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Research Paper

Comparison of the Seven-Factor Model with the Capital Assets Pricing Model and the Fama and French Three-Factor Model to Predict the Expected Returns of Stock in the Tehran Stock Exchange[1]

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INTRODUCTION

The expected return is one of the main variables in guiding investors' decisions in the stock market and its accurate forecast is of great importance for investors. The amount of money a person expects to receive from their investments is called the expected return. The expected return is a tool to determine whether an investment with a median net income is negative or positive. In addition to portfolio allocation and investor risk control, this variable also plays a key role in asset pricing and valuation, and performance evaluation of firms. For this reason, identifying its determinants is one of the most important issues in financial research.

There are several ways to calculate the expected return. The capital asset pricing model (CAPM) is the most common way to calculate expected returns. Other methods include the three-factor model of Fama and French, the four-factor model of Carhart, the five-factor model of Fama and French, and the six-factor model, which have been extensively evaluated and compared in studies. Recently, seven-factor models have been proposed that can increase the accuracy of predicting expected stock returns. This model has not yet been extensively tested and evaluated empirically, and only a few external studies have compared it with previous multifactorial models. In this regard, the purpose of this study is to evaluate the seven-factor model on the Tehran Stock Exchange and compare it with the CAPM model and the three-factor model of Fama and French to predict the expected return on shares of financial companies listed on the Tehran Stock Exchange from 2016 to 2019.

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MATERIALS AND METHODS

This research is applied type with a quantitative descriptive-analytical approach. The library method has been used to collect information related to the literature and research background. In this way, books, articles, and dissertations available on Internet sites and databases have been used for this purpose. Statistics and information about final stock prices, market value, total market index, trading volume, and liquidity ratio have been collected directly and indirectly from the website of the Tehran Stock Exchange Technology Management Company (TSETMC). Information about the book value of the companies has been collected from the coral website and statistics related to the commodity index have been collected from the website of the Central Bank of the Islamic Republic of Iran. Also, the process of data collection and calculation has been done in the Excel software environment and Eviews10 software has been used to estimate the pattern.

The statistical population of this research is the companies listed on the Tehran Stock Exchange from 2016 to 2019 that operate in the financial sector. Data are collected monthly. To select a sample from all financial companies listed on the Tehran Stock Exchange, the following items have been considered:

- The selected share must be in the financial sector of the stock exchange.
- The selected share must be a public stock.
- Daily information on closing price, book value, market value, and trading volume should be available for selected stocks.
- Selected shares must be traded in more than 90% of business days within the specified time period.

Based on the mentioned cases and according to Fama and Farang's method (1993), the companies were selected from the highest to the lowest based on the trading volume, and the companies at the top of the table that had the highest trading volume were selected. A total of 30 financial sector companies have been selected, including six banking companies, four insurance companies, 15 investment companies, and four leasing companies.

In this study, the Auto Regressive Distributed Lag (ARDL) and the bound test of Pesaran et al. (2001) were used to perform the cointegration test and model estimation. The reasons for using this method are as follows:

- Compared to other cointegration methods, the ARDL method is simpler and easier (Magnus and Foss 2006).
- Unlike other cointegration methods, there is no limit to the degree of stationary of variables (same source).
- Unlike other methods, the cointegration of the ARDL method in small samples also leads to non-biased coefficients and reliable results (same source).
- In this method, long-term relationships are estimated based on short-term dynamics.

RESULTS AND DISCUSSION

Once it is found that there is a long-run relationship between the model variables, the next step is to estimate this long-term relationship. The results of this estimate are shown in Tables (5) and (6). These results demonstrate that in CAPM and 3-factor models, the coefficient of the market factor is positive and statistically significant. In

the three-factor model, the size of the company has a positive and significant effect on the expected return on the portfolio, which shows that the greater the difference between the returns of small and large companies, the higher the expected return on the portfolio. Also, the ratio of book value to market value has a negative effect on expected returns, which shows that the portfolios expected return decreases as the difference between the returns of companies with a high ratio of book value to market value and returns of companies with a low ratio of book value to market value decreases.

Table 1. Long-rub estimates of the CAPM and three-factor model

Model	Variable	Coefficient	t	Prob
CAPM	R_m_R_f	027757/0	411641/5	0000/0
3 Factor	R_m_R_f	022894/0	550343/6	0000/0
	SBM	564965/0	559276/3	0011/0
	HML	-669337/0	-417824/4	0001/0

In 7 factor model, the coefficient of all variables except the market variable is negative. Also, except for the three variables of market, size, and government bond index, the coefficient of other variables is significant.

Table 2. Long-run estimates of the seven-factor model

Variable	Coefficient	t	Prob
R_m_R_f	003030/0	350589/1	1860/0
SMB	025457/0-	333187/0-	7411/0
HML	297156/0-	845563/4-	0000/0
WML	036100/0-	41426/12-	0000/0
LMH	702991/0-	289172/6-	0000/0
GBI	000446/0-	648739/0-	5210/0
CI	010262/0-	961230/1-	0583/0

The RMSE and CVRMSE values for the three models are described in Table 3. As can be seen, the absolute value of these two indicators in the seven-factor model is much less than the CAPM and the three-factor model, which indicates a good fit in the seven-factor model.

Table 3. RMSE and CV (RMSE) values for CAPM model, three factors and seven factors

CVRMSE	RMSE	Model
09852/0-	001157/0	CAPM
05872/0-	000691/0	3 Factor
02907/0-	000342/0	7 Factor

CONCLUSION

- The adjusted R squares of the seven-factor model are significantly higher than the CAPM model and the three-factor model. This indicates that the addition of more

factors to the CAPM model and three factors have significantly increased the model's explanatory power in explaining the expected stock returns.
- In addition to the adjusted R squares, due to the comparison of in-sample and out-of-sample prediction error, the seven-factor model is more accurate than the competing models.
- The findings of this study confirm the higher predictive power of the seven-factor model and provide a new model for predicting the expected return on the stock portfolio that can be used to form a stock portfolio for investors and also to predict the expected return of different stock groups for policymakers.

Keywords: Expected Stock Returns, Capital Asset Pricing Model, Fama and French, Seven Factors Model, Tehran Stock Exchange.

JEL Classification: G10 ،G11 ،G12 ،G17.

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