The Gap between the Returns that Calculated by Capital Asset Pricing Model and the Actual Returns in Abu Dhabi Securities Exchange (ADX): Evidence from the United Arab Emirates

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Abstract

This study aimed to compare the Historical Returns (Rit) in companies listed in Abu Dhabi Securities Exchange (ADX) with the return which calculated by Capital Asset Pricing Model (E(Rit)) for the same companies and periods, and trying to figure out the level of dispersion, distortions and differences between them, and trying to figure out the strengths and weaknesses for the CAPM to explain the variances which happened in the Annual Return.

The researcher used the time series analysis to achieve the target of this study, using Microsoft Office Excel software to introduce some figure and graphs which considered as output from Scatter charts, which are often used to find out if there's a relationship between variable X and Y to make judgment on the gap between the variables mentioned before.

The researcher found that in the most of the study sample firms the capital asset pricing model could not to predict the returns were generated by companies in Abu Dhabi Securities Exchange (ADX), except in the banking sector, the result was amazing because the graphs which output from the time series analysis show the ability of CAPM to predict the Historical Returns, they were very closed and they Walking in the same direction without volatility.

After the results appear in the time-series analysis researcher can says that there are weaknesses in the ability of CAPM to predict the returns in the financial markets which consistent with the (Fama & French, 1992) and with most studies conducted in this regard, but the model shows high ability to predict the returns in the banking sector. Therefore, the researchers can generalization this result on the financial markets in the United Arab Emirates.

Keywords: Abu Dhabi Securities Exchange (ADX), Capital Asset Pricing Model (CAPM), Expected Return (E(Rit), Historical Returns (Rit), Risk (β).

JEL classification: G20, G21, G24, G30, G31

1. Introduction

The capital asset pricing model (CAPM) is a mathematical model which describes the hypothetical relationship between risk and expected return for financial assets, especially stocks, it extensively used in finance management field for the estimation of securities that include risk, therefore, this model takes into account the risks involved on capital which used in the investment in securities. CAPM, introduced a theoretical exemplification of the conduct of securities, it can be used in assess a firm's cost of equity capital. In spite of restriction, this model can be an advantageous supplement to several parties like financial managers, investors, Prospective shareholders, Creditors and Potential lenders.

The charisma of the CAPM is that it offering strong satisfactory prognostications for how to measurement involved risk and the relationship between the most important items in the finance field expected return and risk. Unluckily, the experimental record in this model is inferior enough to decline the method it is used in implementations. The CAPM's experimental troubles might reflect theoretical weakness, because of many

simplify assumptions, but some of these reasons maybe also appear by difficulties in achievement valid tests of this model.

The CAPM constructs on the model of portfolio select progressed by Harry Markowitz (1959). In this model, the choice of investors to choose portfolio at period t-1 that generates a random return at t. The Markowitz model suppose all investors are risk aversion and, when they have many choices to select between portfolios, they only concern about the (mean, variance) of their (t) period investment return, especially for one time investment, so, the Markowitz model is often called a (mean-variance) model.

The CAPM was introduced by Jack Treynor (1961, 1962), William F. Sharpe (1964), John Lintner (1965) and Jan Mossin (1966) separately. In the regarding of the CAPM's assumptions, the scholars mentioned before agreed on a number of assumptions, the most important of these assumptions that all participants in the financial market have the same target mainly is to maximize wealth, and the investors rational in addition to risk-averse, and their investment are widely diversified, in addition that all investors are price takers which is mean they cannot effect in securities prices, the processes of lend and borrow will be done under the interest equal risk free rate, all transactions devoid of taxation costs, all securities are completely capable of being divided and liquid, all investors have identical expectations, and the last assumption for this model perfectly linked with the market efficiency especially the strong form efficiency market where this model assumes that all information are available timely to all investors at the same degree of accuracy.
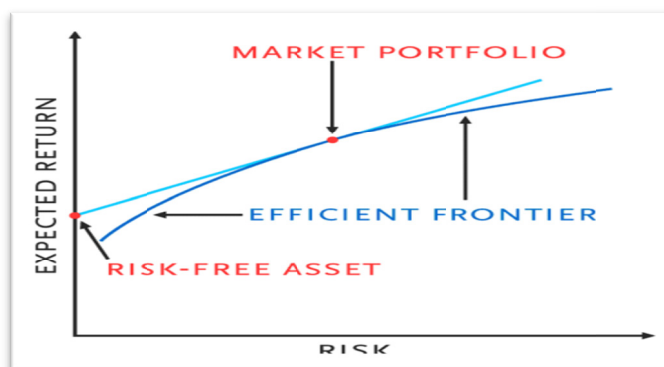

Figure 1. Capital Asset Pricing Model & the relationship between Risk & Return.

Many of experimental tests show market distortions like the effect of size and value of firms that cannot be demonstrate and explained by the capital asset pricing model.(Fama & French, 1992) in the three-factor model. Through this idea, the researcher will try in this study to figure out the possibility of predicting the returns in the Abu Dhabi Securities Exchange (ADX), by comparing the returns calculated by the CAPM and the historical returns for the same firms & periods, to find out the extent of the differences and distortions that occur in this financial market which is classified as an emerging market.

2. Literature Review

A many Literatures have shown that non varied skewness and kurtosis shows a significant role in security estimation. (Fang & Lai, 1997) derived a four-moment CAPM and it was shown that methodical variance, methodical skewness and methodical kurtosis engage to the risk premium of securities. (Christie & Chaudhry, 2001) they display that the third and fourth moments explain the return-producing process in the financial markets well. All Investors are mostly recompensed for taking risk as assessing by high methodical variance and methodical kurtosis. They also keep the expected returns E(Rit) for taking the profit of a positively skewed market (Arditti, 1971). It also has been documented that skewness and kurtosis cannot be various away by growing the magnitude of portfolios.

According to the (Ferson & Harvey, 1991) study of US bond and stocks returns, they discovered that the timing of variation in the risk premium is more significant than the changes in the betas. That's why equity premium of risk was set to modify with market situation and business cycles.

(Schwert, 1989) imputed differential risk premium between up and down markets to varying methodical risk over the business rotation. (Friend and Blume, 1970) and (Black, Jensen and Scholes, 1972) study the portfolios behavior, not only the individual securities. Expected returns and market betas collect in the same method in portfolios, if the CAPM demonstrates securities returns it can demonstrates portfolio returns. (Fama & French, 1992) in this paper they discuss the relationship between beta and expected return may be even adulate than the

one reported by the early experimental literature. That idea was however defy in 1995 by Kothari et al. (Fama and French, 2004) that the reported effects sound to lack a theoretical base.

3. The study objective

This study aims to compare the historical returns in companies listed in Abu Dhabi Securities Exchange (ADX) with the return calculated by Capital Asset Pricing Model for the same companies and the same period, and trying to figure out the level of dispersion, distortions and differences between them, and trying to figure out the strengths and weaknesses for the CAPM to explain the variances which happened in the Annual Return. At the local level, this study is the first attempt to discuss the differences between the historical returns & the return calculated by CAPM.

4. The Study Model

Figure 2 below shows the virtual model for this study to achieve the object of this research, which explain two main variable of this study the 1st one is the historical return (Actual return), and the 2nd is the return calculated by CAPM, for the same companies and the same periods:
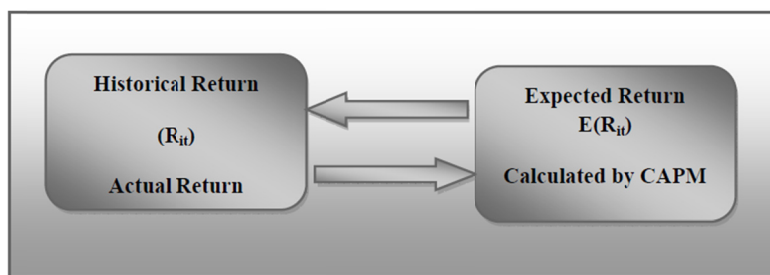

Figure 2. The virtual model of the study, Source: made by researcher

From the Figure 2 above, it's clear that this study looking for make comparison between the (Rit: The Actual Return) and (E(Rit): the Return calculated by CAPM) for the sample will take randomly from the companies listed in the ADX.

5. The Population & Sample of the Study

5.1 The Study Population

The Population of this study is the companies listed in Abu Dhabi Securities exchange, this financial market was established in November 15, 2000 for trading shares and bonds of local and foreign companies.

5.2 The Study Sample

The Sample of this study includes random companies taken from listed companies in Abu Dhabi Securities exchange. There are many sectors in the Abu Dhabi Securities Exchange (ADX), But it consider a small number companies in this financial market compared to other markets, so the researcher takes approximately 48% as random sample from the a whole companies listed in (ADX). The table1 below includes the study sample:

Table 1. The Study Sample

SR	Sector	Symbol	Company
1	Services	ADAVIATION	Abu Dhabi Aviation Co.
2	Insurance	ABNIC	Al Buhaira National Insurance
3	Services	ADNH	Abu Dhabi National Hotels
4	Insurance	ADNIC	Abu Dhabi National Insurance Co.
5	Industrial	ADSB	Abu Dhabi Ship Building PJSC
6	Consumer Staples	AGTHIA	AGTHIA GROUP PJSC
7	Banks	ADCB	Abu Dhabi Commercial Bank
8	Banks	ADIB	Abu Dhabi Islamic Bank

Source: made by researcher

6. The Study Method

The researcher used the time series analysis to achieve the target of this study; he found it the most appropriate way for this type of research, below the steps that the researcher goes through it in the next sections:

6.1 The first step: Collect the historical return from the secondary resources of data, which published from the

Abu Dhabi Security Exchange (ADX), these monthly data collected for the study sample that includes eight companies listed in ADX for the period (2008-2015).

6.2 *The second step*: calculate the Annual return from the monthly return that collected in the first step, for the study sample using the Holding Period Return (HPR).

6.3 *The third step*: calculate the Beta (systematic Risk) for the companies in the study sample, for the same period above, using the covariance of the return of an asset and the return of the industry index divided by the variance of the return of the industry index over a study period.

6.4 *The fourth step*: getting the risk free rate (Rf) from the Central Bank in Abu Dhabi for the years including in this study (2008-2015), it equals the Interest Rate for the Treasury Bills that issued from the CB in Abu Dhabi.

6.5 *The fifth step*: getting the industry index for each sector used in this study as shown in Table (1) from the ADX for the years including in sample (2008-2015).

6.6 *The sixth step*: calculate the E(Rit) Expected Return for each company in the study sample using the CAPM. Because the Variables that need to use CAPM equation become existed in the previous steps

6.7 *The seventh step*: the researcher will use the output in the previous steps especially the Historical Return (Rit) and the Expected Return E(Rit) to achieve the time series analysis, by insert the output these information to the Microsoft Office Excel software, and from the result of the Graphics which produced by Excel software then the researcher can make the comparison between the variables above.

7. The Study Variables

The variables of this study as following:

7.1 *The Historical Return*: the returns which actually earned by investors in the study period, in this regard the researcher used the HPR equation to calculate this variable:

$$\text{Rit} = \frac{P(t) - P(t-1)}{P(t-1)} \tag{1}$$

Whereas,

R_{it}: return on acquisition period representing return on stock

$P_{(t)}$: stock price at the end of year

$P_{(t-1)}$: stock price at the beginning year

7.2 *The Systematic Risk (Beta)*: to calculate the Beta for the companies in the study sample the researcher used the covariance equation as following:

$$\beta = \frac{Covariance\ (Rit, Rm)}{Variance\ of\ Market} \tag{2}$$

Whereas,

β: Systematic Risk

Covariance (R_{it}, R_m): the covariance of the return of an asset and the return of the industry index

Variance of Market: the variance of the return of the industry index

7.3 *The Expected Return*: after the researcher get the Beta (β), Risk free rate (R_f) and the industry index (Rm), he used the CAPM to calculate the Expected Return for the study period for all companies in the study sample as following:

$$E(R\,it) = Rf + \beta * (Rm - Rf) + \acute{e} \tag{3}$$

Where,

$E(R_{it})$: Expected Return for the Company (i), Period (t)

R_f: Risk free rate

R_m: industry index

$\acute{e}$: Random Error

8. Discussion the Results

After using the Software Excel to draw the disparity between the Historical Return in the ADX and the Expected Return calculated by CAPM in the same market for the same companies which include in the study sample, the researcher divide results discussion to be each company separately, the following figures show the Differences between the actual values of return and the values calculated for the return using CAPM for each company in the study sample:

*8.1 The 1st Company: **ADAVIATION***
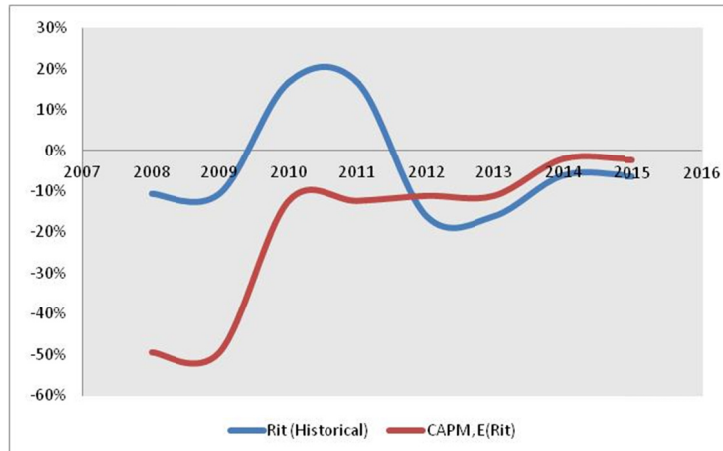
Figure 3. Scatter chart output from Microsoft Office Excel software for the ADAVIATION Company

ADAVIATION: this Symbol indicates to the Abu Dhabi Aviation Co. it is one of the Abu Dhabi companies in the Services sector, after calculate the E(Rit) using CAPM and calculate (Rit) using HPR and make comparison between them using Excel software especially Scatter charts which are often used to find out if there's a relationship between variable X and Y to make judgment on the gap between the variables mentioned before which are governed by TIME SERIES.

Given the figure above researcher found that the time series can be divided into two main periods the first from 2008 to 2012 and the second from 2012 to 2015. In the first period the gap between the (Rit) and E(Rit) it was very high and the Historical Return (Rit) exceed the Expected Return E(Rit).

This case shows the weakness of CAPM to predict the return in the ADX, but in the second period the E(Rit) exceed the (Rit) but they were very closed to each, the researcher can say in the second period the gap in not significant. Which means the CAPM was able to predict the returns in period of (2012-2015).

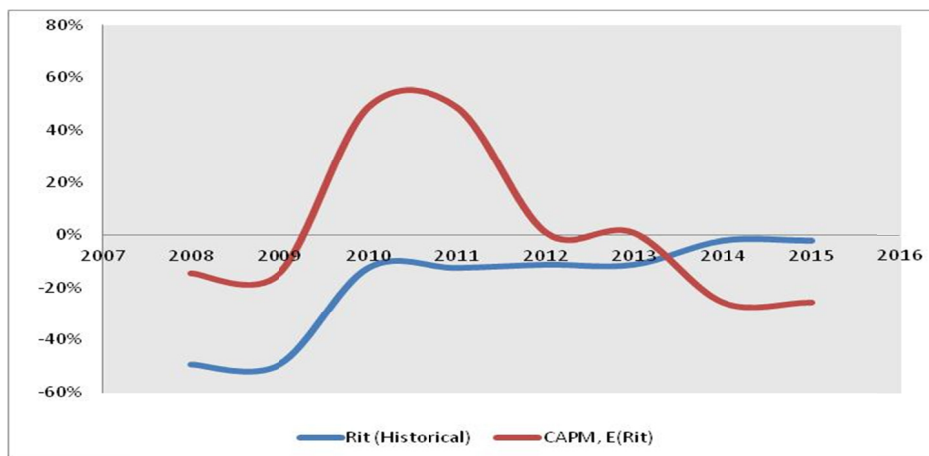*8.2 The 2nd company: **ABNIC***

Figure 4. Scatter chart output from Microsoft Office Excel software for the ABNIC Company

ABNIC: this Symbol indicates to the Al Buhaira National Insurance it is one of the Abu Dhabi companies in the Insurance sector, given the figure above researcher found that the time series can be divided into two main periods the first from 2008 to 2013 and the second from 2013 to 2015. In the first period the gap between the (Rit) and E(Rit) it was very high and the Expected Return E(Rit) exceed Historical Return (Rit) this case shows

the weakness of CAPM to predict the return in the ADX, but in the second period the (Rit) exceed E(Rit), which shows the weakness of CAPM too. That means the CAPM wasn't able to predict the returns in period of time series (2008-2015).

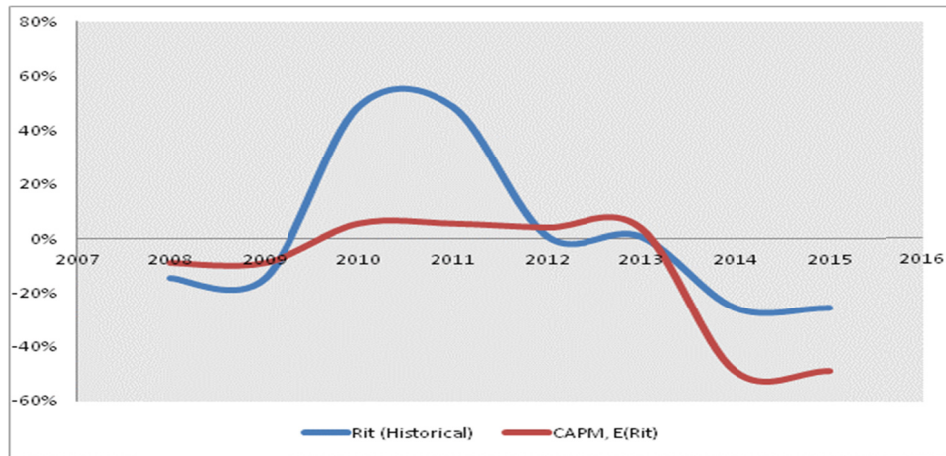*8.3 The 3rd company: **ADNH***

Figure 5. Scatter chart output from Microsoft Office Excel software for the ADNH Company

ADNH: this Symbol indicates to the Abu Dhabi National Hotels it is one of the Abu Dhabi companies in the Services sector, given the figure above researcher found that the time series can be divided into two main periods the first from 2009 to 2012 and the second from 2013 to 2015. In the first period the gap between the (Rit) and E(Rit) it was very high and the Historical Return (Rit) exceed the Expected Return E(Rit) this case shows the weakness of CAPM to predict the return in the ADX, and in the second period the (Rit) exceed E(Rit) too, which also shows the weakness of CAPM. That means the CAPM wasn't able to predict the returns in period of time series (2008-2015). It is good to say that the (Rit) and E(Rit) were very closed in the (2008-2009) & (2012-2013) but in the time series analysis it is not considered a one period statistically significant, so the researcher ignore these two years.

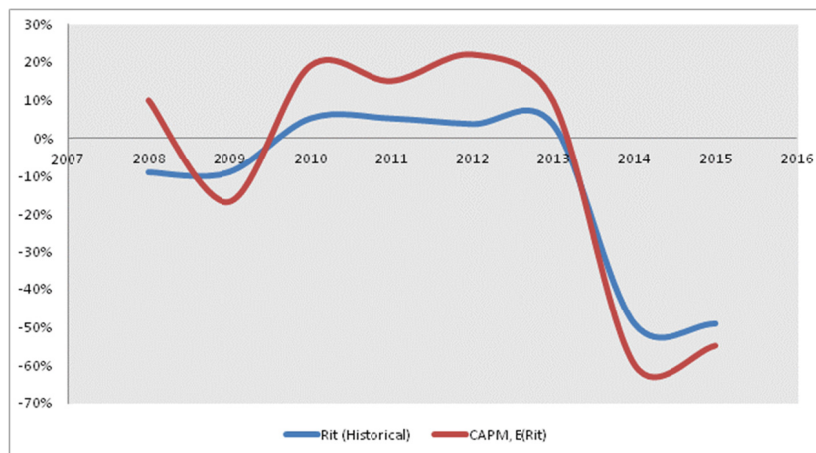*8.4 The 4th company: **ADNIC***

Figure 6. Scatter chart output from Microsoft Office Excel software for the ADNIC Company

ADNIC: this Symbol indicates to the Abu Dhabi National Insurance Co. it is one of the Abu Dhabi companies in the Insurance sector, given the figure above researcher found that the time series can be divided into two main periods the first from 2008 to 2010 and the second from 2010 to 2015. In the first period the gap between the (Rit) and E(Rit) it was very high and there was very volatility in the result, this case shows the weakness of CAPM to predict the return in the ADX, but in the second period they were very closed to each with some differences but they go hand in the same direction. Which means the CAPM was able to predict the returns in period of (2010-2015).
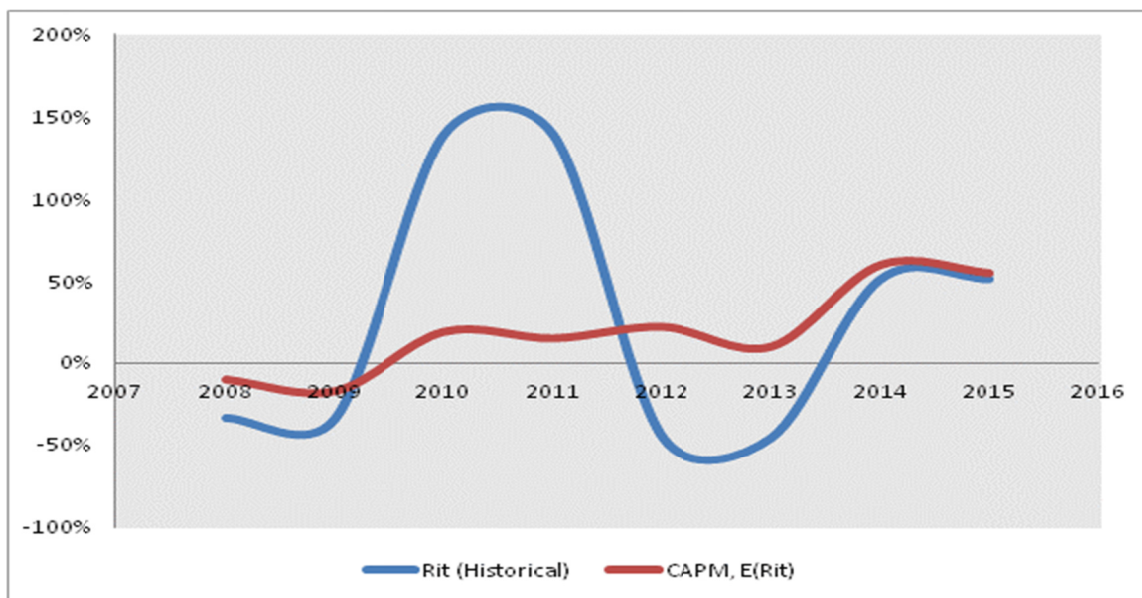
*8.5 The 5th company: **ADSB***

Figure 7. Scatter chart output from Microsoft Office Excel software for the ADSB Company

ADSB: this Symbol indicates to the Abu Dhabi Ship Building PJSC. It is one of the Abu Dhabi companies in the Industrial sector, given the figure above researcher found that the time series can be divided into two main periods the first from 2009 to 2012 and the second from 2012 to 2015. In the first period the gap between the (Rit) and E(Rit) it was very high and the Historical Return (Rit) exceed the Expected Return E(Rit), this case shows the weakness of CAPM to predict the return in the ADX, but in the second period the E(Rit) exceed the (Rit) but they were very closed to each, the researcher can say in the second period the gap in not significant. Which means the CAPM was able to predict the returns in period of (2012-2015). From the same figure above it appears that there is noticeable result in the years (2014-2015) it almost equal in returns.
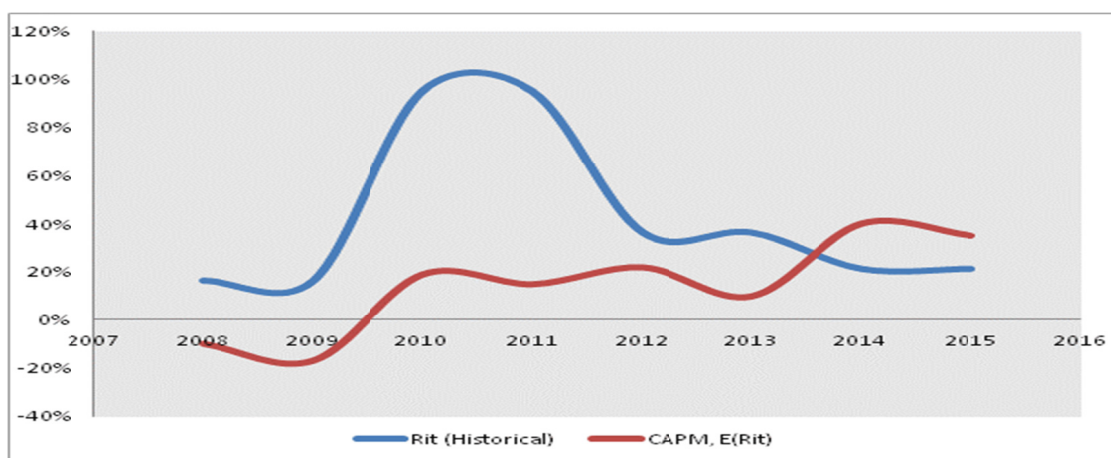
*8.6 The 6th company: **AGTHIA***

Figure 8. Scatter chart output from Microsoft Office Excel software for the AGTHIA Company

AGTHIA: this Symbol indicates to the AGTHIA GROUP PJSC. It is one of the Abu Dhabi companies in the Consumer Staples sector, given the figure above researcher found that the time series from 2008 to 2015, when make comparison between the (Rit) and E(Rit) it was very high gap and the Historical Return (Rit) almost exceed the Expected Return E(Rit), this case shows the weakness of CAPM to predict the return in the ADX for a whole period of study.

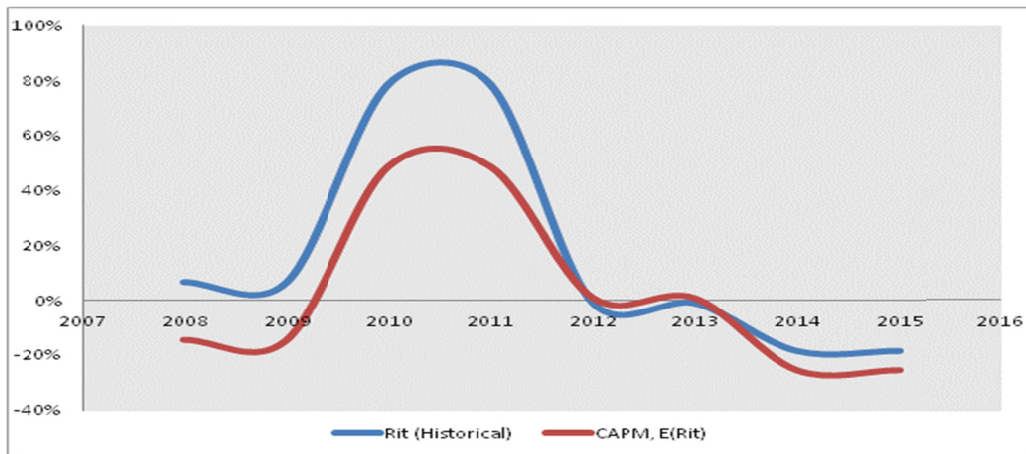*8.7 The 7th company: **ADCB***

Figure 9. Scatter chart output from Microsoft Office Excel software for the ADCB Company

ADCB: this Symbol indicates to the Abu Dhabi Commercial Bank. It is one of the Abu Dhabi companies in the bank sector, given the figure above researcher found that the time series from 2008 to 2015, when make comparison between the (Rit) and E(Rit) it was very small gap and the Historical Return (Rit) almost exceed the Expected Return E(Rit), this case shows the strong ability of CAPM to predict the return in the ADX for a whole period of study. Actually this is interesting result.
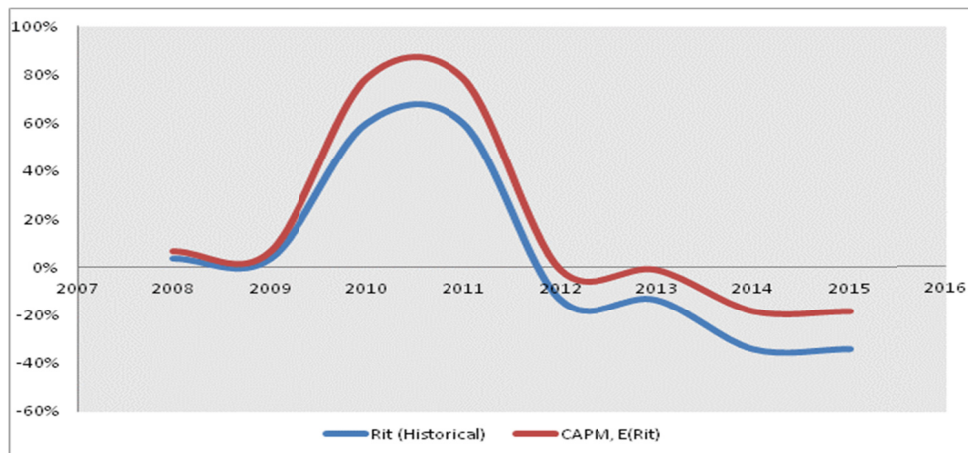
*8.8 The 8th company: **ADIB***

Figure 10. Scatter chart output from Microsoft Office Excel software for the ADIB Company

ADIB: this Symbol indicates to the Abu Dhabi Islamic Bank. It is one of the Abu Dhabi companies in the bank sector; it is interesting result too like the result in the previous bank, given the figure above researcher found that the time series from 2008 to 2015, when make comparison between the (Rit) and E(Rit) it was very small gap and the Expected Return E(Rit) exceed the Historical Return (Rit), this case shows the strong ability of CAPM to predict the return in the ADX for a whole period of study. The Returns (E(Rit) & (Rit)) went in the same direction without having fluctuated or volatility between them.

9. Conclusion

This study is the first of its kind which conducted on the Abu Dhabi Securities Exchange (ADX) where it dealt with differences between the actual returns and the expected returns calculated by capital asset pricing model, includes many sectors: Insurance, Services, Industrial, Consumer Staples and Banks, by using time series analysis that showed that the capital asset pricing model could not to predict the returns were generated by companies in Abu Dhabi Securities Exchange (ADX), except in the banking sector, it showed the ability of CAPM to predict the Historical Returns.

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