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Fama &French Model Testing Traditional An applied study in Iraqi stock market

Prof. Dr. Abdullah Kadhim Hassan[1] **Researcher. Nibras Majed Kadhim**[2]
abdulla.hassen@qu.edu.iq[1] mang.post20@qu.edu.iq[2]

[12]*(Department of Business Administration, College of Administration and Economics / University of Al-Qadisiyah, Iraq)*

المستخلص: ان الغرض الاساس من هذه الدراسة اختبار نموذج Fama-French بالمقارنة بين النموذج التقليدي, ولاجل تحقيق هدف الدراسة تم اختيار سوق العراق للاوراق المالية كعينة تطبيقية, اذ انعكست عينة الدراسة في الشركات الصناعية المختلطة والتي تمثلت في اثنا عشر شركة (شركة المنصور الدوائية, وشركة السجاد والمفروشات, وشركة بغداد لمواد التغليف, وشركة بغداد للمشروبات الغازية, والشركة العراقية لتصنيع التمور, وشركة الهلال الصناعية, وشركة الصناعات الكيماوية, وشركة الكندي للقاحات البيطرية, وشركة العراقية للأعمال الهندسية, وشركة الخازر للمواد الانشائية, وشركة انتاج الالبسة الجاهزة, وشركة العراقية لصناعة الكارتون) اذ انحصرت فترة دراسة الشركات بين (2011-2017) مما يدل على ان فترة الدراسة تمثلت في سبعة سنوات, ومن اجل استخراج النتائج في ضوء البيانات المسحوبة من سوق العراق للأوراق المالية عينة الدراسة لجأت الدراسة الى استعمال مجموعة من المؤشرات المهمة في التحليل المالي, والتي تمثلت في (معامل بيتا للسهم, ومعدل العائد المتوقع, والقيمة السوقية للشركة, وعامل القيمة الدفترية الى القيمة السوقية, ومعامل الربحية, وصافي الدخل, وعدد الاسهم, ومعامل الاستثمار), وعليه توصلت الدراسة الى مجموعة من النتائج لعل ابرزها تمثل تميزت شركة الصناعات الكيماوية بمخاطرها العالية من خلال ما عكسه معامل بيتا للسهم والذي ظهر بانه اعلى من مخاطرة السوق وهذا يعكس الحساسية العالية لعائد السهم تجاه التغيير في عوائد محفظة السوق.

Abstract: The primary purpose of this study is to test Fama-French model in comparison with traditional model. To achieve objective of study, Iraq Stock Exchange was selected as an application sample, reflecting sample of study in mixed industrial companies, which consisted of twelve companies. (Al-Mansur Pharmaceutical Company, Carpet and Mattress Company, Baghdad Packaging Materials Company, Baghdad Gas Beverage Company, Iraqi Tiger Manufacturing Company, Crescent Industrial Company, Chemical Industries Company, Canadian Veterinary Vaccine Company, Iraqi Engineering Works Company, Khazar Construction Company, Ready Clothing Company and Iraqi Car), The corporate study period was limited between 2011-2017, indicating that study period was seven years, and in order to extract results in light of data drawn from Iraq Stock Exchange, study sample used a set of important indicators in financial analysis, which were: (beta-stock factor, expected rate of return, company market value, book value to market value factor, profitability factor, net income, number of shares and investment factor), So study came up with a set of findings, most notable of which was fact that Chemical Industry Company was characterized by its high risk by inversion of beta-stock coefficient, which appeared to be higher than market risk, reflecting high sensitivity of share's return to change in market purse returns.

Keywords: Fama & French model, Iraq stock exchange, traditional model

I. Introduction

The world has witnessed very important financial developments in recent years, leading to economic openness among its various States. Industrial companies now play an important role in development of economies of countries in which they operate. The world has thus undergone many economic changes, main ones being globalization of world markets, world trade liberalization agreements, liberalization of financial services trade and progressive liberalization of capital flows. This has contributed to liberalization of their activities and to existence of competition between domestic and foreign industrial companies. Thus, three-factor model of Fame and French came as a result of failure of capital asset pricing model, which relied on one factor, which is risk factor (market risk) measured by beta coefficient. The study proved failure of application of CAPM model in many financial markets and that Fama model traditional application is applied to many financial markets, and study also proved that extraordinary returns achieved by stocks in financial markets are result of risk factors and are considered as a return premium to compensate investor for risks he is exposed to.

A simple monitoring of markets and movement of investors' shares and activities through information flows and their multiple channels by researchers and academics shows many of phenomena in which it is necessary to study them, to study them in order to determine their nature, to advise and advise many groups, to assess phenomenon and to determine its dimensions and to identify its disadvantages and pros. The relationship between revenue and risk is one of most important things to be seen.

In this sense, following question can be raised (how can Fama and Franch models be invested in predicting equity returns in emerging financial markets). To answer this question, therefore, a group of companies belonging to a range of sectors in Iraq Stock Exchange was selected as sample for current study.

The research was divided into four lead investigators, first dealing with scientific methodology of research, second with traditional Fama and Franch model, third with applied aspect of research, and fourth with findings and recommendations.

II. First Part: Scientific methodology for research

First: Study problem

The model traditional Fama and Franch is one of most important in financial management. However, neglect of financial markets by importance of this model has contributed to a lack of predictability of equity returns in emerging stock market, and failure to link equity returns in such markets to their key characteristics and indicators, such as investment rate, profitability, company size and others. These part have received considerable attention among Iraqi companies as basis for minimizing risk rates, and problem of study is therefore raised by following question. (How can Fama and Franch models be invested in predicting equity returns in emerging financial markets)From this question, a series of important sub-questions can be raised:

1) Can Fama and Franch maximize equity returns in emerging financial markets?
2) What steps are being taken to reduce financial risk?
3) What strategies can be pursued to improve investment capacity of start-ups?

Second: Importance of study

The importance of current study stems from following points:

1) The Fama and Franch models are among important financial models that have received high interest among researchers.
2) The study derives its field significance by contributing, inter alia, to identification of sample companies with need to pay attention to Fama and Franch models in order to maximize their equity returns.
3) Using new pricing models at market and sectoral levels by linking them to one of most important emerging market economic indicators.
4) Propose a set of results through which performance of companies in Iraq Stock Exchange can be enhanced in order to give them greater capacity and support to compete with foreign companies.

Third: Objectives of study

The objectives of study are reflected in following points:

1) Knowledge of ability of companies in Iraq Stock Exchange to use them for Fama and Franch models.
2) Identifying ways in which equity returns have been maximized in emerging financial markets.
3) Measuring impact of traditional Fama and Franch model factors in predicting equity returns at market level
4) Identifying effect of traditional Fama and Franch model factors in predicting equity returns at sectoral level
5) Measuring importance of traditional Fama and Franch model in predicting equity returns in emerging markets.

Fourth: Description of study sample

The study community is defined in Iraq stock market, which consists of 12 Iraqi companies distributed on basis of a range of mixed industrial sectors. These sectors are one of most important Iraqi markets in various categories. and perhaps study was prepared on all companies listed in these Sectors starting from 2011-2017 and on various sectors.

III. second part: Theoretical aspect of research

First: Historical philosophy of development of traditional Fama and Franch models

The model of pricing capital asset is an important development in construction of financial management theory. The model has greatly enriched knowledge of financial management by discussing key relationship on which investor builds its decisions, namely, relationship between return and risk, and focus of such theories in financial management on efficiency of financial market, Hence model of capital asset for investors and financial decision makers as an important tool for formulating policies, strategies to reach and achieve goals pursued by investor, and, on other hand, model shows how financial market balances, one of most important aspects of which is relationship between return and risk (Al-Jameel, 2009: 255).

The three-factor asset pricing model for Vama and Franch was developed as a response to poor performance of capital asset pricing model in interpreting returns achieved (Al Saftawi, 2016:33), as well as criticisms of capital asset pricing model (CAPM) and its inexplicability to explain and rely on a single beta factor, as this created need to develop a model that would operate on a combination of factors. This prompted (Fama and French, 1992) to provide a three-factor model in which application of capital asset pricing models could not be applied. (CAPM) In explaining expected return of asset, researchers developed an asset pricing model by combining company size and value factors as well as market risk factors, to be used to predict and explain average return on equities as these ratios define differences in expected returns because stock prices move opposite expected returns (Nawajha 2014: 1),

Sharp introduced this model as part of UCLA Operations Research PhD requirements in 1964, by which he linked returns of tilt notes to market index assuming that movements of a financial paper are an embodiment or a response to market movements he embodies on assumption that (SHARP) One year's index, which means that rate of return or portfolio of securities is a function of market index and a set of uncontrolled random factors (Al Khafaji and Abdul Rasoul, 2019: 157).

The triple model was developed in 1993 by professors at the University of Chicago (School of Business) as a result of increased applied research, which indicates a weak capital asset pricing model, meaning that the Fama & French model is a modified model of capital asset pricing (Aldaarmi et al.,954), the model assumed that the CT difference in expected returns from equities was a three-factor function (Kregar, 2011:38), moreover, Fama & French has studied wallet theory and asset pricing for the purpose of interpreting and determining returns on equity portfolio, Their study found that the factors of company size and value are more important than the market risk factor, In their 1993 study, which was presented by a different view of asset pricing models, the aim of the study was, at the time (Nahzat Abbas et al,2015:90).

One of the most important results of the application of the model was that low or low revenue companies tend to have a book value ratio to high market value and a positive tendency for the value risk premium and vice versa for high revenue companies, as they are. (Fama & French) There is an inverse relationship between the average return and the size of the company and a positive relationship between that average and the book-value risk premium to the market value, in other words, according to the financial management literature, small firms and companies with high book value are more risky, prompting investors to request a higher return to compensate for that risk (Maris, 2009:17), which means that the model allows control of the relationship between average return and company size and with the share price index as additional variables to estimate the required share return according to its degree of volatility with the market index return used by the capital asset pricing model as a single illustration variable to explain that relationship, However, recent research testing the model found that it was incomplete and could not control all differences in equity return, especially those attributable to profitability and investment factors (Martins & Eidjr, 2015:2)

Second: - concept of traditional Fama & Franch model

This model was developed in 1993 by professors at University of Chicago (School of Business) as a result of increased applied research, which indicates a weak model of pricing capital assets, meaning that model of Fama & French is a modified model of capital asset pricing (Aldaarmi et al., 2015:954), The model assumed that CT difference in expected returns from equities was a three-factor function (Kregar, 2011:38), moreover, Fama & French has studied wallet theory and asset pricing for purpose of interpreting and determining returns on equity portfolio, Their study found that factors of company size and value are more important than market risk factor, In their 1993 study, which was presented by a different view of asset pricing models, aim of study was, at time, to explain excess returns of investment portfolio with three risk factors (Nahzat Abbas et al,2015:90):

This model is based on a market classification of investment portfolios by the following options:

A. Depending on the interaction of the company size factor with the book-to-market value factor: The shares are classified into five groups by company size factor, and then reclassified into five groups by book value factor to market value, which spawned 25 investment portfolios for stock analysis and selection.
B. According to the interaction of the company size factor with the profitability factor: Fama and Franch relied on the previous classification itself, classifying the shares into five groups on the basis of the company's size factor first and then typically classifying them into five groups by profitability rather than book value to market value.
C. Depending on the interaction of the company size factor with the investment factor: Fama and Franch used 25 wallets following the same previous method by classifying each of the first five groups reached on a volume factor to five groups on an investment factor basis where the investment factor was expressed for the period (t) the increase in the total value of assets in the period (t- 1) to the sum of assets in the period (t- 1) and thus the calculation of the value of the four factors (SMB, HML, RMW, CMA), (Fama & French, 2014:5-6)

Third: Factors of traditional Fama & Franch model

1) Beta coefficient of stock

Beta coefficient is the core of the capital asset pricing model that defined it. Sharpe is the tendency of the simple linear regression function, which is the statistical measure of systemic risk. When applied in the capital asset pricing model, beta is used to recognize the capital asset response, or to recognize the sensitivity of share returns to the systemic market risk factor, i.e., as long as an efficient or optimal portfolio excludes irregular risks by diversification, beta gives an indication of the amount of systemic risk (market risk) (Korr and Zuf, 2018: 13).

The beta coefficient represents a relative measure of the volume of regular risk, in which the yield of the financial paper is linked to the market return, and expresses the sensitivity of the expected return fluctuation of the asset with the volatility of the market portfolio (Al-Qur&Zatif, 2018: 13). As illustrated in the diagram below:

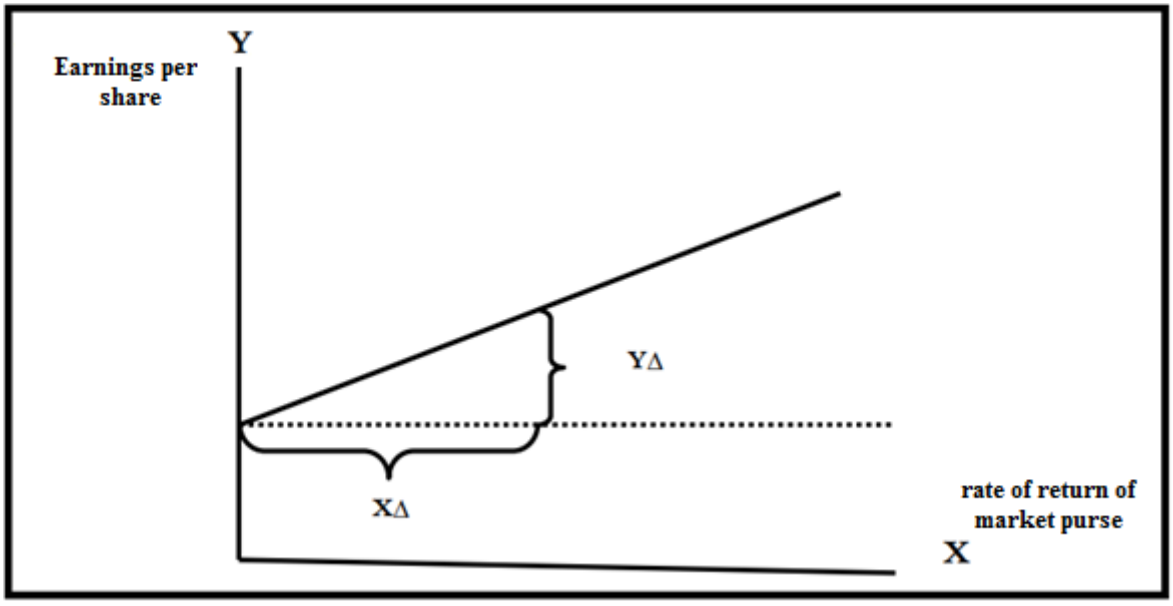

Figure 1 Graph showing the estimate of beta coefficient

Source: Hachaychi, S, 2018 "Proposed model for assessing financial assets in Arab financial markets: A Standard Study "University of Fahim Abbas-Suttif 1, Faculty of Economic, Commercial and Management Sciences, Economics, p. 18.

The emergence of the beta scale is associated with the introduction of the Capital Asset Pricing Model (CAPM) in 1964, based on efficient wallet theory, is one of the most important academic pores in financial thought, and measures the beta factor's market risk for the share, since it is assumed that there is an important direct relationship between the beta parameter and the required return.

The share beta is measured by dividing combined variation of poison rate of return with market purse rate of return by showing rate of return of market purse, according to following formula:

$$Bj = \frac{COV(Rj, Rm)}{\sigma^2 Rm}$$

whereas:

Bj = beta factor

$COV(Rj, Rm)$ = Common contrast of share return to market purse return

$\sigma^2 Rm$ = Different rate of return of market purse

2) Company Size (SMB)

The size of a company is known once a year as the quantitative market value of the share, as the first step is the number of shares (Acar and Mentor, 2020: 79), from previous studies that tested the size of the company, it was asserted that the size of the company had an impact on the returns of the shares, with many studies finding that the size of the company, measured in market value, is inversely related to the rate of return, and that the portfolio of the small market-value companies earns additional returns higher than those of the larger market-value companies. The size of large and small companies was determined by the market value of the shares (Alkor and Al-Zatif, 2018: 13). The size of the company is a measure describing the total value of the company's assets (Lumapow & Tumiwa, 2017:21), as well as the fact that the company's size is one of the important causes affecting the company's finance managers (Akter et al., 2018:4). The importance of company size lies in:

- Improving company performance
- Increased profitability of the company (Bandanuji & Khoiruddin, 2020:201)
- Improving a company's investment in its resources and promoting its own technological development
- Promoting organizational innovation
- Creating lots of jobs
- Improving the financial performance of the company (Tang et al., 2020:4).
- An important indicator of managerial capacity
- Improving the company's capacity to adopt, implement and refine electronic service systems (Jacobsen, 2018:112).
- Management of the company's research and development efforts
- Better distribution of special costs in research and development.
- Investing economies of scale in research and development
- Guiding R & D actions in marketing performance
- Improving corporate vision, visibility and resilience to environmental risks
- Improving the company's capacity to manage the troubled environment
- Helping the company develop its organizational efficiency
- Developing the company's awareness on how to improve the efficiency of information technologies (Gibb & Haar, 2007:4).

- Measurement of company profitability
- Bridging the Gap Between the Size and Performance of the Company (Olawale et al., 2017:70).
- Find more resources
- Expansion of the size of the company's activities
- Good Reputation
- Increased vision and evolving management experience
- Improved Planning and Risk Management Capacity (Khan et al., 2009:680).

The market value of property rights (MVE) is also measured by following formula:

MVE = Number of Shares traded × Share Price in Market

whereas:

MVE = Market value of equity (Chen& Strange,2005:11-11-35)

3) Book value factor to market value (HML)

The leader in building this model is William Sharpe, who is the first founder of this model, since the underlying objective of this model can be used in using the market index as a representative of the general common factor (S & P 500) (Bodie et al., 2008: 258), the book value of the share is the value that can be obtained if all of the company's assets are sold at a price exactly equal to its book value (accounting,) and after all of the liabilities have been paid by the company, and it is recently defined in the science of finance that the book value is the historical cost of the company's capital.

The market value of the stock is the value of the stock in the market through the forces of demand and supply on the stock as it is traded in the market, as it is characterized by instability, which fluctuates continuously as investors change their expectations about the return and risk of investing in ordinary equities. A governor with a high book-to-market value ratio (BE/ME) is known as a governor with a low book-to-market value ratio (BE/ME) is known as a growth governor. Several studies found that the value conservator earned returns (Bauman et al 1998; Fama & French, 1992) is a more risk-adjusted example than did the Governor of Growth (Alcor & Zatif, 2018: 14).

It also assumes that if the stock's market value is greater than the stock's book value, then the investor is optimistic about the share's future. Thus, companies with a high rate of book value to market value have a higher return than low-value companies. When Fama and Franch tested their assumptions, they found that small companies and companies with high book and market value had higher rates of return than average market returns, Thus, each company has a different proportion of book value and market value (Algebra and Saleh, 2018: 234).

The market value also includes a range of risks that can affect the share price, through the possibility that the market share price may be exposed to loss, damage or risk, i.e., that it involves unwanted events, or that actual returns differ from expectations (Atiyah and Atiyah, 2016: 334 Risk is an ongoing process to implement a proactive planning, leadership, management and risk control strategy for the bank in the short and long term (Kanchu & Kumar, 2013:145). In the same context, the risk (Drigă, 2012:164) suggests an ongoing process of identifying, measuring and controlling each type of financial risk to a bank through an integrated and coherent approach to all risks, with systematic monitoring enabling managers to proactively manage their own portfolios and take corrective action when necessary.

measured by dividing book value of share by share

$$Book\ Value/Marketvalue = \frac{Book\ Valu\ of\ The\ Share}{Share\ Price\ in\ the\ Market}$$

(Ehrhardt& Brigham,2011:95)

IV. Third Part: Application aspect of research

1. Calculation of beta coefficient by Fama and French three-factor model

The results in table (1) indicate that Chemical Industries Company (CIC) had a beta coefficient (10.227), followed by a ready-to-wear producer with a beta coefficient (6.120), and Baghdad Packaging Company with a beta coefficient (4.120). Thus, there is a disparity in transactions of shares in selected firms in industry, resulting from disparity in total returns of their shares. Bj is market system risk factor at core of capital asset pricing model, which is calculated from combined share and market earnings variation of market portfolio and which is first factor of Fama and French triplets.

Table 1 Corporate beta coefficient study sample

Company Name	Market Index	Share Price	(Bj)
Al-Mansur Pharmaceutical Company	1.279	1.200	0.565
Carpet and Mattress Company	4.840	5.076	1.475
Baghdad Packaging Company	3.209	2.953	4.120
Baghdad Gas Company	2.121	2.343	0.212
Iraqi Tiger Manufacturing Company	1.341	1.283	0.024
Crescent Industrial Company	0.653	0.594	0.073
Chemical Industries Corporation	60.333	61.043	10.227
Canadian Veterinary Vaccine Company	1.942	2.071	1.465
Iraq Engineering Company	1.577	1.429	0.847
Kathim Construction Materials Company	1.916	1.740	0.165
Ready Dress Production Company	7.381	9.756	6.120
Iraqi Cartoon Company	0.684	0.606	0.105

2) Company Size (SMB)

The results in table (2) indicate that Chemical Industries Company achieved highest share price if it reached 61.043 and came in first place, followed by Ready Clothing Company at a share price of 9.756, and Carpet and Mattress Company came in third with a share price of 5.076, representing highest share price in industry for period of 2011-2017.

Table 2 Share price for companies study sample

Company Name	Share Price							rate
	2011	2012	2013	2014	2015	2016	2017	

Al-Mansur Pharmaceutical Company	**919069226**	**865923539**	**1815184271**	**1602707544**	**1866727103**	**3356413548**	**1625116071**	**1721591615**
Carpet and Mattress Company	**81042559**	**45443526**	**30914222**	**38559960**	**59689567**	**52175054**	**91568356**	**57056177.7**
Baghdad Packaging Company	**47851767**	**212343174**	**234765319**	**89321984**	**129095147**	**482020803**	**118984199**	**187768913.3**
Baghdad Gas Company	**48540149601**	**29624895082**	**20308510628**	**8418329638**	**12224996896**	**16930553761**	**11791269212**	**21119814974**
Iraqi Tiger Manufacturing Company	**3188497044**	**3120986979**	**2529681493**	**3855838803**	**2520334735**	**1026702956**	**1596595730**	**2548376820**
Crescent Industrial Company	**2471698008**	**10889906272**	**3203082111**	**1732613486**	**2364592357**	**7440013893**	**2594553458**	**4385208512**
Chemical Industries Corporation	**641661**	**1656789**	**1304717**	**600711**	**263800**	**550000**	**1963625**	**997329**
Canadian Veterinary Vaccine Company	**1172562370**	**1682352772**	**824703451**	**1307311586**	**629153846**	**3159110516**	**662478514**	**1348239008**
Iraq Engineering Company	**87976870**	**48485442**	**171411746**	**88527989**	**514467344**	**12179261**	**26694500**	**135677593.1**
Kathim Construction Materials Company	**56534204**	**27221338**	**264961340**	**3777876**	**12921600**	**18022577**	**4144717**	**55369093.14**

Ready Dress Production Company	**1013207731**	**1519408750**	**18213648**	**66699721**	**54813003**	**43942747**	**27014428**	**391900004**
Iraqi Cartoon Company	**2639640770**	**451945757**	**154741238**	**199647688**	**123866997**	**895973011**	**365514241**	**690189957.4**

3) Book value factor to market value (HML)

The results in table 3 indicate that Chemical Industries was in first place with its book value (38.178), followed by Carpet and Mattress with its book value (3.962) and Baghdad with its book value (1.478).

Table 3 Book value of companies sample study

Company Name	**Book value**							rate
	2011	2012	2013	2014	2015	2016	2017	
Al-Mansur Pharmaceutical Company	1.143	1.200	1.143	1.124	1.167	1.163	1.171	1.159
Carpet and Mattress Company	3.770	3.870	4.010	4.120	3.981	3.793	4.193	3.962
Baghdad Packaging Company	1.007	1.018	1.046	1.007	0.929	0.932	0.935	0.982
Baghdad Gas Company	1.200	1.260	1.321	1.424	1.629	1.785	1.729	1.478
Iraqi Tiger Manufacturing Company	1.200	1.265	1.085	1.166	1.109	0.990	0.887	1.100
Crescent Industrial Company	0.035	-0.259	-0.613	-0.359	-0.653	0.77	0.886	-0.028
Chemical Industries Corporation	64.097	53.883	37.231	29.249	29.403	26.851	26.531	38.178
Canadian Veterinary Vaccine Company	1.970	1.600	1.420	1.132	1.035	1.043	1.065	1.324
Iraq Engineering Company	1.288	1.577	1.238	1.133	1.025	0.878	0.869	1.144
Kathim Construction Materials Company	1.007	1.018	1.046	1.007	0.929	0.932	0.935	0.982
Ready Dress Production Company	1.130	1.040	1.011	1.124	1.100	1.065	1.154	1.089

V. **Fourth Part: Conclusions** & **Recommendations**

First:- Conclusions

1- The results from analysis of market value of corporate stock sample showed a clear fluctuation in market value as a result of fluctuations and changes in stock price of those companies.

2- The use of three-factor Fama and Franch model contributes to interpretation of returns on shares listed on Iraq Stock Exchange by showing a high explanatory capacity for different equity returns. This indicates that it can contain all risks and thus compensate investors for them.

3- The existence of a self-correlating relationship between Bj and size of company and 0.832 indicating that improvement of studied companies' beta coefficient by one standard weight would result in an improvement of company size by 0.832, indicating that company should improve its capacity by 0.168.

4- The existence of a self-correlating relationship between Bj and 0.762, indicating that improvement of studied companies' beta coefficient by one standard weight improves firm's investment capacity by 0.762, indicating that firm's investment capacity needs to be improved by 0.238.

5- The existence of a self-correlating relationship between size of company (SMB) and profitability factor (0.630) indicates that an improvement in size of considered companies by one standard weight would lead to an improvement in size of company by 0.630, which means that company must improve its profitability by 0.370.

6- The existence of a self-correlating relationship between profitability factor (RWM) and investment factor (0.587) indicates that improvement of profit factor by one standard weight by considered companies leads to an improvement of investment factor by 0.587, which means that company must improve its book value by 0.413.

Second:- Recommendations

1- Companies in sample are required to adopt real stock value indicators under traditional Fama and Franch models because it takes additional variables of profitability and investment factors.

2- Attention to efficiency of pricing in Iraq Stock Exchange to reflect real stock values.

3- The need to update financial locals by disseminating awareness of such models and conducting training courses on applicability of such models and expected benefits of such application.

4- Move away from non-scientific methods based on randomness to identify investments and rely on right scientific method through which we can achieve desired objectives.

5- Using financial resources well in corporate investment portfolios is a sample study with a view to achieving greatest possible return.

6- The need for companies to rely on scientific and objective basis of study to evaluate their investments thus helps them to direct their funds to invest in more profitable and secure investment instruments and areas.

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