

# DEVELOPMENT THE CAPITAL ASSET PRICING MODEL ON THE EGYPTIAN STOCK EXCHANGE

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## ABSTRACT

Despite the criticisms and problems encountered with the application of Capital Asset Pricing Model model in the field of investment and financing, particularly with regard to realism and the availability of the assumptions underlying this model, the recent studies in this area were especially interested to examine and assess the status quo of this model, indicating that this model is still extensively used by financial analysts, companies and financial institutions operating in this area, and concluded that this model is one of the forms of quantitative analysis in financial decision-making in general, and investment decisions in particular, and this model is one of the most important models used to rationalize the trade-off between the securities for the purpose of investment. It also helps the investor to derive the rules of the process to make better investment decisions. This study aimed to test the capital asset pricing model in the Egyptian stock market using monthly data for a period of five years for the main index of the Egyptian Stock Exchange EGX 30, where this index includes the top thirtieth companies in terms of liquidity and activity, whereby: this study assumed that the expected return on investment in the Egyptian stock Exchange is not commensurate with the value of investing in the stock market. The study used the quantitative approach which is in the equation of simple regression to determine the coefficient of risk-formal (Beta) to achieve this goal, then used the equation of the capital asset pricing model on the companies of the study sample, also used T-test, to test the moral difference between the actual return and expected return according to the CAPM to make sure of the validity of the hypothesis that was proposed by the study. The findings of this study shows that the total of effective returns on investment for all companies of the study sample equal to (4.543), while the expected returns on investment equal to (3.660), and the relative importance of t-test equals to (0.131), that confirms acceptance of the negative hypothesis of the study, which stipulates that the expected return on investment is not commensurate with the value of investment in the Egyptian stock market during the study period.

**Keywords:** CAPM, EGX 30, Egyptian Stock Exchange, expected returns, effective returns.

## 1. INTRODUCTION

In the markets, traders need to use the methods of pricing to enable them to assess the securities traded there so that they can make a good investment decision by choosing stocks that can be bought or sold or shares can be retained. Pricing is intended to determine the rate of expected return on the asset in light of the return and the degree of risk attached to this return, and the evaluation of shares means determining the fair value of the asset. Through what is happening on the latest developments and globalization in the global stock exchanges, those witnessing these stock exchanges have become characterized by inefficiency. From that situation, we can therefore assume weaknesses are exposed in national and international financial regulatory frameworks. As such, there exist opportunities offering attractive rewards to abnormal returns in emerging stock exchanges as compared with the developer stock exchanges, at the same level of risk. Investors may capitalize from the situation to explore the investment opportunities to achieve abnormal returns. Likewise experts may advise that there is a need for maintaining strong risk-management practices in good times as well as bad (Bernanke, 2009). Bernanke (2009) also stressed there is the need for improvement in supervisory practices and internal communication. Buiter (2007) points to a number of flaws in the financial system that existed at the peak of the boom. These include excessive securitization, as well as investors and regulators placing too much faith in the opinions of private rating agencies. The impact from regulatory weaknesses and inefficiencies offers many returns and risks for investors in these stock exchanges. Many studies in this area showed that there are attractive rewards In light of the situation. This research will be based on The Egyptian stock exchange which is one of the most important emerging stock exchanges in the Middle East and North Africa, because this stock exchange is highly attractive and the possibility of investment during the previous years. The study will examine whether there is a possibility to determine the site to take advantage of mispricing in this stock exchange.

## 2. LITERATURE REVIEW

The first use of CAPM was in the 1960's as a model that allows investors to predict from the expected return whether to invest in the stock exchange; numerous empirical studies had been carried out to analyze the applicability of CAPM in different stock exchanges. Some empirical findings supported the model conditionally or unconditionally. It should be noted that many studies and previous attempts to shed light on the problem of conflicting research findings on the ability to accurately determine the expected return or to predict whether using the capital asset pricing model or other methods of financial analysis. Determining the expected return is only the attempt to simulate and predict the future based on current or past data. It is natural should investors not feel shocked when 100% reality cannot be reached. Many studies carried out for investment in emerging stock exchanges, concluded that there are many opportunities for investors to invest in emerging stock exchanges as compared with investing in developed stock exchanges, that is because inefficiencies in emerging stock exchanges provide many investment opportunities. The investors should take advantage of these opportunities to achieve abnormal returns. From previous studies in this area, which refer to the poor efficiency of emerging financial markets. The Egyptian Stock Exchange continued to take steps to develop all the systems of trading in this market to raise the level of efficiency. This research will be an attempt to determine the ability of the Egyptian Stock Exchange in the pricing of assets traded, especially in light of studies pointing to poor efficiency of pricing in the emerging financial markets. To achieve the objective of this study the behavior of stock prices in the Egyptian stock market will be explored using the capital asset pricing model, using monthly data for the most important and most active companies traded on the Stock Exchange for a period of five years, from 2005 to 2009.

## 3. METHODOLOGY AND RESEARCH DESIGN

This study is conducted for the purpose of knowing the ability of the Egyptian Stock Exchange to provide a return on investment commensurate with the value of investment in this financial market. The financial performance of the companies will be assessed in this study through the use of the most important financial ratios used in the evaluation of performance as a preliminary step, in order to give a clear idea of the financial performance for the study sample, and then the second step (the main step of the study) will make use of capital asset pricing model for the analysis of population data for the study. The use of CAPM to respond to a series of questions to measure the value of the actual returns achieved and comparing the expected returns according to this model to determine the relationship between money invested and the returns from these investments. There are two categories of samples taken: non-random sampling and random sampling taken, random samples taken is the process of selecting the sample that would be representative of the companies in the stock exchange. In contrast, non-random samples that do not provide an equal opportunity for each company will be specified in the research sample. Another reason is that the results will yield a strictly representative sample. The sample of the study is (EGX 30 index) includes the top 30 companies in terms of liquidity and activity. It is the main index of the Egyptian Stock Exchange.

## 4. DISCUSSION OF FINDINGS

### 4.1 Results of assessment of the risk coefficient (Beta)

In this step, the factor of beta has been estimated through the use of simple linear regression equation on the grounds that the market return independent variable affects the earnings per shares as the dependent variable for each company of the companies of the study through the use of the following equation:

$$R_i = \alpha_i + \beta_i R_m$$

Through the use of the previous equation the following results were obtained:

- Companies that have been rejected because there is no statistically significant of beta.

Table 1: shows Companies that have been rejected because there is no statistically significant of beta

	$\alpha$	$\beta$	$R^2$	$\sigma$	$\sigma_1$	$\sigma_2$
Co 2	3.034 t(1.016)	0.350 t(1.202)	3.10 %	138.715	4.318	134.397
Co 5	-0.445 t(-0.110)	0.100 t(0.255)	10 %	184.866	0.266	184.600
Co 7	1.369 t(0.369)	0.358 t(0.989)	2.10 %	171.576	3.649	167.927
Co 9	-0.592 t(-0.298)	0.244 t(1.263)	3.40 %	92.423	3.162	89.261
Co 15	1.882 t(0.226)	1.085 t(1.338)	3.80 %	387.791	14.849	372.942
Co 20	25.786 t(1.411)	0.442 t(0.248)	10 %	835.904	1.145	834.759
Co 23	2.683 t(0.543)	0.053 t(0.111)	0.00 %	225.940	0.061	225.879
Co 24	4.097 t(1.172)	-0.066 t(-0.194)	10 %	159.812	0.134	159.678
Co 25	8.543 t(0.979)	0.025 t(0.030)	0.00 %	398.801	0.008	398.793
Co 26	13.501 t(1.820)	0.808 t(1.118)	2.70 %	343.798	9.286	334.512
Co 27	7.234 t(0.916)	0.997 t(1.294)	3.60 %	367.761	13.203	354.558

 $\alpha$  Fixed pieces $\sigma$  The overall risk $\beta$  Formal risk factor $\sigma_1$  Systematic risk $R^2$  Coefficient of determination $\sigma_2$  Non-systematic risk

Table 1 shows the companies that have been rejected because there is no statistically significant of beta, as the value of a beta for companies listed in the table above (0.350 , 0.100, 0.358, 0.244, 1.085 , 0.442 , 0.053, -0.066, 0.025, 0.808, 0.997) respectively, as shown in the table the values of t-test for the parameter (beta), which achieved values less than the value of tabular T (1.676) when the level of significance (10%) for all listed companies; which means that there is no statistical significance at all levels of moral recognized, this also indicates the lack of the slope coefficient significantly different from zero, so these companies will not fall within the companies that will be run by the capital asset pricing model for the purpose of measuring the expected return on investment.

Table 2 below shows that the values of the calculated T are largest than the values of T indexed for all companies, at all levels recognized of Sig (1 % to 10 %), which means that there is a positive relationship between returns of market portfolio and returns of securities.

Table 2: shows Companies that have been accepted because there is a statistically significant of beta.

Co No	$\beta$	T calculated	Sig.	T indexed	$R^2$
Co 1	1.278	t(1.708)	10 %	1,676	6.10 %
Co 3	0.969	t(9.908)	1 %	2,678	68.60 %
Co 4	2.282	t(7.905)	1 %	2,678	58.10 %
Co 6	0.355	t(2.196)	5 %	2.009	9.70 %
Co 8	0.501	t(3.182)	1 %	2,678	18.40 %
Co 10	0.732	t(4.336)	1 %	2,678	29.50 %
Co 11	0.623	t(3.644)	1 %	2,678	22.80 %
Co 12	0.496	t(3.059)	1 %	2,678	17.20 %
Co 13	0.646	t(2.493)	5 %	2.009	12.10 %
Co 14	1.013	t(4.159)	1 %	2,678	27.80 %
Co 16	0.471	t(1.814)	10 %	1,676	6.80 %
Co 17	1.579	t(4.766)	1 %	2,678	33.50 %
Co 18	0.679	t(2.180)	5 %	2.009	9.50 %
Co 19	1.229	t(2.824)	1 %	2,678	15.10 %
Co 21	0.821	t(2.096)	5 %	2.009	8.90 %
Co 22	1.387	t(4.637)	1 %	2,678	32.30 %

But, this positive relationships is different according to the values of beta, where the values of beta of companies (Co1= 1.278, Co 4=2.282, Co14=1.013, Co17=1.579, Co19=1.229, Co 22=1.387), are larger than one, this

concludes that whenever there are high returns of market portfolio, this will lead to higher stock returns, more than the returns of market portfolio, and vice versa in the case of a decline. And if the values of beta of companies (Co 3=0.969, Co 6=0.355, Co 8=0.501, Co 10=0.732, Co 11=0.623, Co 12=0.496, Co 13=0.646, Co 16=0.471, Co 18=0.679, Co 21=0.821), are less than one, this concludes that whenever there are high returns of the market portfolio, this will lead to higher stock returns but by less than the returns of the market portfolio, and vice versa in the case of a decline.

#### 4.2 Results of assessing the financial performance

The results of financial analysis which will be presented in the current step influence in particular the investment decisions. However, the results of financial analysis of historical financial statements are not an end in itself. Although they are useful in assessing the financial performance of companies, but they are just an important step in an integrated process designed to determine the values of companies; where the values of companies, are determined on the basis of values of future profits or any values associated such as (cash flows, dividends, and profits remaining).

Table 3: Financial indicators of companies that have been accepted according to (Beta)

Ratios →	Market ratios		Profitability ratios			Asset management ratios				Liquidity ratios		
	Co ↓	P/E	P/B	Profit margin	ROE	ROA	Fixed Assets Turnover	Total Assets Rotating Rate	DSO	Inventory Turnover	Current Ratio	Quick Ratio
	1	10.37	2.14	12.14%	17.69%	6.11%	1.48	0.50	151.1	14.61	1.20	1.10
	3	9.31	0.90	41.29	8.85%	2.09%	0.92	0.47	123.70	19.52	0.88	0.86
	4	14.18	0.61	91.70%	8.28%	1.75%	0.88	0.02	318.91	51.09	0.33	0.33
	6	6.86	0.78	32.10%	11.8%	9.97%	0.71	0.31	117.23	22.28	2.10	1.99
	8	17.55	3.61	12.91%	32.9%	8.16%	1.09	0.63	148.30	79.58	0.38	0.36
	10	10.39	0.53	0.70 %	1.40%	0.53%	1.31	0.76	33.20	4.70	1.01	0.49
	11	6.10	0.93	6.79 %	13.76%	5.55%	3.48	0.82	115.14	3.34	1.22	0.72
	12	3.56	0.29	29.94%	10.81%	3.44%	2.49	0.11	555.54	1.34	1.49	1.49
	13	9.41	2.08	19.17%	20.28%	9.52%	1.13	0.50	116.34	23.10	0.99	0.92
	14	9.62	0.54	26.04%	5.62 %	1.96%	5.88	0.08	290.91	69.29	1.18	1.18
	16	44.83	0.55	8.66 %	0.37 %	0.32%	2.64	0.04	361.69	32.08	3.25	3.25
	17	2.53	0.54	12.03%	1.56 %	1.20%	1.62	0.10	6.31	3.67	2.56	2.25
	18	3.57	0.37	19.76%	8.19 %	6.52%	1.05	0.33	265.00	3.04	2.43	1.72
	19	13.82	0.81	11.37	4.53 %	3.93%	0.03	0.02	746.33	2.38	0.26	0.26
	21	12.03	0.73	3.13 %	6.94 %	4.80%	3.06	0.05	453.10	3.12	3.84	3.84
	22	4.46	0.27	12.19%	4.46 %	4.04%	0.76	0.33	68.36	3.20	6.86	6.86

##### 4.2.1 P/E (Price-Earnings Ratio)

The table 3 shows that there are two companies that have achieved very high values, and three companies that have achieved high values compared with the standard market values of the industry, while there are seven companies that had fair values compared with the standard values of the industry, while the remaining four companies have achieved low values of the market value compare with the industry standard.

##### 4.2.2 P/B (Price-to-Book)

Also it is clear from table 3, that there are only three companies that have achieved high values of Price-to-Book compared with the standard values of the industry, and ten companies that were included in the classification of fair values in accordance with the industry standard, while the other three companies are rated low values of Price-to-

Book in accordance with the industry standard. This ratio is also called, by market capitalization to shareholders' equity and used for comparison between the market value to book value, calculated on the tangible assets, which reflect the break-up value of the company.

#### **4.2.3 Profit margin**

Through the analysis of profitability ratios, it shows that there is only one company that has achieved a good profit margin compared with the industry standard, and four companies in the classification of fair values, and the rest of the companies are in the classification of low profit margin, this means that the majority of companies need better control of costs. In general, the increase in profits does not mean that the company's profit margin has improved, if the increased costs are at a greater rate than sales, it leads to low profit margins.

#### **4.2.4 ROE (Return on Equity)**

This ratio is used to measure the amount of profit earned as a percentage of the rights of ordinary shareholders, and thus the net rate of profit earned by investors from investing their money, as a consequence of their risks in the recruitment of their money. This ratio indicates the extent of management efficiency in the recruitment of shareholders' money. The results of the analysis of this ratio shows that there is only one company that has a good efficiency to the management of shareholders' funds, and two companies that have a medium efficiency for the management of Shareholders' funds, while the other thirteen companies are companies that have a weak efficiency for the management of Shareholders' funds.

#### **4.2.5 ROA (Return on Assets)**

The company's assets consist of total liabilities and capital, and this money is used to finance the company's activities, so the rate of return on assets gives an idea of the effectiveness of the company to transfer the money invested into profits. As it is clear from the analysis of this ratio, as shown in table (3), that all weak companies invested into profits, meaning that these companies have a low efficiency in the use of their assets to achieve profits.

#### **4.2.6 Fixed Assets Turnover**

This ratio describes the ability of the entity to achieve the optimum utilization of its fixed assets to achieve profits of the enterprise. In this study, it is clear that there are five companies that have a good ability to achieve profits from the use of fixed assets, also there are six companies that have a fair ability to achieve profit from the use of fixed assets, and the other companies five companies) have a low ability to achieve profits from the use of their fixed assets.

#### **4.2.7 Total Assets Rotating Rate**

This ratio describes the activities of the company and its ability to achieve sales through the use of total assets. Through the assessment of this rate, table 3 shows that all companies have an impaired ability to achieve good rates of sales through the use of total assets.

#### **4.2.8 Days Sales Outstanding**

This ratio is used to measure the average number of days that a company takes to collect revenue after a sale has been made. A low DSO number means that it takes a company fewer days to collect its receivable accounts. A high DSO number shows that a company is selling its product to customers on credit and taking longer to collect back the money.

In this study, it is clear that there are thirteen companies that have a high DSO number showing that these companies are selling their products to customers on credit and taking longer to collect back their money, and one company has a medium DSO number, showing that this company is selling its product to customers on credit and taking a medium time to collect back the money, while there are only two companies that have a low DSO number showing that these companies are selling their products to customers on credit and taking a short time to collect back the money (as shown in table 3).

#### **4.2.9 Inventory Turnover**

This rate is used to measure the number of times of inventory turnover of the company, whenever this ratio is higher, it is in the interest of the company where the company can achieve significant profits using the profit margin similar to companies that have less inventory turnover, a significant competitive advantage can be utilized. In this study, it is clear from table 3, that there are eight companies that have a high rate of inventory turnover, and six companies have an average rate of inventory turnover, whereas there are only two companies that have a low rate of inventory turnover, taking into account that a much higher rate could lead to inventory management risks.

#### 4.2.10 Current Ratio

This ratio shows the number of times the current viability of the company's assets to cover its short-term. The assets of the company are to ensure its obligations in all circumstances, whether in borrowing or liquidation. The rate (2 times), is a fair value for most sectors, but if the ratio is less than two times, the company will not be able to repay its obligations in the short term, may indicate that the company is not in good financial standing, but this does not mean that the company will be bankrupt or go on liquidation, there are several ways to get funding. In this study, as shown in table 3, that there are three companies which can fully cover their short-term obligations, and three companies which can cover the short-term liabilities ratio fairly, while the other companies ten companies are in the low level, and have an impaired ability to cover short-term obligations.

#### 4.2.11 Quick Ratio

This ratio is similar to the proportion of trading, but does not include the stock of goods; assets can be liquidated as quickly as required. Thus, this ratio uses more stringent standards in measuring the Company's ability to cover its short-term obligations. The financial analysts looking forward to quick cash of (1:1) is acceptable as a target for this ratio. And the companies with ratios less than one should be properly viewed with extreme caution. Table 3 shows that there are four companies in the high level of this ratio, and there are five companies in the fair level to cover short-term obligations, and the other companies seven companies are in the low level to cover short-term obligations.

#### 4.3 Results of running the CAPM for all companies

It's clear from the results in table 4 below, that the average value of the effective return on investment of all companies of the study sample is equal to (4.543), while the average value of the expected return on investment of all companies of the study sample according to the CAPM is equal to (3.660), this indicates that actual returns of the stock exchange are higher than the expected returns according to the CAPM.

Table 4: The results of running the CAPM for all companies

	$R_i$	$E(R_i)$	AR	t
1	5.800	1.160	4.641	1.747
2	1.064	3.454	-2.391	-0.648
3	5.607	-6.296	11.903	3.293
4	2.203	8.014	-5.811	-2.927
5	6.278	6.930	-0.652	-0.177
6	7.376	5.214	2.162	0.693
7	0.703	6.024	-5.321	-1.469
8	5.848	6.967	-1.119	-0.220
9	4.466	5.853	-1.387	-0.659
10	7.692	3.127	4.565	1.227
11	0.993	7.152	-6.159	-1.841
12	4.009	-1.076	5.085	1.431
13	3.915	5.608	-1.693	-0.243
14	2.250	1.523	0.727	0.169
15	7.331	4.553	2.778	0.592
16	7.148	0.350	6.798	1.133
Average	<b>4.543</b>	<b>3.660</b>	<b>0.883</b>	<b>0.131</b>

$$AR = R_i - E(R_i)$$

$$0.883 = 4.54 - 3.660$$

Therefore, the value of abnormal returns are equal to (AR= 6.798, also that the value of calculated T is equal to (0.131), it is less than the value of tabular T equal to (1.796), at 5% of Sig and 11 degrees of freedom. This conclude that the effective returns of all companies of the study sample does not significantly differ than the expected returns on investment according to the CAPM during the study period, while taking into account the criticisms and the most important problems facing this model.

## 5. CONCLUSION

In this study Capital asset pricing model has been used, which is one of the models of quantitative analysis in decision-making in general, and the investment decisions in particular, and that this model is one of the most important models used in the rationalization of trade-off between the securities for the purpose of investment. It also helps the investor to derive the rules in the process to make better investment decisions. This study aimed to measure the expected rate of return on investment in the Egyptian stock market using the capital asset pricing model during the period (2005 - 2009), where: this study assumed that the expected return on investment in the Egyptian stock Exchange is commensurate with the value of investing in the stock market. To achieve this goal the study relied on a sample of thirty companies listed on the EGX 30 index, main index of the Egyptian Stock Exchange, as this index includes the top thirtieth companies in terms of liquidity and activity. The sample has been tested according to specific conditions designed by the researcher, and has been collecting data from different sources of the Egyptian financial market and the Central Bank of Egypt, and was used the quantitative approach which is in the equation of simple regression to determine the coefficient of risk-formal (Beta), then use the equation of capital asset pricing model on the companies in the study sample. Also used T-test, to test the moral difference between the actual return and expected return according to the CAPM to make sure the validity of the hypothesis proposed by the study. The findings of this study confirm the acceptance of negative hypothesis (Ho2) that states that the size of the expected return from investing in the Egyptian stock Exchange is not commensurate with the value of investment in this stock market, and rejection of the positive hypothesis (Ho1) that states that the size of the expected return from investing in the Egyptian Stock Exchange is commensurate with the value of investing in this stock market; where: the total of effective returns on investment for all companies of the study sample equal to (4.543), while the expected returns on investment equal to (3.660), and the relative importance of t-test equals to (0.131).

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