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The relationships between stock market capitalization rate and interest rate: Evidence from Jordan

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The paper examines the effect of interest rates on the stock market capitalization rate in Amman Stock Exchange (ASE) over the period 1999-2008. Based on the multiple linear regression model and simple regression model, the time series analysis revealed that there is significant and positive relationship between government prevailing interest rate (R) and stock market capitalization rate (S). The study shows that Government development stock rate (D) exerts negative influence on stock market capitalization rate (S), also it finds a significant and negative relationship between government prevailing interest rate (R) and Government development stock rate (D). Finally, this study suggests the importance of government intervention to encourage investment in ASE by reducing rate of personal taxation thus, granting incentive for creation of wealth, controlling interest rate so as to aid the growth of the stock market and improving the regulatory environment and decreasing red tape.

JEL Classifications: E44

Keywords: Stock market capitalization rate, prevailing interest rate, Government development stock rate.

Introduction

Most studies suggest that the macroeconomic environment has an important effect on the stock market capitalization rate such as gross domestic product, exchange rates, interest rates, current account and money supply (Kurihara, 2006; Ologunde et al., 2006). Maintaining macroeconomic stability has been of the main challenges for developing countries (Iqbal, 2001). The relationships between stock market capitalization rate and interest rate have preoccupied the minds of economists since they both play important roles in influencing a country's economic development (Aydemir and Demirhan, 2009).

In this study, we examined the impact of interest rates on the stock market capitalization rate in ASE over the period of (1990-2008). The main purpose of this study was to examine the relationships between stock market capitalization rate and prevailing interest rate (loans and advances) in Amman Stock Exchange (ASE) over this period.

The trading volumes of shares in the secondary market in Jordan reached JD 20 938 million in 2008. The value of stocks traded through the trading system (the first and second markets) made 97% of the total trading value at the secondary market. The weighted market value of traded bonds in ASE during the period reached JD 6 million. The weighted market value of development bonds in total volume of bonds traded during the period made JD 0.8 million (20.6%), while the market value of traded corporate bonds mounted JD 3.3 million (79.4%). Table 1 shows share of each sector in market capitalization of the whole market. As it is seen from the table, market capitalization of banking sector is about half of the market capitalization of whole sector. Table 2 demonstrates how the price index weighted by market capitalization dropped in 2008 due to influence of global financial crisis. The price index weighted by market capitalization dropped to 6243 points or 17.0%, the un-weighted price index dropped to 1236 points (31.3%).

TABLE 1. MARKET CAPITALIZATION OF LISTED COMPANIES IN DIFFERENT SECTORS

Year	Market capitalization as a proportion of capitalization of total market (%)				
	Banking	Insurance	Services	Industrial	All sectors
1999	40	3	7	50	100
2000	41	2	6	51	100
2001	43	2	7	48	100
2002	48	2	9	41	100
2003	50	2	10	38	100
2004	52	2	10	36	100
2005	68	2	7	23	100
2006	57	2	11	30	100
2007	53	3	16	24	100
2008	65	3	14	27	100
Mean	51.7	2.3	9.7	36.3	100

Source: Annual Reports for Amman Stock Exchange for the years 1999-2008.

TABLE 2. PRICE INDEX WEIGHTED BY MARKET CAPITALIZATION OF EACH SECTOR (1999 = 100)

Year	Price index weighted of each sector				
	Banking	Insurance	Services	Industrial	Weighted for all sectors
2000	198.7	119.7	99.8	75.2	133.1
2002	255.7	106.1	106.1	101.6	170
2004	723.1	187.4	187.4	252.7	424.6
2006	1070.5	228.7	228.7	250.8	551.8
2007	1388.7	274	274	456.6	751.9
2008	1138	382.1	186.6	456	624.3
Mean	743.44	199.11	100.02	163.87	507.65

Source: Annual Reports for Amman Stock Exchange for the period 1999-2008.

The general objective of this study is to present an overview of the relationships between stock market capitalization rate and interest rate. The specific objectives of this study are:

- to identify the type of relationship between stock market capitalization rate and government development stock rate;
- to examine the relationship between government development stock rate and interest rate.

Theoretical framework and literature review

We can distinguish many types of interest rates in Jordan financial market. However, in this study we shall concentrate on prevailing interest rate (loans and advances) and government development stock rate (discounted bills and bonds).

Many studies examined the empirical relationships between stock market capitalization rate and interest rates. Mahmudul and Gazi (2009) in their study (based on the monthly data from January 1988 to March 2003) found that interest rate exerts significant negative relationship with share price for markets of Australia, Bangladesh, Canada, Chile, Colombia, Germany, Italy, Jamaica, Japan, Malaysia, Mexico, Philippine, South Africa, Spain, and Venezuela. For six countries from this sample, they argued on the availability of significant negative relationship between changes of interest rate and changes of share price. Researchers suggest "... if the interest rate is considerably controlled in these countries, it will be the great benefit for their Stock Exchange through demand pull way

of more investor in share market, and supply push way of more extensional investment of companies” (Ibid., p.47).

Aydemir and Demirhan (2009) studied the causal relationship between stock prices and exchange rates, using data from 23 February 2001 to 11 January 2008 for Turkey. Their empirical research found the bidirectional causal relationship between exchange rate and all stock market indices. While the negative causality exists from national 100 service, financial and industrial indices to exchange rate, there exists a positive causal relationship from technology sector indices to exchange rate. On the other hand, negative causal relationship from exchange rate to all stock market indices is determined.

Ologunde et al (2006) examined the relationships between stock market capitalization rate and interest rate in Nigeria. They used the ordinary least-square (OLS) regression method and they found that the prevailing interest rate exerts positive influence on stock market capitalization rate. Also, they are finding that Government development stock rate exerts negative influence on stock market capitalization rate and prevailing interest rate exerts negative influence on government development stock rate.

Kurihara (2006) suggests that stock market capitalization rate is significantly influenced by the macroeconomic environment factors such as gross domestic product, exchange rates, interest rates, current account and money supply.

Doong et al (2005) investigated the dynamic relationship between stocks and exchange rates for six Asian countries (Indonesia, Malaysia, Philippines, South Korea, Thailand, and Taiwan) over the period 1989-2003. According to their study, these financial variables are not cointegrated. The result of Granger causality test shows that bidirectional causality can be detected in Indonesia, Korea, Malaysia, and Thailand. Also, there is a significantly negative relation between the stock returns and the contemporaneous change in the exchange rates for all countries except Thailand.

Hsing (2004) adopted a structural VAR model that allows for the simultaneous determination of several endogenous variables such as, output, real interest rate, exchange rate, the stock market index and found that there is an inverse relationship between stock prices and interest rate.

Arango (2002) found that some evidence of the nonlinear and inverse relationship between the share prices on the Bogota stock market and the interest rate measured as the interbank loan interest rate, which is to some extent affected by monetary policy. The model captures the stylized fact on this market of high dependence of returns in short periods. These findings do not support any efficiency on the main stock market in Colombia.

Zhou (1996) also studied the relationship between interest rates and stock prices using regression analysis. He found that interest rates have an important impact on stock returns, especially in long-term investment horizons, but the hypothesis that expected stock returns move one-for-one with *ex ante* interest rates is rejected. In addition, his results showed that long-term interest rate explains a major part of the variation in price-dividend ratios. Besides, he suggests that the high volatility of the stock market is related to the high volatility of long-term bond yields and may be accounted for by changing forecasts of discount rates.

Kaul (1990) studied the relationship according to the “proxy hypothesis” of Fama (1981); he found support that expected inflation is negatively correlated with anticipated real economic activity, which in turn is positively related to returns on the stock market.

Campbell (1987) considered the relationship between the yield spread and stock market returns. He argues that the same variables that used to predict excess returns in the term structure also predict excess stock returns, deducing that a simultaneous analysis of the returns on bills, bonds and stock should be beneficial. His results support the effectiveness of the term structure of interest rates in predicting excess returns on the U.S. stock market.

The methodology

a. Data

This study uses data from different sources including annual reports issued by ASE and Central Bank of Jordan; statistical information derived from the Jordanian Department of Statistics, UNCTAD Handbook of Statistics, and data sources of the World Bank.

b. Models

This study is a correlational descriptive research that attempts to understand the relationship between interest rate and stock capitalization rate as well as between interest rate and government development stock rate.

The study therefore employs a time series analysis to examine the effect of interest rate and other variables such as stock market capitalization rate, government development stock rate. We use the ordinary least-square (OLS) regression method. The linear relationship between the dependent and the independent variables is determined. Multiple Linear Regression Model and Simple Regression Model are used for the regression analysis and inferences are drawn based on the regression analysis.

In order to estimate the stock market capitalization rate (S) and government development stock rate (D) the following basic linear models of (S) and (D) are specified:

$$\text{Model (1):} \quad S = a_0 + a_1 R + a_2 D + e_t \quad (1)$$

$$\text{Model (2):} \quad S = b_0 + b_1 R \quad (2)$$

$$\text{Model (3):} \quad D = c_0 + c_1 R \quad (3)$$

Where: S = stock market capitalization rate, R = prevailing interest rate, D = government development stock rate (D), e_t is the error term, a , b and c = constant

c. Variables measurement

Stock market capitalization rate(S)

It is measured by the total value of a companies' outstanding shares. To find the market cap of a company one needs to multiply the market price of the stock by the number of shares outstanding.

The measurement of stock market's price can be done using the "price/earnings ratio" or P/E ratio. As an example, if a company's stock is trading at 40 USD per share and its earnings per share (EPS) is forecast at 2.50 USD, the P/E ratio is 16. Since the cap rate is defined as reciprocal of the P/E ratio, it equals $1/16$ or 0.0625 (6.25%). According to Rose and Marquis (2008) we define the stock market price by the following equation:

$$P_0 = \sum_{t=0}^{\infty} \frac{E(D_t)}{(1+r)^t}$$

Where: P_0 = the present value of stock market price, $E(D_t)$ = the expected cash flows, R = required rate of return, t = time series.

Government development stock rate (D)

In our study as proxy for the government development stock rate (*D*) we used the yield to maturity (*YTM*) of bond. To derive *YTM* of bond we used the equation (Rose and Marquis, 2008):

$$\text{Market Price} = \sum_{t=1}^n \frac{(CF_t)}{(1 + YTM)^t}$$

Where: *Market price* = the present value of stock market price for government development, *Cft* = cash flows, *YTM* = yield to maturity (required rate of return *t* = time series

The weighted market value of development bonds traded during the period 1990-2008 mounted to JD 0.8 million of 20.6% of the total trading value of bonds (JD 6 million), while the market value of traded corporate bonds made JD 3.3 million (79.4%).

Government prevailing interest rate (R)

An interest rate is the cost of borrowing money. We measure the annual rate of interest on loan able funds according to Rose and Marquis (2008): Annual rate of interest on loan able funds = Fee required by the lender for the borrower to obtain credit \ Amount of credit made available to the borrower * 100.

Table 3 summarizes the descriptive statistics for the variables. It appears that mean of stock market capitalization rate (*S*) and standard deviation are 21.180 and 10.4997 correspondingly over the period 1990-2008. The mean of government development stock rate (*D*) and government prevailing interest rate (*R*) are 4.850 and 7.802 respectively; the standard deviation for government development stock rate (*D*) and government prevailing interest rate (*R*) are 0.9294 and 1.2700 respectively. We believe that ratios are acceptable when we compare with other ratios in similar countries like Nigeria where the mean of stock market capitalization rate is 22.12%, government development stock rate is 2.24% and the government prevailing interest rate is 7.8% (Ologunde et al., 2006; UNCTAD, 2003; 2008 and 2009).

TABLE 3. SUMMARIZES THE DESCRIPTIVE STATISTICS FOR THE VARIABLES (1990 - 2008)

Variable	Mean	Standard Deviation
stock market capitalization rate(S)	21.180	10.4997
government development stock rate (D)	4.850	.9294
government prevailing interest rate (R)	7.802	1.2700

Table 4 outlines the correlation coefficients between dependent variable represented by stock market capitalization rate (*S*) and independent variables which include government development stock rate (*D*) and government prevailing interest rate (*R*). The main object is measuring the strength or degree of linear relationship between these variables. In general, most variables have high pairwise correlation coefficients, indicating that the multicollinearity problem might not appear among the variables.

TABLE 4. CORRELATION COEFFICIENTS

	S	R	D
S	1.000	.774	-.813
R	.774	1.000	-.689
D	-.813	-.689	1.000

This table shows that there is a positive correlation between stock market capitalization rate and prevailing interest rate and a negative correlation between stock market

capitalization rate and government development stock rate. These results are similar to those results that are obtained by (Mahmudul and Gazi, 2009; Doong et al., 2005).

d. The hypotheses of study

Based on the above discussion we can state the hypotheses as follows:

H1: There is a negative relationship between stock market capitalization rate and prevailing interest rate.

H2: There is a negative relationship between stock market capitalization rate and government development stock rate.

H3: There is a negative relationship between government development stock rate and prevailing interest rate.

To test the above hypotheses we need to estimate regression models based on the theoretical models 1-3.

Results and discussion

Table 5 shows the results of regression analysis of government prevailing interest rate (R) and government development stock rate (D) on stock market capitalization rate (S):

TABLE 5. REGRESSION RESULTS ON STOCK MARKET CAPITALIZATION RATE (S)

Variable	Sig. *	t-statistic	St. coefficient beta
Constant	0.003	.433	-
D	0.045	-1.176	-.376
R	0.016	1.432	.663

Note: * Significant at the 0.05 level; Adjusted R² = 0.505; Sig. F change = 0.035; DW = 1.364.

TABLE 6. REGRESSION COEFFICIENTS: PREVAILING INTEREST RATE (R) ON STOCK MARKET CAPITALIZATION RATE (S)

Variable	Sig. *	t-statistic	St. coefficient beta
Constant	.007	.631	-
R	.019	3.031	.548

Note: * Significant at the 0.05 level; Adjusted R² = 0.463; Sig. F change = .005; DW = 1.493.

TABLE 7. REGRESSION COEFFICIENTS: PREVAILING INTEREST RATE (R) ON GOVERNMENT DEVELOPMENT STOCK RATE (D)

Variable	Sig. *	t-statistic	St. coefficient beta
Constant	.007	0.953	-
R	.029	-0.391	-.372

Note: * Significant at the 0.05 level; Adjusted R² = 0.323; Sig. F change = .005; DW = 1.293.

The results from Table 5 show a significant and positive relationship (0.663) between government prevailing interest rate and stock market capitalization rate. Also, it shows that government development stock rate exerts negative influence (-0.376) on stock market capitalization rate. Based on the regression results we reject (H1) claiming a negative relationship between stock market capitalization rate and prevailing interest rate. In addition, we accept (H2) asserting a negative relationship between stock market capitalization rate and government development stock rate. The results from Table 6 show a significant and positive relationship (0.548) between government prevailing interest rate and stock market capitalization rate. This outcome is similar to the one obtained by (Ologunde, et al., 2006; Zhou, 1996; Aydemir et al., 2009). Based on the above discussion we reject (H1) arguing for a negative relationship between S rate and R. The results from Table 7 show a significant and negative relationship (-0.372) between R

and D . This result is similar to the outcome obtained by Ologunde et al. (2006); Zhou (1996); Aydemir et al. (2009); Mahmudul et al. (2009). Based on the above discussion we accept (H3) stating that there is a negative relationship between R and D .

Summary and conclusion

This study examined the impact of interest rates on the stock market capitalization rate in ASE over the period 1990-2008. It focused on prevailing interest rate (loans and advances) and government development stock rate (discounted bills and bonds). Utilized time series analysis revealed that there is significant and positive relationship between government prevailing interest rate (R) and stock market capitalization rate (S). In addition, it shows that government development stock rate (D) exerts negative influence on stock market capitalization rate (S); it shows also availability of a significant and negative relationship between government prevailing interest rate (R) and government development stock rate (D).

Obtained empirical evidence allows noticing the importance of government intervention to encourage investment in the Amman financial market. Possible policy directions might include encouraging the supply of investment funds through significant reducing the rate of personal taxation and, consequently, granting incentives for creation of wealth; favoring control of interest rate to stimulate the growth of the stock market; improving the regulatory environment and decreasing red tape.

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