

Beta Estimation and Thin Trading: Evidence from Bahrain Bourse

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Abstract

This study provides some guidelines indicating how to estimate beta (systematic risk) for companies listed on the Bahrain Bourse. Several estimation techniques were used to estimate beta. The methodology suggested by Fama and MacBeth (1973) for testing the CAPM based on cross-section analysis is used. Several problems are identified which require attention when estimating beta of companies listed on the Bahrain Stock Exchange. These are the intervals of rate return, the length of the estimation period, the best procedure to control for thin trading, the market index that should be used to estimate beta and the stability of beta estimates over time.

The present study uses rates of return for different intervals (daily, weekly and monthly) for the period between January 2007 and December 2011 for 39 companies to test a number of hypotheses. The results of various tests show the following: 1) the estimated betas are insensitive to the length of period used; 2) the impact of return intervals on estimated betas is not significant; 3) betas estimated using the All-Share Index and the MCSI are not significantly different from each other; 4) the estimated betas based on weekly data do not depend on the day of the week chosen to calculate the rate of returns; and 5) the impact of thin trading on beta depends on the method used to account for thin trading.

Keywords: Bahrain, beta, emerging markets, systematic risk, Thin trading

1. Introduction

The capital asset pricing model (CAPM) predicts that an asset's expected and required rates of return are linear functions of its systematic (non-diversified) risk, measured by beta. This is because beta is the only measure of risk that explains the cross sectional variation of asset rates of return. Beta measures the risk associated with a particular asset in relation to the overall market. Since it was developed by Sharpe (1964), Lintner (1965) and Black (1972) (SLB hereafter), CAPM underwent extensive investigations to determine its validity and the usefulness for determining the rates of return of securities and portfolios. Those investigations yielded mixed results. The results of a number of empirical studies, such as Reinganum (1981), Lakonishok and Shapiro (1986), Fama and French (1992), Jagadeesh (1992), Yang and Donghui (2007), Nikolaos (2009) and Zubairi and Farooq (2011), provide that the relationship between beta and expected rate of return is not always significant. Fama and French (2004) state that empirical work since the late 1970s has challenged the validity of the prediction made by CAPM. Specifically, evidence mounts that much of the variation in expected return is unrelated to market beta. However, Vosilov and Bergström (2010) report that beta is a proper predictor of rate of return. Despite the mixed research results, practitioners continue to use the model for portfolio construction, investment decisions and measuring asset rates of return and cost of capital. A survey of a thousand financial directors of American firms which is made on a regular basis by Duke University and CFO Magazine shows that in 2008 and 2009 nearly 75% of respondents used CAPM in the construction of asset valuations (Graham & Harvey, 2009).

The present paper contributes to the literature on the subject as it represents a primary investigation in at least two respects. While there is substantial evidence about this relationship for developed countries, there is little evidence for developing economies with relatively immature stock markets and potentially unique transmission mechanism mediating real activities and monetary policies.

Potential beneficiaries of the findings from this study include Bahrain Bourse, financial institutions operating in Bahrain and other countries, the Central Bank of Bahrain, students and the academic community.

2. Data Sources

The empirical tests were conducted with the following databases: a daily stock series, and daily index series. Data were obtained from Bahrain Bourse and www.morganstanley.com.

2.1 Methodology

The most widely cited procedure for estimating beta in finance textbooks, involves using five years of monthly values of a security and the market index to estimate a model in the following form:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_i \quad t = 1, 2, 3 \dots, n \quad (1)$$

where R_{it} is the return on stock “i” at time “t” and R_{mt} is the return on the market portfolio (index) at time “t”.

To obtain an efficient estimate of Equation (1) it is desirable to use the longest period possible. However, as the number of observations increases, the question arises of the stability of the beta. Instability might be the result of changes in the company’s characteristics, such as changes in capital structure, changes in operating leverage, changes in the management, changes in profit volatility, or changes in the risk level of the firm’s investment. If the estimates are not stable then they are considered to be biased estimates of the population parameters. Hence, researchers would be forced to trade-off between stability and efficiency. For companies listed on the Bahrain Bourse, which has a short history, the only way to increase the number of observations and, thus, reduce the probability of unstable beta estimates is to use a daily or weekly interval instead of monthly data. However, shorter interval data are characterized by higher fluctuations compared with longer interval data, and often lead to more noise in the data series and as a consequence the estimates will be less efficient. This situation means that two important issues need to be addressed before estimating beta:

- (1) What is length of the estimation period?
- (2) What is the best return interval to use (daily, weekly, monthly or annual)?

Handa et al. (1989) examine the relationship between the return interval and beta estimates. They use frequencies ranging from daily to annual data and conclude that the return interval affects the beta estimates. However, they stop short of making any recommendation about which frequency should be used in estimating beta.

Draper and Paudyal (1995) consider the other problem, the relationship between the length of the estimation period and beta estimates. They use a daily return interval over different estimation periods, and conclude that the best beta estimates can be obtained using around 400 observations.

One of the most important assumptions when making beta estimates is that the security is traded frequently. This assumption cannot be assumed in Bahrain, as it has what must be described as an emerging stock exchange which characterized by non-synchronous trading or thin trading. That is to say, not every security is traded every day. Estimating beta using the index model (Equation, 1) in the presence of non- synchronous trading leads to biased estimates of beta. To overcome this problem, several estimation procedures have been developed, but there is no consensus about which procedure leads to unbiased beta estimates. Hence, the issue that should be resolved is:

- (3) What is the best estimation procedure to control for non-synchronous trading on the Bahrain Bourse?

Evidence relating to the procedures for controlling for thin trading are not conclusive (Dimson & Marsh, 1983; Berglund et al., 1989; Bartholdy & Riding, 1994; Louma et al., 1994). Bartholdy and Riding (1994) use a monthly return interval with an estimation period of five years in New Zealand and report no significant difference between the various control methods.

Estimation of beta requires information about the market index. However, there is no clear definition of this index. The Capital Asset Pricing Model specifies the index as a value weighted market index containing all risky assets. The only market index available for the Bahrain Bourse is the All-Share Index. It contains 39 value weighted stocks. This index has several problems, including the fact that a large number of companies included in the index are thinly traded and a few companies dominate the index. These problems might indicate that the Bahrain Index does not represent the overall market. Therefore, the use of this index might not be appropriate for estimating beta. An alternative might be a price index (Dow Jones method) consisting of stocks trading on most trading days. This leads to next issue that should be addressed which is:

- (4) Which index should be used to estimate beta?

Another important assumption about beta estimates is that it is stationary, or constant over time. Violation of this assumption will limit the use of beta estimates as a measure of systematic risk. Blume (1971) found that beta estimates do not appear to be constant over time. His results show that the value of beta estimated using the

market model is related to the previous period. He suggested a correction procedure which is based on a cross-section regression from one period to the next. The estimated regression equation is then used to adjust the betas for the next period. The results of Vasikcek (1973) lend further support to those reported by Blume (1971). However, he suggested another correction procedure. As the estimation of the index is crucial to the estimation of beta, the issue that should be considered is:

(5) Are betas constant over time?

Therefore, the estimation methodology used to estimate betas should address the above mentioned five problems.

2.2 Data and Methodology

The data used in addressing the five problems identified in the previous section is collected from various issues of local newspapers over the period between January 1990 and December 2003 (inclusive). For a stock to qualify for inclusion in the sample it is required to have prices available for fourteen years from 2007 through 2011. A total of 35 companies were included.

The optimal return interval (issue number (1) above) is addressed using three return frequencies: for each stock daily, weekly and monthly returns adjusted for splits, dividends and rights issues were calculated. For the issue of the optimal length of the estimation period (issue number (2) above) three different estimation periods are used. These involve monthly returns from January 2007 to June 2009, five years of monthly returns from January 2007 to December 2011, and three years of monthly returns from January 2008 to December 2011. For each period betas were estimated using daily, weekly and monthly rates of return. The market proxy used is the Bahrain Bourse All-Share Index.

Issue number (3) is concerned with the optimal procedure to control for thin trading. The following estimation techniques are used:

2.3 Market Index Model

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_i \quad t = 1, 2, 3 \dots, n$$

The abbreviations used are as defined for Equation (1).

Scholes-Williams (1977).

Scholes and Williams (1977) addressed the issue of thin trading and then recommended the following correction method:

$$\beta_{sw} = \frac{\beta_{-1} + \beta_0 + \beta_{+1}}{1 + 2\rho} \quad (2)$$

Where

β_{-1} : OLS beta with the return on the market index lagged one period.

β_0 : OLS beta with the contemporaneous return of the market index.

β_{+1} : OLS beta with the return on the market index leading one period.

ρ : First order autocorrelation coefficient of the return on the market.

2.4 Beta Based on Rates of Return Adjusted for Thin Trading

Bahrain Bourse is characterized by non-synchronous and infrequent trading of many stocks. Many studies have pointed out that thin (or infrequent) trading can generate spurious serial correlation in stock return and seriously bias the outcomes of empirical tests for market efficiency (Lo & MacKinlay, 1990; Stoll & Whaley, 1990; Miller et al., 1994). To deal with this problem, the methodology proposed by Miller et al. (1994) is employed. These authors suggested an adjustment based on the estimation of a moving average model which reflects the number of non-trading days. However, due to difficulties in determining the non-trading days, Miller et al. (1994) show that an AR(1) model can be used instead. Specifically, the model can be stated in the following equations:

$$x_t = \alpha_0 + \alpha_1 x_{t-1} + \varepsilon_t \quad (3)$$

Then, using the residuals from Equation (3), adjusted returns are computed as follows:

$$x_t^{Adj} = \frac{\varepsilon_t}{1 - \alpha_1} \quad (4)$$

Where x_t^{Adj} is the adjusted return for thin trading at time t.

All tests are conducted with both observed and corrected data.

3. Analysis of the Results

3.1 The Length of Estimation Period

It has been argued that an estimation period of four to five years is an appropriate trade-off between the number of observations and the stability of the beta estimate when dealing with monthly data (Brailsford et al., 1997). However, for the sample used in this research, 39 companies have consistent data over six years, and therefore, subsequent analysis adopts a six-year estimation period and the analysis uses the logarithm of monthly returns (log monthly returns).

The three different estimation periods, involving log monthly returns from January 2007 to June 2009, from January 2007 to December 2011 (five years), and from January 2008 to December 2011 (three years), are used. For each period betas are estimated using daily, weekly and monthly rates of return. The market proxy used is the Bahrain Bourse All-Share Index.

Tables 1, 2 and 4 show regular betas, betas adjusted for thin trading and Scholes-Williams betas from the three different estimation periods for monthly rates of return. It can be seen from the tables that the differences in beta estimation are small. Analysis of variance is used to test the null hypothesis that states beta is stable over time. The results indicate that F-statistics are 1.237, 0.33 and 0.724, for regular betas, betas adjusted for thin trading and Scholes-Williams betas, respectively. The F-statistics indicate that the null hypothesis cannot be rejected at a five per cent level of significance. These results further support the use of beta by practitioners in estimating the cost of capital, capital budgeting and valuing companies, among other decisions.

Table 1. Comparison of estimated betas (regular beta, thin-trading, sholes-williams) with all-share Index for Bahrain bourse as market proxy (using daily rate of return) for the period from January 2007 to June 2009

Company Name	Regular Beta	Adj. R-Sq.	Thin Beta	Adj. R-Sq.	Scholes and Williams Beta
Ahli United Bank	2.337*	46.69%	2.096*	47.18%	5.856
Bank of Bahrain and Kuwait	0.662*	11.83%	0.577*	12.24%	1.620
Bahrain Islamic Bank	0.593*	4.84%	0.572*	4.61%	1.452
National Bank of Bahrain	0.661*	10.51%	0.517*	9.23%	1.712
Alsalam Bank	1.105*	4.60%	0.787**	0.56%	2.687
Bahrain Saudi Bank	0.576	8.25%	0.525*	6.93%	1.420
Ithmar Bank	1.292*	5.93%	1.192*	2.91%	3.272
Khaliji Commercial Bank	0.739*	9.54%	0.725*	8.38%	1.860
Banader Hotels	0.026	-0.30%	0.015	-0.31%	0.064
Bahrain Hotels	0.137	0.25%	0.116	0.45%	0.273
Bahrain Tourism Company	0.315 *	5.09%	0.194*	4.63%	0.727
Family Leisure	0.374*	27.40%	0.272*	18.98%	0.687
National Hotels	(0.124)	3.25%	(0.096)	3.19%	(0.286)
Alba	0.272	1.30%	0.306***	17.89%	2.608
Bahrain Flour Mills	0.040	-2.06%	0.037	-2.08%	0.087
Delomon Poultry	0.311**	13.29%	0.166**	10.63%	0.661
Ahlia Insurance company	0.169	1.10%	0.103	-0.30%	0.365
Arab Insurance group	0.559*	11.12%	0.484	13.74%	1.548
Bahrain & Kuwait Insurance	0.129	0.86%	0.031	-0.93%	0.181
Bahrain National Hotel	0.227* *	2.30%	0.203**	3.36%	0.584
Arab Banking Corporation	0.453 *	5.68%	0.134	0.29%	0.825
Baraka Group	0.702*	4.85%	0.707*	4.79%	1.839
Bahrain Commercial	0.235 *	2.51%	0.119***	0.85%	0.484
Bahrain Middle East Bank	0.086	-2.70%	0.297	2.91%	0.565
Esterad	0.657*	5.25%	0.621*	3.80%	1.587
Gulf Finance House	2.537 *	22.00%	2.413*	21.10%	5.966
Inovest	1.072*	7.66%	1.206*	7.60%	3.207
Invest Corp	0.627 *	33.09%	0.266***	10.54%	1.140
United Gulf bank	0.816*	15.47%	0.876*	19.85%	2.104
United Gulf Industries	0.012	-0.71%	0.020	-0.70%	0.072
Bahrain Shipyard	(0.107)	-1.30%	(0.070)	-0.83%	(0.235)
Batelco	0.694 *	11.16%	0.557*	9.92%	1.643
Bahrain Maritime	0.101	0.14%	0.048	-0.13%	0.200
Bahrain Cinema	0.402*	8.19%	0.393*	7.54%	0.917
Bahrain Car park	0.141	0.61%	0.022	-1.59%	0.213

Duty Free	0.203***	1.35%	0.146***	1.02%	0.404
Nass Company	0.704*	4.98%	0.871*	5.62%	2.182
Seef Real Estate	0.431*	3.48%	0.396*	3.77%	1.140
Trafco	0.098	-0.04%	0.022	-0.49%	0.220

Note. *** Significant at 0.001, **Significant at 0.05, *Significant at 0.10.

Table 2. Comparison of estimated betas (Regular beta, Thin-trading, Sholes-Williams) with all-share index for Bahrain Bourse as market proxy (using daily rate of return) for the period from July 2009 to December 2011

Company Name	Regular Beta	Regular Beta	Adj. R-Sq.	Thin Beta	Adj. R-Sq.	Sholes and Williams Beta
Ahli United Bank	2.621*	2.621*	49.51%	2.528*	49.46%	7.186
Bank of Bahrain and Kuwait	0.412*	0.412*	6.00%	0.378*	5.65%	1.129
Bahrain Islamic Bank	0.509*	0.509*	3.44%	0.482*	3.57%	1.268
National Bank of Bahrain	0.58*	0.58*	8.56%	0.450*	7.90%	1.682
Alsalam Bank	0.609*	0.609*	3.17%	0.558*	2.76%	1.529
Bahrain Saudi Bank	0.023	0.023	-4.72%	0.122	-4.51%	0.372
Ithmar Bank	1.309*	1.309*	7.41%	1.248*	7.29%	3.299
Khaliji Commercial Bank	0.235*	0.235*	0.54%	0.202**	0.40%	0.602
Banader Hotels	0.042	0.042	-0.85%	0.038	-0.85%	0.139
Bahrain Hotels	0.252	0.252	2.09%	0.340**	4.01%	0.234
Bahrain Tourism Company	0.379*	0.379*	6.41%	0.233*	5.12%	0.906
Family Leisure	(0.210)	(0.210)	-6.82%	(0.126)	-2.78%	0.228
National Hotels	0.006	0.006	-6.05%	0.002	-6.09%	0.009
Alba	1.996*	1.996*	22.11%	2.079*	22.02%	5.680
Bahrain Flour Mills	0.191	0.191	-2.30%	0.177	-2.77%	0.405
Delomon Poultry	(0.700)***	(0.700)***	22.40%	(0.712)***	27.48%	(5.365)
Ahlia Insurance company	(0.160)	(0.160)	-1.17%	(0.324)	1.20%	(0.703)
Arab Insurance group	0.311	0.311	0.35%	0.283	0.41%	0.772
Bahrain & Kuwait Insurance	0.712**	0.712**	15.20%	0.457***	8.78%	1.494
Bahrain National Hotel	0.125	0.125	-0.64%	0.098	-0.59%	0.353
Arab Banking Corporation	1.325*	1.325*	25.08%	0.387**	5.03%	1.784
Baraka Group	0.981*	0.981*	6.71%	1.090*	6.21%	2.936
Bahrain Commercial	0.158	0.158	-0.03%	0.133	-0.07%	0.476
Bahrain Middle East Bank	-	-	0.00%	-	0.00%	-
Esterad	0.332***	0.332***	0.77%	0.166	-0.11%	0.680
Gulf Finance House	(6.218)*	(6.218)*	11.96%	(1.901)*	4.55%	(14.262)
Inovest	1.041*	1.041*	5.69%	1.275*	5.77%	2.907
Invest Corp	0.467	0.467	-11.30%	2.128*	53.77%	5.301
United Gulf bank	0.347	0.347	0.91%	0.412	0.85%	1.040
United Gulf Industries	(0.080)	(0.080)	-2.04%	0.094	-2.10%	(0.590)
Bahrain Shipyard	(0.011)	(0.011)	-4.16%	(0.027)	-4.10%	(0.138)
Batelco	0.553*	0.553*	11.06%	0.540*	11.15%	1.537
Bahrain Maritime	0.155	0.155	0.21%	0.164	0.30%	0.363
Bahrain Cinema	0.261	0.261	1.09%	0.205	-0.69%	0.656
Bahrain Car park	0.530**	0.530**	14.57%	0.442***	9.77%	2.143
Duty Free	0.434**	0.434**	2.13%	0.345**	2.40%	1.007
Nass Company	0.643*	0.643*	3.04%	0.694*	2.82%	1.700
Seef Real Estate	0.064	0.064	-0.15%	0.055	-0.14%	0.171
Trafco	0.178	0.178	-0.04%	0.146	-0.42%	0.300

Note. *** Significant at 0.001, **Significant at 0.05, *Significant at 0.10.

3.2 Rate of Return Intervals

Practitioners use different return intervals for estimating betas. It is not customary to use daily rates of return. There is a consensus among practitioners to use weekly or monthly figures. To test the effect of rate of return

interval on the estimates, betas of the sample companies are estimated using daily, weekly and monthly rates of return. These estimates were made for the whole period, and the All-Share Index is used as the market proxy.

Table 3 presents the estimated betas (regular betas, betas that are based on the rates of return adjusted for thin trading and Scholes-Williams betas) using monthly rates of return. Analysis of variance is used to test the sensitivity of estimated betas to rate of return intervals. The F-statistics obtained are 0.564, 0.287 and 0.236 for regular betas, betas adjusted that are based on rates of return adjusted for thin trading and Scholes-Williams betas, respectively. These statistics are not significant at the five per cent level, which indicates that the null hypothesis (H_0 : $\text{Beta}_{\text{daily}} = \text{Beta}_{\text{weekly}} = \text{Beta}_{\text{monthly}}$) cannot be rejected. These results are true regardless of the procedure used to estimate betas.

Table 3. Comparison of estimated betas (Regular beta, Thin-trading, Scholes-Williams) with all-share index for Bahrain Bourse as market proxy (using monthly rate of return)

Company Name	Regular Beta	Adj. R-Sq.	Thin Beta	Adj. R-Sq.	Scholes and Williams Beta
Ahli United Bank	2.135*	48.69%	1.744*	48.05%	5.671
Bank of Bahrain and Kuwait	0.518*	9.72%	0.358*	8.66%	1.098
Bahrain Islamic Bank	0.954*	9.56%	0.802*	8.82%	2.430
National Bank of Bahrain	0.513*	8.32%	0.444*	7.73%	1.265
Alsalam Bank	1.656*	11.66%	1.849*	4.09%	4.278
Bahrain Saudi Bank	0.692*	23.42%	0.533*	19.00%	1.834
Ithmar Bank	1.287*	6.81%	1.177*	3.51%	3.167
Khaliji Commercial Bank	0.724*	8.33%	0.665*	8.42%	1.870
Banader Hotels	0.036	-0.72%	(0.011)	-0.77%	0.077
Bahrain Hotels	0.266**	3.11%	0.182**	4.05%	0.342
Bahrain Tourism Company	0.309*	6.66%	0.194**	5.46%	0.598
Family Leisure	0.570*	41.06%	0.423*	50.65%	1.131
National Hotels	(0.073)	-2.58%	(0.044)	-2.32%	(0.120)
Alba	2.443*	26.73%	3.016*	16.26%	4.956
Bahrain Flour Mills	0.053	-3.34%	0.030	-3.38%	0.116
Delomon Poultry	0.109	-1.79%	0.067	-2.51%	0.215
Ahlia Insurance company	0.474*	13.22%	0.314*	18.55%	0.911
Arab Insurance group	0.564*	8.08%	0.339*	5.78%	1.037
Bahrain & Kuwait Insurance	0.134	0.20%	0.071	0.22%	0.212
Bahrain National Hotel	0.165	0.97%	0.075	0.35%	0.323
Arab Banking Corporation	1.059*	31.29%	0.918*	40.75%	2.589
Baraka Group	0.671*	4.32%	0.570*	3.83%	1.431
Bahrain Commercial	0.359*	5.83%	0.211**	4.71%	0.636
Bahrain Middle East Bank	0.424	-2.53%	0.079	-5.05%	0.550
Esterad	1.188*	14.46%	1.104*	13.71%	2.856
Gulf Finance House	(1.151)	0.38%	0.624	0.30%	(3.119)
Inovest	0.981*	4.61%	0.905*	4.55%	2.367
Invest Corp	0.782*	41.78%	0.743*	51.90%	1.416
United Gulf bank	0.619*	6.39%	0.324***	2.29%	1.205
United Gulf Industries	0.506***	3.65%	0.145	0.00%	0.765
Bahrain Shipyard	(0.123)	-1.82%	(0.062)	-2.03%	(0.347)
Batelco	0.666*	11.54%	0.580*	11.68%	1.709
Bahrain Maritime	(0.011)	-0.66%	(0.094)	0.06%	(0.025)
Bahrain Cinema	0.299	2.38%	0.087	-1.23%	0.544
Bahrain Car park	0.080	-1.72%	0.019	-2.54%	0.227
Duty Free	0.196	0.95%	0.131	0.70%	0.444
Nass Company	1.11*	8.09%	0.917*	7.20%	2.358
Seef Real Estate	0.376**	2.69%	0.338*	3.14%	1.123
Trafco	0.247**	3.39%	0.117	0.62%	0.497

Note. *** Significant at 0.001, **Significant at 0.05, *Significant at 0.10.

Table 4. Comparison of estimated betas (Regular beta, Thin-trading, Sholes-Williams) with Bahrain Bourse all shares-index as market proxy (using daily rate of return)

Company Name	Regular Beta	Adj. R-Sq.	Thin Beta	Adj. R-Sq.	Scholes and Williams Beta
Ahli United Bank	2.378*	46.84%	2.181*	46.80%	5.980
Bank of Bahrain and Kuwait	0.415*	4.58%	0.363*	4.15%	1.093
Bahrain Islamic Bank	0.591*	4.37%	0.559*	4.37%	1.368
National Bank of Bahrain	0.631*	9.00%	0.510*	8.51%	1.612
Alsalam Bank	0.992*	3.64%	0.871*	0.85%	2.313
Bahrain Saudi Bank	0.365*	5.36%	0.384*	4.89%	1.234
Ithmar Bank	1.188*	5.17%	1.035*	2.53%	2.802
Khaliji Commercial Bank	0.545*	4.52%	0.491*	3.98%	1.336
Banader Hotels	(0.007)	-0.26%	(0.010)	-0.25%	(0.015)
Bahrain Hotels	0.270*	3.32%	0.247*	3.98%	0.439
Bahrain Tourism Company	0.245*	2.49%	0.171*	2.71%	0.595
Family Leisure	0.433*	26.04%	0.384*	31.97%	1.273
National Hotels	(0.105)	1.62%	(0.074)	1.28%	(0.227)
Alba	1.996*	22.11%	2.079*	22.02%	5.680
Bahrain Flour Mills	0.047*	-1.16%	0.039	-1.30%	0.094
Delomon Poultry	0.240**	7.76%	0.144***	6.14%	0.589
Ahlia Insurance company	0.125	0.29%	0.067	-0.43%	0.255
Arab Insurance group	0.396*	3.30%	0.219*	2.17%	0.745
Bahrain & Kuwait Insurance	0.120	0.31%	0.038	-0.76%	0.207
Bahrain National Hotel	0.284*	4.24%	0.246*	5.96%	0.799
Arab Banking Corporation	0.468*	5.78%	0.074	-0.12%	0.804
Baraka Group	0.699*	5.20%	0.705*	5.30%	1.944
Bahrain Commercial	0.240*	1.91%	0.071	0.23%	0.408
Bahrain Middle East Bank	0.048	-2.15%	0.159	-1.43%	0.449
Esterad	0.467*	2.66%	0.386*	1.70%	1.057
Gulf Finance House	(2.265)*	2.72%	(0.125)	-0.08%	(5.033)
Inovest	1.259*	9.72%	1.468*	9.67%	3.647
Invest Corp	0.877*	48.98%	0.884*	50.18%	1.430
United Gulf bank	0.537*	5.14%	0.371*	3.10%	1.153
United Gulf Industries	(0.008)	-0.55%	(0.038)	-0.51%	(0.039)
Bahrain Shipyard	0.052	-1.58%	0.070	0.25%	0.098
Batelco	0.717*	11.76%	0.594*	10.89%	1.706
Bahrain Maritime	0.208**	1.16%	0.170**	1.15%	0.425
Bahrain Cinema	0.250**	2.57%	0.159	0.87%	0.522
Bahrain Car park	0.169	1.80%	0.063	-0.24%	0.375
Duty Free	0.243**	1.54%	0.159**	1.23%	0.482
Nass Company	0.571*	2.98%	0.575*	2.84%	1.530
Seef Real Estate	0.340*	2.06%	0.293*	2.17%	0.843
Trafco	0.066	-0.15%	0.053	-0.23%	0.183

Note. *** Significant at 0.001, **Significant at 0.05, *Significant at 0.10.

3.3 Thin Trading Effect

Table 4 shows the estimates for three types of beta, namely regular beta, beta based on returns after adjusting them for thin trading of the 39 companies and the difference between the mean betas for the whole period (that is 2007-2011). It is evident from the table that there is not much difference between the betas obtained from the three procedures used. The estimated betas of the sample are all positive, with exception of four companies that have negative betas. Alahli United Banks (AUB) has the highest beta, while Bahrain Middle East Bank had the lowest positive estimated beta. Furthermore, the most frequently traded stocks have upward biased OLS beta estimates, and this is consistent with the findings of Dimson (1979).

The Table 2 shows the significance level for the two-sample t-test run for the three different returns. The tests at the five per cent significance level indicate high p-values, and, therefore, the null hypothesis (H_0 : $\text{Beta}_{\text{regular}} =$

$\text{Beta}_{\text{SW}} = \text{Beta}_{\text{adjusted}}$ for thin trading) cannot be rejected. The results show that for most companies, the estimated regular betas are higher than those of thin trading betas, while betas_{SW} are higher than the regular and thin trading betas. The results show that H_0 cannot be rejected for the mean difference between the estimated regular betas and those estimated after adjusting returns for thin trading. However, the null hypotheses of no significant differences between the regular beta and beta_{SW} and between thin trading beta and beta_{SW} are rejected at the per cent significance level. These results indicate that the variations in beta estimates are substantial.

3.4 The Effect of Using Different Market Proxies on Estimated Betas

For all methods of estimating betas using the market model, the independent variable is market rate of return. However, the magnitude of the independent variable depends on the market proxies. Two market proxies are used to measure the impact of the independent variable on the estimated betas. These are the Bahrain All-Share Index calculated by Bahrain Bourse and the Bahrain Index calculated by Morgan Stanley (MSCI). To test the null hypotheses, beta was estimated for the sample companies using the whole sample period and the Bahrain Index (MCSI) as the independent variable. The results are compared with those reported in Table 5.

Table 5. Comparison of estimated betas (Regular beta, Thin-trading, Scholes-Williams) with MSCI index for Bahrain Bourse as market proxy (using daily rate of return)

Company Name	Regular Beta	Adj. R-Sq.	Thin Beta	Adj. R-Sq.	Scholes and Williams Beta
Ahli United Bank	2.378*	46.84%	2.181*	46.80%	5.980
Bank of Bahrain and Kuwait	0.415*	4.58%	0.363*	4.15%	1.093
Bahrain Islamic Bank	0.591*	4.37%	0.559*	4.37%	1.368
National Bank of Bahrain	0.631*	9.00%	0.510*	8.51%	1.612
Alsalam Bank	0.992*	3.64%	0.871*	0.85%	2.313
Bahrain Saudi Bank	0.365*	5.36%	0.384*	4.89%	1.234
Ithmar Bank	1.188*	5.17%	1.035*	2.53%	2.802
Khaliji Commercial Bank	0.545*	4.52%	0.491*	3.98%	1.336
Banader Hotels	(0.007)	-0.26%	(0.010)	-0.25%	(0.015)
Bahrain Hotels	0.270*	3.32%	0.247*	3.98%	0.439
Bahrain Tourism Company	0.245*	2.49%	0.171*	2.71%	0.595
Family Leisure	0.433*	26.04%	0.384*	31.97%	1.273
National Hotels	(0.105)	1.62%	(0.074)	1.28%	(0.227)
Alba	1.996*	22.11%	2.079*	22.02%	5.680
Bahrain Flour Mills	0.047	-1.16%	0.039	-1.30%	0.094
Delomon Poultry	0.240	7.76%	0.144***	6.14%	0.589
Ahlia Insurance company	0.125	0.29%	0.067	-0.43%	0.255
Arab Insurance group	0.396*	3.30%	0.219*	2.17%	0.745
Bahrain & Kuwait Insurance	0.120	0.31%	0.038	-0.76%	0.207
Bahrain National Hotel	0.284*	4.24%	0.246*	5.96%	0.799
Arab Banking Corporation	0.468*	5.78%	0.074	-0.12%	0.804
Baraka Group	0.699*	5.20%	0.705*	5.30%	1.944
Bahrain Commercial	0.240*	1.91%	0.071	0.23%	0.408
Bahrain Middle East Bank	0.048	-2.15%	0.159	-1.43%	0.449
Esterad	0.467*	2.66%	0.386*	1.70%	1.057
Gulf Finance House	(2.265)*	2.72%	(0.125)	-0.08%	(5.033)
Inovest	1.259*	9.72%	1.468*	9.67%	3.647
Invest Corp	0.877*	48.98%	0.884*	50.18%	1.430
United Gulf bank	0.537*	5.14%	0.371*	3.10%	1.153
United Gulf Industries	(0.008)	-0.55%	(0.038)	-0.51%	(0.039)
Bahrain Shipyard	0.052	-1.58%	0.070	0.25%	0.098
Batelco	0.717*	11.76%	0.594*	10.89%	1.706
Bahrain Maritime	0.208**	1.16%	0.170**	1.15%	0.425
Bahrain Cinema	0.250**	2.57%	0.159	0.87%	0.522
Bahrain Car park	0.169	1.80%	0.063	-0.24%	0.375
Duty Free	0.243**	1.54%	0.159**	1.23%	0.482
Nass Company	0.571*	2.98%	0.575*	2.84%	1.530

Seef Real Estate	0.340*	2.06%	0.293*	2.17%	0.843
Trafo	0.066	-0.15%	0.053	-0.23%	0.183

Note. *** Significant at 0.001, **Significant at 0.05, *Significant at 0.10.

The estimated betas of the sample companies using MSCI as the market proxy are shown in Table 2. The results are based on the daily rates of return. A t-test was used to test the sensitivity of estimated betas to the market proxy used in the market model. The estimated betas were compared using the three procedures, namely regular betas, betas that are based on rates of return adjusted for thin trading and Scholes-Williams. The results provide evidence in support of the null hypothesis which states that the betas estimated using the All-Share Index and MSCI are not significantly different from each other at the five per cent significance level. However, the results may not be generalized because only two market proxies are used in the analysis.

3.5 The Effect of Seasonality

A considerable body of research provides evidence suggesting that beta is not the only factor that affects the pricing of returns on securities, but that there are also seasonal and firm size effects. It has been noted that seasonality is an explanatory factor of risk-adjusted returns. Brailsford et al. (1997) provide examples of large returns in January and low returns on Mondays and Tuesdays.

To remove the seasonality effect, it is customary to include dummy variables in the ordinary least squares (OLS) regression. Draper and Paudyal (1995) found that UK stock betas have day of the week or day of the month effects when using weekly or monthly observation, respectively. They also noted that the variation in the estimates is often statistically significant and that estimates from weekly returns calculated on Monday or at the end of the month were significantly different from those derived for other days of the week or selected days of the month. The results reported by Asamoah and Quartey-Papafio (2011) lend further support to the findings of Draper and Paudyal (1995). They found that estimated betas are sensitive to the day-of-the-week effect. To test the seasonality effect, betas were estimated for the sample companies using weekly rates of return with the purpose of testing the following null hypothesis:

$$\beta_{\text{Sunday}} = \beta_{\text{Monday}} = \beta_{\text{Tuesday}} = \beta_{\text{Wednesday}} = \beta_{\text{Thursday}}$$

The estimated betas using weekly rate of returns are shown in Tables 6 to 10. Analysis of variance (ANOVA) is used to test the null hypothesis that estimated betas are not affected by the-day-of-the-effect, while a t-test is used to test the null hypothesis that there is no significant difference between each pair of days of the week. The results of these tests are reported in Table 6 to 10. The evidence shown indicates that the null hypotheses cannot be rejected at the five per cent level of significance.

Table 6. Comparison of estimated betas (Regular beta, Thin-trading, Sholes-Williams) with All-Share Index for Bahrain Bourse as market proxy (using weekly rate of return) and weekly rate of return–Sunday

Company Name	Regular Beta	Adj. R-Sq.	Thin Beta	Adj. R-Sq.	Scholes and Williams Beta
Ahli United Bank	2.146*	52.66%	1.955*	52.66%	6.217
Bank of Bahrain and Kuwait	0.654*	16.23%	0.541*	16.37%	1.562
Bahrain Islamic Bank	0.545*	3.08%	0.395**	1.86%	1.354
National Bank of Bahrain	0.677*	12.70%	0.546*	12.01%	1.618
Alsalam Bank	1.648*	11.03%	1.650*	3.09%	4.386
Bahrain Saudi Bank	0.532*	14.10%	0.284**	6.69%	1.263
Ithmar Bank	1.405*	8.80%	1.358*	4.71%	3.604
Khaliji Commercial Bank	0.598*	7.01%	0.609*	6.61%	1.932
Banader Hotels	(0.042)	-0.74%	(0.050)	-0.59%	(0.082)
Bahrain Hotels	0.323**	5.86%	0.192*	6.77%	0.389
Bahrain Tourism Company	0.335*	8.96%	0.168*	6.78%	0.606
Family Leisure	0.441*	26.25%	0.315*	24.29%	0.844
National Hotels	(0.098)	-1.02%	(0.018)	-4.57%	(0.162)
Alba	2.384*	25.18%	2.704*	21.14%	6.531
Bahrain Flour Mills	0.104	-2.69%	0.041	-3.63%	0.183
Delomon Poultry	0.130	0.93%	0.071	0.16%	0.329
Ahlia Insurance company	0.500*	24.33%	0.467*	29.70%	1.223
Arab Insurance group	0.438**	3.98%	0.195***	1.31%	0.817

Bahrain & Kuwait Insurance	0.113	-1.13%	0.035	-2.22%	0.201
Bahrain National Hotel	0.255***	2.70%	0.190**	5.09%	0.555
Arab Banking Corporation	0.548*	6.11%	0.160	0.10%	0.978
Baraka Group	0.760*	4.40%	0.546*	3.92%	1.441
Bahrain Commercial	0.309**	3.65%	0.068	-0.05%	0.480
Bahrain Middle East Bank	0.329	-2.80%	0.199**	19.68%	1.053
Esterad	1.106*	11.38%	0.978*	9.08%	2.629
Gulf Finance House	(1.052)	0.22%	0.663	0.41%	(2.689)
Inovest	0.692**	2.37%	0.644**	1.95%	1.879
Invest Corp	0.689*	42.99%	0.451*	32.38%	1.009
United Gulf bank	0.671*	7.02%	0.328**	2.90%	1.226
United Gulf Industries	0.266	0.13%	(0.056)	-1.29%	0.299
Bahrain Shipyard	0.013	-4.52%	(0.016)	-4.43%	0.029
Batelco	0.509*	8.51%	0.494*	7.36%	1.299
Bahrain Maritime	0.025	-0.61%	0.003	-0.63%	0.058
Bahrain Cinema	0.375***	4.14%	0.178	0.25%	0.742
Bahrain Car park	0.236***	6.64%	0.213**	9.89%	0.627
Duty Free	0.126	-0.14%	0.078	-0.42%	0.298
Nass Company	0.919*	5.75%	0.622*	3.36%	2.007
Seef Real Estate	0.533*	6.05%	0.474	6.00%	1.555
Trafo	0.275**	3.24%	0.116	0.27%	0.481

Note. *** Significant at 0.001, **Significant at 0.05, *Significant at 0.10.

Table 7. Comparison of estimated betas (Regular beta, Thin-trading, Sholes-Williams) with all-share index for Bahrain Bourse as market proxy (using weekly rate of return) and weekly rate of return–Monday

Company Name	Regular Beta	Adj. R-Sq.	Thin Beta	Adj. R-Sq.	Scholes and Williams Beta
Ahli United Bank	2.135*	48.69%	1.744*	48.05%	5.671
Bank of Bahrain and Kuwait	0.518*	9.72%	0.358*	8.66%	1.098
Bahrain Islamic Bank	0.954*	9.56%	0.802*	8.82%	2.430
National Bank of Bahrain	0.513*	8.32%	0.444*	7.73%	1.265
Alsalam Bank	1.656*	11.66%	1.849*	4.09%	4.278
Bahrain Saudi Bank	0.692*	23.42%	0.533*	19.00%	1.834
Ithmar Bank	1.287*	6.81%	1.177*	3.51%	3.167
Khaliji Commercial Bank	0.724*	8.33%	0.665*	8.42%	1.870
Banader Hotels	0.036	-0.72%	(0.011)	-0.77%	0.077
Bahrain Hotels	0.266**	3.11%	0.182**	4.05%	0.342
Bahrain Tourism Company	0.309*	6.66%	0.194**	5.46%	0.598
Family Leisure	0.570*	41.06%	0.423*	50.65%	1.131
National Hotels	(0.073)	-2.58%	(0.044)	-2.32%	(0.120)
Alba	2.443*	26.73%	3.016*	16.26%	4.956
Bahrain Flour Mills	0.053	-3.34%	0.030	-3.38%	0.116
Delomon Poultry	0.109	-1.79%	0.067	-2.51%	0.215
Ahlia Insurance company	0.474*	13.22%	0.314*	18.55%	0.911
Arab Insurance group	0.564*	8.08%	0.339*	5.78%	1.037
Bahrain & Kuwait Insurance	0.134	0.20%	0.071	0.22%	0.212
Bahrain National Hotel	0.165	0.97%	0.075	0.35%	0.323
Arab Banking Corporation	1.059*	31.29%	0.918*	40.75%	2.589
Baraka Group	0.671*	4.32%	0.570*	3.83%	1.431
Bahrain Commercial	0.359*	5.83%	0.211**	4.71%	0.636
Bahrain Middle East Bank	0.424	-2.53%	0.079	-5.05%	0.550
Esterad	1.188*	14.46%	1.104*	13.71%	2.856
Gulf Finance House	(1.151)	0.38%	0.624	0.30%	(3.119)
Inovest	0.981*	4.61%	0.905*	4.55%	2.367
Invest Corp	0.782*	41.78%	0.743*	51.90%	1.416
United Gulf bank	0.619*	6.39%	0.324***	2.29%	1.205

United Gulf Industries	0.506***	3.65%	0.145	0.00%	0.765
Bahrain Shipyard	(0.123)	-1.82%	(0.062)	-2.03%	(0.347)
Batelco	0.666*	11.54%	0.580*	11.68%	1.709
Bahrain Maritime	(0.011)	-0.66%	(0.094)	0.06%	(0.025)
Bahrain Cinema	0.299	2.38%	0.087	-1.23%	0.544
Bahrain Car park	0.080	-1.72%	0.019	-2.54%	0.227
Duty Free	0.196	0.95%	0.131	0.70%	0.444
Nass Company	1.111*	8.09%	0.917*	7.20%	2.358
Seef Real Estate	0.376**	2.69%	0.338*	3.14%	1.123
Trafco	0.247**	3.39%	0.117	0.62%	0.497

Note. *** Significant at 0.001, **Significant at 0.05, *Significant at 0.10.

Table 8. Comparison of estimated betas (Regular beta, Thin-trading, Sholes-Williams) with all-share index for Bahrain Bourse as market proxy (using weekly rate of return) and weekly rate of return–Tuesday

Company Name	Regular Beta	Adj. R-Sq.	Thin Beta	Adj. R-Sq.	Scholes and Williams Beta
Ahli United Bank	2.130*	44.33%	1.709*	0.000%	5.062
Bank of Bahrain and Kuwait	0.596*	14.01%	0.471*	0.000%	1.213
Bahrain Islamic Bank	0.768*	6.78%	0.670*	0.015%	2.112
National Bank of Bahrain	0.418*	5.51%	0.358*	0.067%	1.085
Alsalam Bank	1.693*	12.19%	1.746*	0.091%	4.067
Bahrain Saudi Bank	0.487*	7.81%	0.425*	0.358%	1.454
Ithmar Bank	1.497*	8.75%	1.265*	0.065%	3.477
Khaliji Commercial Bank	0.991*	11.49%	0.854*	0.000%	2.567
Banader Hotels	0.011	-0.73%	(0.051)	57.095%	0.029
Bahrain Hotels	0.177	0.69%	0.141	12.214%	0.098
Bahrain Tourism Company	0.393*	11.41%	0.207*	0.163%	0.702
Family Leisure	0.564*	60.18%	0.430*	0.000%	2.023
National Hotels	(0.133)	1.95%	(0.094)	15.429%	(0.239)
Alba	2.764*	34.65%	3.581*	0.006%	5.119
Bahrain Flour Mills	0.042	-3.00%	0.031	80.405%	0.087
Delomon Poultry	0.167	1.61%	0.089	34.229%	0.329
Ahlia Insurance company	0.133	-0.72%	0.070	54.352%	0.299
Arab Insurance group	0.741*	21.86%	0.688*	0.000%	1.646
Bahrain & Kuwait Insurance	0.249**	12.12%	0.178*	0.904%	0.562
Bahrain National Hotel	0.086	-0.75%	0.010	86.827%	0.152
Arab Banking Corporation	1.110*	42.30%	1.011*	0.000%	3.392
Baraka Group	0.584**	2.89%	0.565*	0.932%	1.358
Bahrain Commercial	0.410*	7.51%	0.288*	0.340%	0.915
Bahrain Middle East Bank	0.608***	11.57%	0.531	15.009%	1.069
Esterad	1.163*	11.22%	0.903*	0.001%	2.291
Gulf Finance House	(1.215)	0.49%	0.670	17.951%	(3.068)
Inovest	1.320*	8.66%	1.139*	0.005%	2.620
Invest Corp	1.030*	55.69%	0.194**	2.614%	1.276
United Gulf bank	0.555*	6.21%	0.529*	0.556%	1.292
United Gulf Industries	0.140	-0.71%	0.133	53.429%	0.394
Bahrain Shipyard	(0.127)	-0.84%	(0.092)	27.655%	(0.280)
Batelco	0.890*	19.24%	0.679	0.000%	2.100
Bahrain Maritime	0.280**	3.23%	0.114*	15.321%	0.491
Bahrain Cinema	0.517*	12.44%	0.405*	0.717%	1.056
Bahrain Car park	0.175	-0.19%	0.005	95.302%	0.348
Duty Free	0.247***	1.78%	0.170	11.373%	0.532
Nass Company	0.912*	5.61%	0.635*	0.050%	1.704
Seef Real Estate	0.557*	9.31%	0.590*	0.001%	1.650
Trafco	0.210	1.54%	0.058	56.273%	0.397

Note. *** Significant at 0.001, **Significant at 0.05, *Significant at 0.10.

Table 9. Comparison of estimated betas (Regular beta, Thin-trading, Sholes-Williams) with All-Share Index for Bahrain Bourse as market proxy (using weekly rate of return) and weekly rate of return–Wednesday

Company Name	Regular Beta	Adj. R-Sq.	Thin Beta	Adj. R-Sq.	Scholes and Williams Beta
Ahli United Bank	2.250*	48.42%	1.876	0.000%	6.045
Bank of Bahrain and Kuwait	0.677*	16.96%	0.515*	0.000%	1.358
Bahrain Islamic Bank	0.600*	5.06%	0.559*	0.078%	1.525
National Bank of Bahrain	0.554*	10.01%	0.447*	0.000%	1.439
Alsalam Bank	1.708*	13.60%	2.061*	0.007%	4.435
Bahrain Saudi Bank	0.598*	12.19%	0.458*	0.087%	1.554
Ithmar Bank	1.680*	12.04%	1.490*	0.005%	4.377
Khaliji Commercial Bank	0.881*	11.65%	0.856*	0.000%	2.684
Banader Hotels	0.016	-0.70%	0.006	94.640%	0.042
Bahrain Hotels	0.249**	2.79%	0.161***	9.411%	0.249
Bahrain Tourism Company	0.382*	8.60%	0.150**	1.396%	0.660
Family Leisure	0.396*	27.62%	0.258**	1.088%	0.713
National Hotels	(0.052)	-1.53%	(0.043)	48.069%	(0.104)
Alba	3.172*	48.01%	4.236*	0.000%	6.952
Bahrain Flour Mills	0.072	-2.45%	0.037	77.268%	0.153
Delomon Poultry	0.378*	24.11%	0.207*	0.409%	0.751
Ahlia Insurance company	0.125	-0.29%	0.060	53.656%	0.274
Arab Insurance group	0.624*	12.30%	0.497*	0.000%	1.555
Bahrain & Kuwait Insurance	0.121	0.19%	0.070	31.652%	0.194
Bahrain National Hotel	0.143	0.05%	0.088	27.847%	0.292
Arab Banking Corporation	0.404**	4.22%	0.119	41.883%	0.766
Baraka Group	0.635*	3.78%	0.636*	0.157%	1.625
Bahrain Commercial	0.260**	3.02%	0.109	15.794%	0.468
Bahrain Middle East Bank	0.164	-3.45%	0.423	15.975%	0.776
Esterad	0.902*	9.53%	0.971*	0.009%	2.304
Gulf Finance House	(1.189)	0.52%	0.666	14.064%	(3.146)
Inovest	1.200*	7.68%	1.382*	0.003%	2.947
Invest Corp	0.849*	44.37%	0.534**	3.987%	1.090
United Gulf bank	0.792*	12.62%	0.807*	0.000%	1.830
United Gulf Industries	0.103	-1.00%	0.101	62.368%	0.282
Bahrain Shipyard	(0.101)	-1.24%	(0.125)	15.022%	(0.212)
Batelco	0.741*	16.91%	0.671*	0.000%	1.980
Bahrain Maritime	0.212**	1.55%	0.114	16.891%	0.391
Bahrain Cinema	0.605*	14.92%	0.538*	0.053%	1.461
Bahrain Car park	0.202	1.75%	0.045	60.067%	0.390
Duty Free	0.255***	1.78%	0.181***	9.265%	0.509
Nass Company	0.780*	4.79%	0.721*	0.027%	1.942
Seef Real Estate	0.379*	2.85%	0.339*	0.824%	0.988
Trafco	0.312*	4.69%	0.165***	7.533%	0.577

Note. *** Significant at 0.001, **Significant at 0.05, *Significant at 0.10.

Table 10. Comparison of estimated betas (Regular beta, Thin-trading, Sholes-Williams) with all-share index for Bahrain Bourse as market proxy (using weekly rate of return) and weekly rate of return–Thursday

Company Name	Regular Beta	Adj. R-Sq.	Thin Beta	Adj. R-Sq.	Scholes and Williams Beta
Ahli United Bank	2.288*	52.66%	1.986*	52.97%	6.029
Bank of Bahrain and Kuwait	0.629*	11.86%	0.413*	10.38%	1.248
Bahrain Islamic Bank	0.524*	3.23%	0.434**	2.59%	1.378
National Bank of Bahrain	0.436*	6.16%	0.348*	5.44%	1.096
Alsalam Bank	1.698*	11.89%	1.833*	4.25%	4.402
Bahrain Saudi Bank	0.447*	6.35%	0.244**	3.73%	1.092
Ithmar Bank	1.413*	9.11%	1.265*	4.18%	3.829
Khaliji Commercial Bank	0.699*	8.15%	0.729*	7.97%	2.360

Banader Hotels	0.050	-0.57%	0.000	-0.68%	0.108
Bahrain Hotels	0.325*	5.38%	0.266*	5.22%	0.317
Bahrain Tourism Company	0.303*	4.88%	0.118**	2.26%	0.495
Family Leisure	0.396*	19.49%	0.238*	20.95%	0.739
National Hotels	(0.073)	-1.05%	(0.055)	-0.64%	(0.139)
Alba	2.926*	46.18%	4.089*	48.80%	9.950
Bahrain Flour Mills	0.072	-1.94%	0.050	-2.01%	0.144
Delomon Poultry	0.264**	11.68%	0.141***	6.68%	0.514
Ahlia Insurance company	0.126	-0.36%	0.033	-1.36%	0.268
Arab Insurance group	0.459*	4.18%	0.196***	1.57%	0.819
Bahrain & Kuwait Insurance	0.148	0.67%	0.094	0.20%	0.276
Bahrain National Hotel	0.212***	1.85%	0.138**	2.95%	0.450
Arab Banking Corporation	0.455*	4.84%	0.054	-0.66%	0.778
Baraka Group	0.686*	4.15%	0.647*	4.70%	1.902
Bahrain Commercial	0.278**	2.30%	0.072	0.05%	0.438
Bahrain Middle East Bank	0.271	-1.03%	0.315	2.51%	0.745
Esterad	0.723*	5.38%	0.628*	2.85%	1.869
Gulf Finance House	(1.161)	0.64%	0.520	0.15%	(2.949)
Inovest	1.116*	6.91%	1.233*	7.98%	2.790
Invest Corp	0.854*	46.86%	0.893*	45.92%	1.382
United Gulf bank	0.518*	4.23%	0.331**	2.11%	1.036
United Gulf Industries	0.021	-1.16%	(0.037)	-1.12%	0.035
Bahrain Shipyard	0.032	-2.29%	0.043	-1.32%	0.030
Batelco	0.561*	10.89%	0.578*	10.53%	1.501
Bahrain Maritime	0.304*	3.33%	0.238*	3.07%	0.678
Bahrain Cinema	0.397**	5.28%	0.285***	3.23%	0.847
Bahrain Car park	0.257**	6.19%	0.153***	3.43%	0.601
Duty Free	0.207	0.63%	0.135	0.55%	0.388
Nass Company	1.053*	10.02%	1.065*	9.08%	2.653
Seef Real Estate	0.612*	10.59%	0.614*	10.91%	1.762
Trafco	0.339*	4.73%	0.217**	3.02%	0.680

Note. *** Significant at 0.001, **Significant at 0.05, *Significant at 0.10.

4. Conclusion

Ever since the seminal work by Markowitz (1959) beta has occupied center stage in both risk management and risk measurement. The parameter beta is used in finance in the form of the market model to estimate systematic risk, which risk determines the rate of return of individual stocks and portfolios. Although such betas are assumed to be time invariant, considerable evidence shows that beta risk is not constant over time. This violates one of the important assumptions on which its use depends. Beta estimation has traditionally been obtained by running a single regression model in which the rate of return of a company's stock as the dependent variable and the market rate of return is the independent variable. The beta of a stock is important in a variety of contexts, such as the determination of the cost of capital, project evaluation, a company's valuation in asset pricing theory and hedging using index derivatives.

The aim of the present study is to consider the effects of various issues on the estimated betas of companies listed on the Bahrain Bourse. Those issues are 1) the length of the estimated period, 2) the effect of the period of returns (daily, weekly and monthly) 3) the effect of the market proxy, 4) the effect of thin trading and 5) the effect of seasonality represented by the day of the week effect.

The results show that, 1) using three different time periods to estimate betas, that those estimates are not sensitive to the length of period used; 2) the betas estimated using daily, monthly or weekly returns are not significantly different; 3) betas estimated using the All-Share Index and MCSI are not significantly different from each other; 4) estimated betas are not sensitive to the day-of-the-week effect. Finally, stocks listed on the Bahrain Bourse are thinly traded and hence the impact of this characteristic on estimated betas was examined. It is found that the impact of thin trading on beta depends on the method used to account for thin trading.

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