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Interest Rate Sensitivity and Stock Returns in the United Arab Emirates

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Abstract. A two-index stock model is developed and tested using data from 24 actively traded shares in the UAE unofficial stock market. The OLS results provided some evidence that commercial banks stock returns are interest rate sensitive.

Introduction

The relationship between stock returns and changes in interest rate has been subject to extensive research, see Fama and Schwert [1], Titman and Warga [2]. The nominal contracting hypothesis, first discussed by Kessel [3], and recently by French, Ruback and Schwart [4] postulates that the interest rate sensitivity of a firm's common stock returns will depend upon the amount of net nominal asset held by the firm. A firm's holdings of nominal assets and nominal liabilities affects its common stock returns through wealth redistribution effects caused by unexpected inflation.[1]

Meanwhile, fluctuations in the term structure of interest rates result primarily from changes in inflationary expectations. A specific relationship, therefore, exists between

[1] Unexpected inflation redistributes wealth from creditors to debtors benefiting stockholders in firms with more nominal liabilities than nominal assets. Hence the equity of firms with positive net nominal assets should decline.

stock returns and changes in interest rate. In fact, fluctuations in interest rates can be assumed to reflect fluctuations in expected inflation. In his seminal paper Stone [5] argued that the omission of systematic interest rate risk from the traditional capital asset pricing model (CAPM) will contribute to the instability, and probably bias the estimate of the market systematic risk. To incorporate the effects of interest rate on the CAPM, he has developed a two-index version, in which stock returns are postulated to be sensitive to interest rate fluctuations. According to Stone, investing in a common stock is a game with two possible outcomes: a fixed risk-free return (a sure thing) represented by interest rate, and a higher-expected return (risky) represented by the market rate of return. Since then researchers have been debating whether investors really take interest rate into consideration when they make their portfolio selections. More explicitly, they have questioned whether the inclusion of interest rate adds any explanatory power to the traditional single-index model.

Using monthly data from 60 commercial banks, Lloyd and Shick [6] found that adding a bond index to the market model only marginally improves the explanatory power of the regression equation. However, when they have added data from 30 companies listed in the Dow Jones Industrial Averages, the bond index has improved the results of the model. They have concluded that the lack of importance of the bond index (for the bank stock) is not surprising since banks' earnings are more sensitive to short-term rather than long-term interest rates. Kane and Undal [7] have found that the sensitivity of interest rate of bank stocks varies significantly with stock duration. More recently, Kwan [8] found that fluctuations in bank stock returns are significantly related to unanticipated changes in interest rates. The findings of these researchers, however, have been inconclusive. While some studies have documented negative relationship between stock returns and interest rate changes, others found a significant positive relationship between the two variables. The fact that the results are mixed and inconclusive can be attributed to the lack of a priori theory to provide explicit guidance in this issue.

The purpose of this paper is to examine the interest-rate sensitivity of common stocks using mixed data from both commercial banks and trading companies. The companies used in the sample depend exclusively on bank loans to finance their investment opportunities, which makes their stock returns vulnerable to interest rate fluctuations. The objective is two fold. First, to test the single-index model in an environment characterized by the absence of an organized capital market. Second, to see whether investors in the United Arab Emirates (UAE) take into consideration market interest rate when dealing with stocks. The rest of the paper is organized as follows. Section II formulates the model, while the data and the methodology are described in Section III. The empirical results are discussed in Section IV, and a conclusion is provided in Section V.

The Model

The traditional Stone [5] two-index model postulates that the holding period return on security j ending in period t can be written as:

$$R_{jt} = \beta_{0j} + \beta_{1j}R_{mt} + \beta_{2j}R_{it} + \upsilon_{jt}$$

where

R_{jt} = return on security j in period t

R_{mt} = return on the market portfolio in period t

R_{it} = fixed return index

β_{0j} is an intercept

β_{1j} and, β_{2j} measure market and nominal interest rate systematic risks respectively (hereafter market and interest rate betas), and υ_{jt} is a random disturbance term, assumed to follow the normal condition. In the above model, the null hypothesis that the interest rate has a significant effect on security returns is tested, since most companies in our sample depend on bank loans (interest-sensitive) to finance their investments.

In the nominal contracting hypothesis framework, a positive value of β_{2j} indicates that the company's nominal value of liabilities is in excess of the nominal value of its assets, a strong implication that the company's market value declines as interest rate increases. A negative value of β_{2j}, on the other hand indicates the excess of nominal assets over nominal liabilities. A significant value of β_{2j} is therefore an indication that stock returns are interest rate sensitive, in other words, investors take interest rate into consideration when buying stocks. However, in the above specification of the model there is a potential causal relationship between R_{it} and R_{mt} since the market return (R_m) may fluctuate due to fluctuations in interest rate and/or unanticipated inflation. Multicollinearity between interest return (R_i) and market return (R_m) will lead to a covariance greater than zero, i.e. $Cov(R_m, R_i) > 0$ which will violate the basic assumptions of OLS. To eliminate the simultaneity between R_{it} and R_{mt}, we orthogonalize R_{it} by constructing a new series of interest rate by running the following regression:[2].

$$R_m = \alpha_0 + \alpha_1 R_i + \upsilon_I \qquad (2)$$

The residuals from Equation (2) are generated using the following equation:

$$R^*_i = R_i - (Cov(R_m, R_i)/\sigma^2_{Rm})R_m \qquad (3)$$

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[2] The orthogonalization has reduced the correlation coefficient between market return and interest return from -0.319 to zero as required by the regression model.

where

Cov)R_m,R_i) is the covariance between interest return and market return

σ^2_{Rm} is the variance of market return.

The series generated in Equation (3) are used as proxies to variations in market interest rates.

The new relation incorporating the newly constructed interest rate index is given by the following equation:

$$R_{jt} = \bar{\beta}_{0j} + \bar{\beta}_{1j}R_{mt} + \bar{\beta}_{2j}R^*_{it} + \varepsilon_{jt} \quad (4)$$

where ε_{jt} is an error term, assumed to be well-behaved, and R^*_{it} are the residual from the auxiliary regression.

Both Equations (1) and (4) were estimated to measure the interest rate sensitivity. The estimated $\hat{\beta}_{2j}$ in Equation (4) is expected to be an unbiased estimator of the effect of interest rate on the return of security j given the market index.

To compare our result with the previous studies, the single-index model of the UAE market will be estimated. The market systematic risk (market beta) is estimated using the following model:

$$R_{jt} = \delta_0 + \delta_1 T_{mt} + \upsilon_t \quad (5)$$

where δ_0 is the intercept, δ_1 is the measure of market risk, and υ_t is the disturbance term.

Data and Methodology

Equations (1), (4) and (5) above are estimated by OLS one company at a time using monthly share prices drawn from the securities market int he United Arab Emirates[3] for the period January 1990 to December 1994. The monthly share prices are gathered from the daily sheet of stock prices published by Abu Dhabi national Bank (ADNB).[4] Although the total number of publicly held companies registered in the Economic and Trade Industry of the United Arab Emirates exceed ninety [9], only the most actively traded shares are used in this study. This left us with 24 firms which have

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[3] It has to be noted that no official stock market exists in the United Arab Emirates. There have been certain attempts to establish an official stock market, however. The latest was in March 1994, when the Council of Ministers formed a committee to study the feasibility of establishing a stock market. The committee has not reached any conclusion yet.

[4] Abu Dhabi National Bank has a department which acts as a stockbroker. It buys and sells shares on behalf of the public but not for its account.

regular and consistent listing of their shares during the period chosen, a total of 60 observations for each company. The market index data published by the (ADNB) for the same period were also used to calculate the return on the market portfolio (R_m). Following Fama [10], monthly rates of return on securities (R_j) were computed using the following equation:

$$R_j = \log P_t - \log P_{t-1} \tag{6}$$

Where p_t is share price at time t and is share price at time p_{t-1}.

Due to unavailability of bonds in the United Arab Emirates, most companies use banks as a source of finance. The need for government bonds has not yet arisen since the government finances its budget primarily from oil revenues.[5]

The interest rate on money market deposits is used to represent the yield on the risk-free security. Banks' deposits are popular investment opportunities among UAE investors since they lack other financial instruments. The only alternative securities are available in financial centers such as New York, London, Japan and other European as well as Asian markets, which are all far from the reach of ordinary investors.

Results

The regression results are reported in Tables 1, 2 and 3. Table 1 contains the results of estimating the single-index market model. In the first column of Table 1, the company name is reported while columns (2), (3) and (4) contain the estimates of the constant and the stock beta (with their respective t-values) and R^2. The estimates of δ_{0j} in Equation 1, represent the monthly rate of return on the share when the market rate of return is zero. Values of δ_{0j} ranged from a minimum of .0001 to a maximum of 0.0157.As indicated by their respective t-values, most of δ_{0j} are not significant at 5 per cent level. Only 2 shares out of the 24 have significant δ_{0j} values at the 5 per cent level. Four other shares have estimates of $\delta 0j$ significant at 10 per cent level. Column 3 of Table 1 contains the beta estimates. They ranged from a minimum of 0.131 to a maximum of 1.28. Out of the 24 stock betas estimated, 19 are significant at 5 per cent level and 18 are significant at 1 per cent level.

Table 2 reports the results of the two index model (Equation 1). Again column (1) lists the names of the companies and columns (2), (3), (4) and (5) report the estimated values of (β_0), stock beta (β_1), interest beta (β_2), with their respective t-values, and R^2 respectively. Table 3 reports the estimates of the orthogonalized two index model (Equation 4). To our surprise, the estimated coefficients in the two versions are only

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[5] The UAE is an OPEC member and the main source of income comes from selling oil. In 1993 its revenue from oil was around 12,500 million US Dollars.

slightly different from each other. The number of stock betas that are significantly different from zero for the two versions of the model do not differ from that of the single

Table 1. Estimates of the single-index model (Numbers in parentheses below parameter estimates are t statistics)

Name	Intercept	Stock beta	R^2
Emirates Telecommunication	0,00001	1.28	0.89
	(0.01)	(21.07)	
National Marine Dredging Co.	-0.0115	0.658	0.18
	(-1.96)	(3.54)	
Abu Dhabi National Hotels	0.00865	0.786	0.36
	(1.98)	(5.64)	
Abu Dhabi Aviation	0.00237	0.847	0.43
	(0.5)	(6.58)	
Abu Dhabi National	0.00336	0.599	0.21
	(0.67)	(3.72)	
Al Ain Ahlia Insurance Co.	0.0102	0.557	0.23
	(2.41)	(4.13)	
Al Dhafra Insurance co.	0.00597	1.08	0.42
	(1.13)	(6.43)	
Emirates Insurance Co.	0.00529	0.969	0.32
	(0.91)	(5.22)	
Abu Dhabi National Foodstuff	-0.00136	0.131	0.01
	(-0.28)	(0.86)	
Abu Dhabi Co-operative	0.00126	1.18	0.25
	(0.15)	(4.39)	
National Bank of Abu Dhabi	-0.00264	1.14	0.41
	(-0.46)	(6.23)	
Abu Dhabi Commercial Bank	-0.00678	0.567	0.32
	(-1.99)	(5.22)	
Union National Bank	-.00697	0.216	0.02
	(-1.14)	(1.11)	
National Bank of Dubai	-0.00439	0.794	0.51
	(-1.33)	(7.54)	
Commercial Bank of Dubai	0.00223	1.25	0.45
	(0.39)	(6.77)	
National Bank of Sharjah	-0.0121	0.228	0.02
	(-1.64)	(0.97)	
National Bank of Ras AlKhaima	0.00804	0.93	0.29
	(1.32)	(4.78)	
National Bank of Fujairah	0.00195	1.24	0.44
	(0.34)	(6.70)	
National Bank of Umm Alquwain	0.00663	0.898	0.34
	(1.26)	(5.36)	
Mashreq Bank	0.0107	0.634	0.21
	(2.02)	(3.78)	
Investment Bank	-0.00066	0.513	0.06
	(-0.08)	(1.89)	
United Arab Bank	0.0157	0.589	0.09
	(2.00)	(2.36)	
Emirates Bank International	-0.00185	1.11	0.46
	(-0.37)	(6.92)	
Dubai Islamic Bank	0.00065	0.538	0.05
	(0.07)	(1.76)	

model. Nineteen out of the 24 stock betas are significantly different from zero. We have expected this result from bank securities which are generally defensive in nature.

Table 2. Estimates of the two-index model (version 1) (Numbers in parentheses below parameter estimates are t statistics

Name	Intercept	Stock beta	Interest beta	R^2
Emirates Telecommunication	-0.00906	1.33	-0.00215	0.89
	(-1.90)	(21.19)	(2.07)	
National Marine Dredging Co.	-0.0342	0.761	0.00538	0.22
	(-2.32)	(3.94)	(1.68)	
Abu Dhabi National Hotels	0.013	0.766	-0.00104	0.36
	(1.16)	(5.17)	(-0.42)	
Abu Dhabi Aviation	0.0154	0.7	-0.00309	0.45
	(1.50)	(.84)	(-1.38)	
Abu Dhabi National Insurance	0.0235	0.508	-0.00477	0.24
	(1.85)	(3.04)	(-1.72)	
Al Ain Ahlia Insurance Co.	0.023	0.499	-0.00304	0.25
	(2.14)	(3.52)	(-1.29)	
Al Dhafra Insurance Co.	0.0123	1.05	-0.00151	0.42
	(0.91)	(5.89)	(-0.51)	
Emirates Insurance Co.	0.0282	0.865	-0.00543	0.36
	(1.92)	(4.48)	(-1.70)	
Abu Dhabi National Foodstuff	0.006	0.097	-0.00173	0.02
	(0.48)	(0.60)	(-0.64)	
Abu Dhabi Co-operative	0.0024	1.17	-0.00027	0.25
	(0.11)	(4.11)	(-0.06)	
National Bank of Abu Dhabi	0.0173	1.05	-0.00472	0.43
	(1.18)	(5.49)	(-1.48)	
Abu Dhabi Commercial Bank	-0.01	0.582	0.00077	0.33
	(-1.14)	(5.04)	(0.40)	
Union National Bank	0.0041	0.166	-0.00262	0.03
	(0.26)	(0.81)	(-0.077)	
National Bank of Dubai	-0.0127	0.832	0.00196	0.51
	(-1.50)	(7.49)	(1.06)	
Commercial Bank of Dubai	-0.0151	1.32	0.00411	0.46
	(-1.03)	(6.86)	(1.28)	
National Bank of Sharjah	0.0037	0.156	-0.00374	0.03
	(0.19)	(0.63)	(-0.91)	
National Bank of Ras Alkhaima	0.011	0.916	-0.00071	0.29
	(0.70)	(4.43)	(-0.21)	
National Bank of Fujairah	0.0127	1.19	-0.00254	0.45
	(0.85)	(6.08)	(-0.78)	
National Bank of Umm Alquwain	0.0222	0.827	-0.0037	0.35
	(1.66)	(4.70)	(-1.26)	
Mashreq Bank	0.041	0.496	-0.00719	0.28
	(3.18)	(2.94)	(-2.56)	
Investment Bank	0.0382	0.336	-0.00921	0.12
	(1.80)	(1.21)	(-1.99)	
United Arab Bank	0.0538	0.416	-0.00902	0.16
	(2.76)	(1.63)	(-2.12)	
Emirates Bank International	0.0123	1.04	-0.00335	0.47
	(0.96)	(6.20)	(-1.20)	
Dubai Islamic Bank	-0.0355	0.702	0.00855	0.09
	(-1.46)	(2.21)	(1.62)	

Table 3. Estimates of the two-index model (version 2) (Numbers in parentheses below parameter estimates are t statistics)

Name	Intercept	Stock beta	Interest beta	R^2
Emirates Telecommunication	-0.00906	1.28	0.00215	0.89
	(-1.90)	(21.66)	(2.07)	
National Marine Dredging Co.	-0.0342	0.658	.00538	0.22
	(-2.32)	(3.59)	(1.68)	
Abu Dhabi national Hotels	0.013	0.786	-0.00104	0.36
	(1.16)	(5.60)	(-0.42)	
Abu Dhabi Aviation	0.0154	0.847)	-0.00309	0.45
	(1.50)	(6.63)	(-1.38)	
Abu Dhabi National Insurance	0.0235	0.599	-0.00477	0.24
	(1.85)	(3.79)	(-1.72)	
Al-Ain Ahlia Insurance Co.	0.023	0.557	-0.00304	0.25
	(2.14)	(4.15)	(-1.29)	
Al Dhafra Insurance Co.	0.0123	1.08	-0.00151	0.42
	(0.91)	(6.39)	(-0.51)	
Emirates Insurance Co.	0.0282	0.969	-0.00543	0.36
	(1.92)	(5.30)	(-1.70)	
Abu Dhabi NationalFoodstuff	0.006	0.131	-0.00173	0.02
	(0.48)	(0.85)	(-0.64)	
Abu Dhabi Co-operative	0.0024	1.18	-0.00027	0.25
	(0.11)	(4.35)	(-0.06)	
National Bank of Abu Dhabi	0.0173	1.14	-0.00472	0.43
	(1.18)	(6.29)	(-1.48)	
Abu Dhabi Commercial Bank	-0.01	0.567	0.00077	0.33
	(-1.14)	(5.18)	(0.40)	
Union National Bank	0.0041	0.216	-0.00262	0.03
	(0.26)	(1.11)	(-0.77)	
National Bank of Dubai	-0.0127	0.794	0.00196	0.51
	(01.50)	(7.55)	(1.06)	
Commercial Bank of Dubai	-0.151	1.25	0.00411	0.46
	(-1.03)	(6.81)	(1.28)	
National Bank of Sharjah	0.0037	0.228	-0.00374	0.03
	(0.19)	(0.97)	(-0.91)	
National Bank of Ras Alkhaima	0.011	0.93	-0.00071	0.29
	(0.70)	(4.74)	(-0.21)	
National bank of Fujairah	0.0127	1.24	-0.00254	0.45
	(0.85)	(6.67)	(-0.78)	
National Bank of Umm Alquwain	0.0222	0.898	-0.0037	0.35
	(1.66)	(5.39)	(-1.26)	
Mashreq Bank	0.041	0.634	-0.00719	0.28
	(3.18)	(3.96)	(-2.56)	
Investment Bank	0.0382	0.513	-0.00921	0.12
	(1.80)	(1.94)	(-1.99)	
United Arab Bank	0.0538	0.589	-0.00902	0.16
	(2.76)	(2.43)	(-2.12)	
Emirates Bank International	0.0123	1.11	-0.00335	0.47
	(0.96)	(6.94)	(-1.20)	
Dubai Islamic Bank	-0.0355	0.538	0.00855	0.09
	(-1.46)	(1.78)	(1.62)	

This result also confirms previous studies, and indicates that the market index is a good indicator of shares behavior in the UAE. For the interest rate betas only 4 are significant at the 5 per cent level. These are the stocks of Emirates Telecommunication, Mashreq Bank, United Arab Bank and Investment Bank. While the sensitivity of the shares of the three banks to interest rate fluctuations is obvious, the shares of Emirates Telecommunication are rate sensitive since they are the most actively traded in the UAE. Four more are significant at the 10 per cent level. These are the interest betas for National Marine Dredging Co., Abu National Insurance Co., Emirates Insurance Co., and Dubai Islamic Bank (DIB), see Table 2.

Although Dubai Islamic Bank does not deal with interest, its shares are rate sensitive. Fixed interest deposits are close substitutes to the profit and loss sharing (PLS) deposits offered by Dubai Islamic Bank, more investors may choose PLS deposits. Therefore the interest beta for Dubai Islamic Bank is positive indicating that interest fluctuations will affect DIB shares favorably.

Even though the inclusion of interest rate has increased the goodness of fit of the model, it did not have any significant impact on the estimated share betas. The mean beta value for the single index model is 0.780583 with a standard deviation of 0.337655, whereas for the two-index model the mean stock beta is 0.74425 for version 1 and 0.780583 for version 2, with standard deviations of 0.359326 and 0.337655 respectively.

Conclusion

The purpose of this paper has been to test empirically the interest sensitivity of common stock in the UAE. The results are mixed, while market beta is statistically significant, the interest beta is found to be only marginally significant.

The effect of interest rate fluctuations on stock returns is found to be significant and negative for a number of banks. However, the inclusion of the interest index did not improve the results. Although there is no official stock market in the UAE, the results indicate that investors in the UAE take interest rate fluctuations into consideration when dealing with stocks. Our results, however, are limited and further study is obviously needed in this area.

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حساسية العائدات على الأسهم لحركات أسعار الفائدة في سوق الإمارات العربية المتحدة للأوراق المالية

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(مقدم للنشر في ١٤١٦/٦/١٨هـ، وقبل للنشر في ١٤١٦/١٠/٢٢هـ)

ملخص البحث. تقوم هذه الدراسة على تطوير واختبار النموذج الثنائي لأسعار الأسهم، ويبين هذا النموذج العلاقة بين أسعار الأسهم وأسعار الفائدة في السوق. تم في هذا البحث استخدام الأسعار الشهرية لأسهم (٢٤) شركة التي تتداول أسهمها في سوق الإمارات العربية المتحدة للأوراق المالية، وكذلك طريقة المربعات الصغرى لاختبار النموذج. وتشير نتائج البحث أن العوائد على أسعار أسهم البنوك التجارية هي الأكثر تأثرا بأسعار الفوائد في السوق.