9*
Investment	0.6	-13.5*	0.6	-27.1*	-5.1*	-9.3*
Industry	0.2	-13.7*	0.04	-27.6*	-6.6*	-12.6*
Real Estate	-1.06	-13.5*	-1.1	-27.2*	-5.1*	-9.6*
Services	-1.1	-12.5*	-1.3	-25.3*	-5.8*	-12*
Food	-0.7	-13.1*	-0.7	-31.5*	-7.3*	-15.2*
Market	-0.04	-12.9*	-0.1	-26.3*	-4.8*	-7.9*

* Significant at 1%

The results of stationarity tests indicate that all indices are non-stationary in their level, but become stationary when transformed into first difference, while volume is stationary. Accordingly, indices will be used in their first difference form while volume will be used in level form. These results indicate the absence of long run equilibrium relationship between volume and price in the KSE.

5.2. Partial Correlation:

Before proceeding with causality test, partial correlation is examined. The results, as shown in table (3), indicate a positive correlation between price indices and volume, a result that has been found in empirical studies on many stock markets worldwide. This result supports the famous adage that volume is heavier in bull market than it in bear market.

Table (3)
Correlation Results

Banks	Insurance	Investment	Industry	Real-Estate	Services	Food	Market
0.3	0.14	0.31	0.25	0.29	0.24	0.28	0.29

5.3. Causality Test:

To test the nature of causality between stock prices and volume, Granger causality test runs on the following equations:

$$P_t = C_1 + \sum_{i=1}^n \alpha_{1i} P_{t-i} + \sum_{i=1}^n \beta_{1i} V_{t-i} + e_1 \quad (1)$$

$$V_t = C_2 + \sum_{i=1}^n \alpha_{2i} P_{t-i} + \sum_{i=1}^n \beta_{2i} V_{t-i} + e_2 \quad (2)$$

Where variables are used in their stationary form, and the appropriate lag length is decided according to Akaike Criteria.

Table (4)
Causality Test Results for the whole period

Sector	Banks	Insurance	Investment	Industry	Real-Estate	Services	Food	Market
Lags	4	4	4	4	4	4	4	4
V → P	2.07	0.3	1.07	2.7**	2.8**	0.5	1.4	0.8
P → V	2.3**	0.5	6.2*	4.7*	9.2*	2.3**	8.5*	7.02*

Table (5)
Causality Test Results for 2002

Sector	Banks	Insurance	Investment	Industry	Real-Estate	Services	Food	Market
Lags	6	2	6	2	2	2	2	4
V → P	2.9*	1.1	1.8	0.3	1.5	2.2	0.6	2.8**
P → V	0.9	1.6	1.6	5.2*	2.1	0.3	1.4	0.1

Table (6)
Causality Test Results for 2003

Sector	Banks	Insurance	Investment	Industry	Real-Estate	Services	Food	Market
Lags	2	6	2	2	4	4	4	4
$V \rightarrow P$	0.03	0.1	0.1	0.1	1.7	1.7	1.8	2.1
$P \rightarrow V$	0.7	0.9	2.1	0.6	1.8	2.8**	1.3	1.2

Table (7)
Causality Test Results for 2004

Sector	Banks	Insurance	Investment	Industry	Real-Estate	Services	Food	Market
Lags	4	2	2	4	4	4	4	2
$V \rightarrow P$	0.5	0.8	0.4	0.9	4.3*	0.9	0.7	3.2**
$P \rightarrow V$	2.6**	1.9	3.6**	0.4	4.6*	1.2	6.1*	7.4*

Table (8)
Causality Test Results for 2005

Sector	Banks	Insurance	Investment	Industry	Real-Estate	Services	Food	Market
Lags	4	4	4	4	4	2	2	4
$V \rightarrow P$	1.07	0.09	7.4*	0.1	1.6	0.1	1.8	0.4
$P \rightarrow V$	5.02*	3.01**	0.3	5.4*	4.2*	3.4**	3.06**	5.02*

* Significant at 1%, ** significant at 5%.

The causality results, presented in the previous tables, indicate that the results varies across sectors and time. For the whole period, two cases have bi-directional causality (Industry and Real Estate), while for the rest the causality runs from price to volume except for Insurance, where causality doesn't exist. For single period, the results vary considerably as the causality relation changes from almost non-

existence to unidirectional. During 2002, causality runs from volume to price for the market as a whole and for the banking sector, while industry causality runs from price to volume, and causality is absent for the rest of the sectors. For the year 2003, the results indicate the absence of causality market wise, while only one causality exists for sectoral results that run from price to volume for the service sector. During the year 2004, the market wise result shows bi-directional causality, while the sector wise results indicate one bi-directional causality for the Real Estate sector, and unidirectional causality running from price to volume for the banking, investment, and food sectors. Finally, the results for 2005 show that causality runs from price to volume for the market as a whole and all sectors except for investment where causality runs from volume to price.

These results reflect the characteristics of the KSE as an example for an emerging market that experiencing changing conditions and forces affecting the behaviour of Price-Volume relationship.

6. Conclusion:

This paper examines the causality between stock prices and volume in KSE during the period from 2002 to 2005 using both market wise and sector wise analysis. The result indicates that the causality varies across time and sectors during the period of study, an observation that might indicate changing environment and information dissemination. The overall conclusion is that KSE exhibits a weak form of efficiency with periods of information inefficiency. These results reflect the nature of a developing stock market in which information may be contaminated with rumors and speculations.

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