THE IMPACT OF FINANCIAL LEVERAGE ON THE PRICING RISK IN THE EGYPTIAN STOCK MARKET

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Abstract
This paper examines the impact of financial leverage on the risk pricing in the Egyptian Stock Exchange (EGX) by adding an additional risk factor reflecting financial leverage to the three factor model of Fama and French. We used monthly excess stock returns of 50 stocks listed on the (EGX) from January 2014 to December 2018 to test Fama and French model before and after adding the financial leverage factor. Total debt to equity ratio was used to calculate the financial leverage. The results do not support Fama and French model before and after adding the financial leverage factor, therefore there is no effect of financial leverage on the risk pricing.

Keywords
Fama and French three-factor model, Financial leverage.

JEL Classification
G12, G32

Introduction

The relationship between risk and return has attracted the interests of many financial science researchers since the last century, where many models have been developed to explain the relationship between return and risk. In (1952), Harry Markowitz developed what is known as portfolio theory, where he demonstrated in a quantitative way how to reduce risks through diversification of the components of the portfolio. Based on portfolio theory, several models have been developed to examine the relationship between return and risk, the most important of these models being the Capital Asset Pricing Model (CAPM), which is presented by Sharpe (1964) and Lintner (1965), and it is considered the most substantial and popular model in the pricing of assets. The CAPM model is the first capital asset pricing model to explain the relationship between the return of any asset and the risks arising from the investment in these assets. Based on the CAPM model, there is only one factor that explains the return of any asset, which is the systematic risk, therefore the assumptions on which the model was developed was criticized by many researchers (Black, 1972;

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Ross, 1976).

In an attempt to explain the relationship between return and risk, Fama and French (1993) concluded that the variation in stock returns could be explained by the market beta coefficient, book to market equity ratio and size of the firm. Accordingly, Fama and French (1993) developed a so-called three-factor model, which is used for explaining the variation in stock returns by employing these three factors as the explanatory variables.

In terms of financing decisions, the most difficult decision facing managers is to determine the optimal mix of the capital structure which affects the profitability and value of the company, where the balance between the return and the risk should be taken into consideration when determining the components of the capital structure. Despite the advantages of debt financing, which are the tax savings, in addition to the fact that borrowing costs are fixed and do not change with the change in the level of profits, it is characterized by many risks represented by the fact that the company may go bankrupt in the event that it is unable to pay interest, in addition, some companies may find it difficult to obtain long-term loans. Also, the debt contract may give the lender the right to impose restrictions on the company such as a ban on obtaining new loans, a ban on buying and selling fixed assets, and preventing or reducing dividends. Therefore managers must take into consideration the impact of debts on the profitability and value of the company, the amount of debt that corresponds to the position of the company, and the appropriate mix of debt and equity.

The research in the field of financial modelling and risk pricing continues to this day, especially after the major developments in the financial science. In this study, we will be exposed to the Financial leverage as one of the most important factors that affects the risks and profitability of companies and that is taken into account when the risk pricing, where we will try to identify the impact of financial leverage on the risk pricing in the Egyptian Stock Exchange (EGX) by adding an additional risk factor reflecting Financial leverage in the company to the three factor model of Fama and French, where the Fama and French (1993) model will be tested in its original form and re-tested after adding the additional risk factor from January 2014 to December 2018, in order to know the effect of Financial leverage on the risk pricing in the Egyptian stock exchange.

The study will be organized as follows. In section 2 we will provide theoretical and empirical literature of the financial leverage and Fame and French (1993) model. Section 3 presents the data and methodology. Section 4, presents empirical results, and finally we will provide the conclusions in Section 4.

1. Review of the scientific literature

1.1 Financial leverage

Arditti (1967) examined the relationship between financial leverage and returns for a sample of firms consisted of industries, railroad and utilities. He measured leverage ratio as the ratio of equity at market value to debt at book value. He found that the relationship between leverage and returns was negative and insignificant.

Hall and Weiss (1967) examined the relation between returns and the ratio of equity to assets, where the ratio of equity to assets is inversely related to leverage. They found a

negative relation between returns and the ratio of equity to assets and argued that the low ratio of equity to assets means a large amount of leverage and this implies high risks.

Hamada (1972) examined the relationship between financial leverage and the stock's systematic risk through the cross-section of all firms, where he used the capital asset pricing model (CAPM). He found that the systemic risk measured by beta factor for levered firms is greater than unlevered firms. Therefore, he concluded that firms with debt had higher returns because its financial risks are higher.

Baker (1973) tested the relationship between financial leverage and industry returns. He measured leverage as the ratio of equity to total assets. He found that the low ratio of equity to assets (large amounts of leverage) lead to raise the industry profit rates.

Masulis (1983) studied daily stock returns; He concluded that there is a positive relationship between the change in leverage and the change in stock returns.

Bhandari (1988) tested whether the expected returns on common stocks are positively related to the ratio of debt to equity. They used the Fama-MacBeth (1973) methodology to examine this relation. They found that the expected returns on common stocks are positively related to the ratio of debt to equity. They concluded that leverage can be used as a proxy for the risk of common equity.

Maroney el al (2004) examined the relation between risk and return in six Asian markets during the 1997 Asian financial crisis. They proposed an asset pricing model that has portfolios incorporated the impact of changes in leverage on the average returns during Asian crisis. They found that financial leverage is one of the most important factors in this crisis. They found evidences that the changes in financial leverage are associated with cross- sectional differences in average returns. They also found that there was a significant increase in beta values due to the higher leverage values associated with exchange rates; this highlighting the important role of financial leverage in explaining the probability of the financial crises.

Ozdagli (2009) find that the financial leverage directly affects stock returns, through its effect on the risk of equity, and also has an indirect effect on business risk, through its effect on investment decisions. Also, debt financing reduce the effective price of capital through tax savings associated with financing with debt.

Bhatti et al (2010) examined the effect of leverage on stock returns and systematic risk in the Pakistan Stock Exchange. They find that the high level of leverage resulting in a high level of systematic risk, lead to high volatility in the prices of stocks.

Hoque et al (2017) examined the relationship between leverage, risk, and profitability. They used data for a sample consisting of 24 manufacturing companies in the Dhaka Stock Exchange form 2007-2014. They suggested that firms which have low profitability are highly riskier, this is due to the very high variations in profit generation . They also found that firms that enjoy high growth rates use high rates of debt; it also has the advantage of being more profitable, but they are more risky.

1.2 Fama and French three-factor model

The Capital Asset Pricing Model (CAPM) was developed by Sharpe (1964) and Lintner (1965); built on the efforts of Harry Markowitz (1959) who developed the "mean-variance model". According to the (CAPM) model, there is a positive a linear

relationship between the expected risk of asset and its expected rate of return. Beta is the only measure of risks, which is measured the systematic risk and estimates how the stocks or portfolio returns move relative to the movements in the market portfolio.

Banz (1981) analyze the relationship between the return and the total market value in the NYSE form 1926 to 1975. He found that smaller firms stocks have risk adjusted returns higher than large firms stocks; this is called 'size effect'.

Reinganum (1981) aimed to verify whether the arbitrage pricing model (APT) proposed by Ross (1976) could explain the differences in average returns between small and big firms in (NYSE) and (AMEX) from 1963-1978. He found that the return on portfolios consisting of small-sized stocks are higher than the return on portfolios consisting of large-sized stocks.

Wong (1989) examined the effect of the firm's size on the stock return in Singapore Stock Exchange from 1974 to 1985. He concluded that the returns on stocks of small firms are greater than the return on the stocks of large firms, where the return on portfolios consisting of stocks of small firms was 1.487%, compared to the return on portfolios consisting of stocks of large firms, whose monthly return was 1.241%.

Chan and Chen (1991) analysed the reasons for the difference in return and risk for both large and small stocks by studying the characteristics of returns of small stocks and large stocks. The sample consisted of all the stocks listed in (NYSE) from 1956 to 1985. They concluded that the size factor has a great explanatory power for the difference in return between large and small firms, as the return on small firms is greater than the return on large firms; this was explained by the risk factors that small companies may be exposed to, such as high leverage and low dividends.

In (1992), Fama and French used non-financial stocks listed on the NYSE, NASDAQ, and AMEX from 1963 to 1990 to examine the ability of the systematic risk (beta), book to market equity ratio, size of the firm, Earnings/Price ratio, and leverage, to predict the stock returns. They found no relationship between market beta factor and the stock returns, they also found that stocks with high book-to-market equity ratios (value stocks) and small stocks, have high returns compared to stocks with low book-to-market equity ratios (growth stocks) and big stocks.

In (1993), Fama and French provided a different perspective to capital asset pricing models. they examined the relation between expected excess returns and the market premium as well as, the value factor measured by the book-to-market equity ratio, which is calculated by taking the average excess return on a portfolio with a high ratio of -book-to-market stocks minus the average excess return on a portfolio with a low ratio of -book-to-market stocks, and company size measured by market capitalization, which is calculated by taking the average return on the portfolios with small market capitalization stocks minus the average return on the portfolios with big market capitalization stocks. Fama and French (1993) expand the study from common stocks to U.S government and corporate bonds in addition to stocks. They confirm that portfolios were created based on market factor, book-to-market-equity (BE/ME) and size have important effects on stock returns, where Fama and French (1993) model is successful in the explanation of the cross-section of average returns on U.S. stocks. Their model can be written as:

$$R_{it} - R_f = b_i [R_{mt} - R_f] + s_i [SMB] + h_i [HML]$$

Where:

- (R_{it}) is the expected return on asset i at time t.
- (R_f) is the risk-free rate.
- ($R_{mt} - R_f$) is the expected excess return of the market portfolio at period t.
- (SMB) is the expected return of the size factor (is proxy for company Size)
- (HML) is the expected return on the book to-market value (BE/ME) factor (is proxy for company value)
- (bi, si, hi) are the coefficients (betas) of the three independent variables $R_{mt} - R_f$, SMB and HML.

Fama and French (1995) analyzed the characteristics of companies with high book-to-market-equity and those with low book-to-market-equity. They examined all stocks listed on U.S. national exchanges (AMEX, NYSE and NASDAQ) from 1963 to 1992. They show that Companies that have a high book-to-market-equity ratio (value stocks) are associated with persistently low earnings and companies that have a low book-to-market-equity ratio (growth stocks) are associated with persistently strong earnings.

Mohanty (2002) tried to test any of the characteristics of the firms that have the ability to explain differences across stocks returns through cross-sectional analysis. The study included factors (size - value - and financial leverage), and used the same methodology followed by Fama and MacBeth (1973), for all stocks listed in the India Stock Exchange from September 1991 to March 2000. The study concluded that the relationship between the firm size and the expected return is a strong inverse relationship, as the return on small firms exceeds the return on large firms by up to 70%. The study also found that the relationship between the book to the market value (Book-to-Market) and the expected return is an inverse relationship as well, while leverage was found to be positively correlated with stock return.

Novak (2010) examined the ability of beta coefficient, size and value to predict Swedish stock returns from 1979 to 2005. The study used the same methodology used by Fama-MacBeth (1973). The rate of return on government bonds was also used as a proxy for the risk-free rate. He found that all the risk factors under study are not statistically significant and do not have the ability to predict Swedish stock returns.

Mehta and Chande (2010) examined the ability of the Fama–French three-factor model (1993) to explain the cross-section of expected stock returns. They used monthly returns for a sample of 219 stocks listed on the Indian stock market from 1999 to 2007. They found that the Fama–French three-factor model (1993) was very statistically significant in explaining the cross-section variance of expected returns. They also found that the size and value factors (SMB & HML) are not sufficient to explain the cross-section variance of expected returns either individually or jointly with each other, but when the market factor (R_M-R_F) is combined with the size and value factors (SMB & HML), this would increase the explanatory power of the model, where the results showed that the explanatory power of the (R_M-R_F) individually was greater than the explanatory power of the total size and value.

Aldaarmi et al (2015) examined the ability of the Capital Assets Pricing Model (CAPM) and Fama and French (1993) model to interpret the expected return by using monthly data for stocks listed on the Saudi Stock Exchange form 2007 to 2011. The study

concluded that the Fama and French three-factor model has a statistically significant explanatory power to interpret the expected return of stocks greater than the capital asset pricing model (CAPM).

Khasawneh (2017) examined the ability of both Fama and French (1993) model and (CAPM) model to predict the expected monthly return in the Omani stock market from July 2001 to April 2010. The study concluded that the explanatory power of the Fama and French (1993) model was greater than (CAPM) model, where the results demonstrated that adding size and value factors to the CAPM model enhances the model's ability to explain the variance in expected return.

Wang (2018) examined the ability of the Fama–French three-factor model (1993) to explain the cross-section of expected stock returns in the Taiwan stock market from 1982 to 2012. He found that the coefficient of determination (R^2) for the six portfolios used to form the Fama-French factors ranged from 93% to 97%, which indicates a great ability to explain the cross-section of expected stock returns.

2. Research methodology

2.1 Data

The Egyptian Stock Exchange is one of the oldest stock exchanges established in the Middle East, where the establishment dates back to the 19th century, when the Alexandria Stock Exchange was established in 1883, followed by the Cairo Stock Exchange in 1903. The number of companies listed on the Egyptian Stock Exchange is 256 at the end of 2018[*]. In this study we used monthly data for a sample of firms listed on the Egyptian Stock Exchange from January 2014 to December 2018 to examine the performance of the Fama–French three-factor model (1993) before and after adding the financial leverage factor as a risk factor, where we will try to identify the impact of financial leverage on the risk pricing in the Egyptian Stock Exchange by adding an additional risk factor reflecting Financial leverage to the Fama and French (1993) model, where the Fama and French (1993) model will be tested in its original form and re-tested after adding the additional risk factor. These data included:

- Monthly stock returns.
- Monthly returns of the EGX100 index, which is used as a proxy for the market portfolio. EGX100 index is price index that measures the performance of the 100 active companies in the Egyptian Stock Exchange, including both the 30 companies of EGX 30 Index and the 70 companies of EGX 70 Index.
- Monthly returns on the Postal Savings are used as a proxy for the risk free rate.
- Data on book values of equity are extracted from annual financial statements.
- Average of shareholders' equity for each company during the study period.
- Average of total debt for each company during the study period.

Not all stocks are chosen for testing the Fama–French three-factor model (1993). Following conditions have to be met:

- Stocks should be listed on EGX100 index.
- The trading currency on the stock should be the Egyptian pound.

[*]- http://www.egx.com.eg

– Stocks of banks and financial institutions are excluded because their specific liability and asset structure usually produces high financial leverage, which prevent the comparability of their book-to-market equity ratios with those of non-financial firms.
– Availability of stock prices for a continuous 60 months.
– The ratio of the book value to the market value should be positive.

The number of stocks satisfying the test conditions are 50 shares listed on EGX100 index in the Egyptian Stock Exchange.

2.2 Methodology

2.2.1 Measurement of the variables and portfolios construction

In order to mimic the common risk factors of size and book-to-market equity we used the same methodology used by Fama and French (1993) to construct the SMB (Small Minus Big) and HML (High Minus Low) factors, all stocks on the sample are ranked based on the firm size (market capitalization as of June of each year t). Stocks are sorted into two portfolios by using the median sample size (Big (B) and Small (S) according to split point which is 50%, where the highest 50% stocks according to size are large stocks and the lowest 50% stocks according to size are the small ones. The sample stocks are also ranked by book-to-market equity, where the stocks are divided to 3 portfolios according to book-to-market equity ratio. First portfolio, 30% of whole sample stocks has book-to-market equity ratio highest (High: H group). Second portfolio, 40% of whole sample stocks has book-to-market equity ratio in medium (Medium: M group) and the third portfolio, 30% of whole sample stocks has book-to-market equity ratio lowest (Low: L group). Six portfolios (SL, SM, SH, BL, BM, BH) are constructed based on the intersection of the tow size and three BE/ME portfolios, where:

– (SH) portfolio with small size and high book-to-market equity ratio.
– (SM) portfolio with small size and medium book-to-market equity ratio.
– (SL) portfolio with small size and low book-to-market equity ratio.
– (BH) portfolio with big size and high book-to-market equity ratio.
– (BM) portfolio with big size and medium book-to-market equity ratio.
– (BL) portfolio with big size and low book-to-market equity ratio.

SMB (small minus big) is the difference of returns on a small stocks portfolio and on a big stocks portfolio, and it was calculated by using the following equation:

$$SMB = [R (SL+SM+SH) - R (BL+BM+BH)] / 3$$

Where R (SL+SM+SH) is the expected return on (SL+SM+SH) portfolio, and R (BL+BM+BH) is the expected return on (BL+BM+BH) portfolio.

HML (high minus low) is the difference of returns on high book to-market value (BE/ME) stocks portfolio and on a portfolio of low (BE/ME) stocks and it was calculated by using the following equation:

$$HML= [R (SH+BH) – R (SL+BL)] / 2$$

Where R (SH+BH) is the expected return on (SH+BH) portfolio, and R (SL+BL) is the expected return on (SL+BL) portfolio.

To calculate the financial leverage we used Total debt / Shareholders Equity using the following equation:

$$\text{Financial leverage} = \frac{\textit{Total debt}}{\textit{Shareholderz Equity}}$$

In order to construct the leverage factor (LEV), we followed the same methodology used by Fama and French (1993) when creating a portfolio of size and value, where we will construct a portfolio called (leverage portfolio), which was created by the difference between the returns on the portfolio in which leverage is greater than one (symbolized $RLev_1$**)**, and the returns on the portfolio in which leverage is less than one, (symbolized $RLev_0$**)**, as follows:

$$LEV = RLev_1 - RLev_0$$

2.2. The model

Fama and French (1993) developed the three factor model to describe the relation between expected excess returns and excess market return (R_M-R_F), the value risk factor (HML) and the size risk factor (SMB). We have added an additional risk factor to the three factor model, called leverage factor (LEV). To estimate the model parameters, the two pass cross sectional regression was used. The first step is to use the time series regression of the excess return of the sample stocks on excess market return, HML, SMB and LEV by using the following model:

$$R_{it} - R_f = a_i + b_i\,[R_{mt} - R_f] + s_i\,[SMB] + h_i\,[HML] + ß_i\,[LEV] + \varepsilon_{it}$$

Where:

- (R_{it}) is the expected return on stock i at time t.
- (R_f) is the risk-free rate.
- ($R_{mt} - R_f$) is the expected excess return of the market portfolio at time t.
- (SMB) is the expected return of the size factor (is proxy for company Size)
- (HML) is the expected return on the book to-market value factor (is proxy for company value).
- (LEV) is the expected return on leverage factor (is proxy for leverage factor).
- (bi, si, hi, $ß_i$) are the coefficients (betas) of the independent variables
- ai, εit are the intercept and the error term respectively.

The second step is to run the cross sectional regression, as follows:

$$r_i = \gamma_0 + \gamma_1\, bi + \gamma_2\, si + \gamma_3\, hi + \gamma_4\, ß_i + \varepsilon_{it}$$

Where:

- (r_i) the average excess return for the stock i over our full sample period.
- γ_0, γ_1, γ_2, γ_3 and γ_4 are the parameters that will be estimated.
- bi is the estimated coefficients of the expected excess return of the market portfolio.
- si is the estimated coefficients of the size factor (SMB).
- hi is the estimated coefficients of the value factor (HML).
- $ß_i$ is the estimated coefficients of the leverage factor (LEV).

3. Results and discussions

3.1 Testing the three factor model of Fama and French in its original form

Table 1 shows the Regression results of the Fama and French (1993) model in the (EGX) from January 2014 to December 2018. Results show that Adjusted R Square is

very weak, as its value is 0.1%; this means that the explanatory power of the three risk factors in the Fama-French model is very weak. The results also show that the intercept is negative and significant. However, the intercept should be equal to zero for the validity of the Fama and French model. The slope of the market premium is positive and insignificant, so the market risk premium is not a determinant of required rate of return. The SBM coefficient is insignificant and equal zero, which confirms the absence of the small firm effect. Finally, the HML coefficient was equal zero and insignificant, which confirms the absence of the the Book to Market ratio effect in the market. These findings do not support Fama and French model findings, which confirms that the Fama-French (1993) model does not have the ability to explain excess stock returns in the (EGX) in its original form.

Table no. 1. Regression results of the Fama and French three factors model

Model	Sum of Squares	df	Mean Square	F	P-value	R	Adjusted R Square
Regression	0	3	0	1.017	0.394	0.249	0.001
Residual	0.007	46	0				
Total	0.008	49					
Coefficients							
	Unstandardized Coefficients		**Standardized Coefficients**	***t-Stat***	***P-value***		
	B	**Std. Error**	**Beta**				
(Constant)	-0.085	0.008		-10.356	0		
Rm-Rf	0.01	0.008	0.138	0.889	0.379		
SMB	0.00	0.003	-0.201	-1.387	0.172		
HML	0.00	0.003	0.046	0.297	0.768		

Source: Author's construction

3.2. Testing the impact of leverage on the expected return

Table 2 shows the regression results after adding an additional risk factor reflecting leverage (LEV) to the Fama-French (1993) model. Results show that Adjusted R Square equal (-0.006), which indicates that the explanatory power of the risk coefficients in the model is very weak. The intercept is significant and negative; while the intercept should be equal to zero for the validity of the model. The slope of the market premium (beta) is positive but not significant with a t-statistics equal (0.815), so the market risk premium is not a determinant of required rate of return. The SBM coefficient is insignificant and equal zero with a t-statistics equal (-1.525), which confirms the absence of the small firm effect. The HML coefficient is equal zero and insignificant with a t-statistics equal (0.176), which confirms the absence of the Book

to Market ratio effect in the market. The (LEV) coefficient is insignificant and equal to zero with a t-statistics equal (0.427). These findings do not support the Fama-French (1993) model after adding the leverage factor; therefore there is no effect of financial leverage on the risk pricing in the Egyptian Stock Exchange (EGX).

Table no. 2. Regression results of the Fama-French (1993) model after adding the leverage factor.

Model	Sum of Squares	df	Mean Square	F	Sig.	R	Adjusted R Square
Regression	0.000602933	4	0.00015073	0.921481556	0.459854313	0.27515132	-0.00645
Residual	0.00736097	45	0.00016358				
Total	0.007963903	49					

Coefficients					
	Unstandardized Coefficients		Standardized Coefficients	t-Stat	P-value
	B	Std. Error	Beta		
(Constant)	-0.084	0.00830058		-10.17309921	0.00
Rm-Rf	0.01	0.00756151	.164	0.815380176	0.419149588
SMB	0.00	0.00258116	-.141	-1.52513262	0.134224116
HML	0.00	0.00335177	.158	0.175760945	0.861270301
leverage	0.00	0.00221086	.249	0.426862267	0.671515049

Source: Author's construction

Conclusions

This study examined the impact of financial leverage on the risk pricing in the Egyptian Stock Exchange by adding an additional risk factor reflecting financial leverage (LEV) to the Fama and French (1993) model. The sample consisted of 50 stocks listed on the (EGX) from January 2014 to December 2018. We first investigated the validity of the Fama-French (1993) model in its original form. The study used the same methodology of Fama and French (1993) to construct six portfolios (SL, SM, SH, BL, BM, BH) based on the intersection of the two size and three BE/ME portfolios. We re-tested the Fama-French (1993) model after adding the additional risk factor, in order to know the effect of financial leverage on the risk pricing in the (EGX). In order to construct the financial leverage factor (LEV), we constructed a portfolio created by the difference between the return on the portfolio in which leverage is greater than one, and the return on the portfolio in which leverage is less than one. We used total debt to equity ratio to calculate the financial leverage. Our statistical results confirmed that the Fama-French (1993) model does not have the ability to explain excess stock returns in its original form and after adding the financial leverage factor as additional risk factor, therefore the beta, HML, SMB factors are not appropriate in evaluating the relationship between risk and return, and there is no effect of financial leverage on the expected return in the Egyptian Stock Exchange.

Our research is of interest to all researchers and investors. Researchers may re-test the proposed model in different financial markets, where they may obtain better results on explaining the relationship between return and risk. On the other hand, investors are concerned to know other factors related to firms such as financial leverage that could affect the returns on their investments.

References

[1] Aldaarmi, A., Abbodb, M. and Salameh, H., 2015. Implement fama and French and capital asset pricing models in Saudi Arabia Stock Market. *Journal of Applied Business Research (JABR)*, 31(3), pp 953-968.

[2] Andriotto, M., and Teti, E., 2013. Size, value and leverage. How are they accounted for?. *Investment Management and Financial Innovations*, 10(4), pp 8-17.

[3] Arditti, F. D., 1967. Risk and the required return on equity. *The Journal of Finance*, *22*(1), pp 19-36.

[4] Baker. S.H., 1973. Risk, leverage and profitability: An industry analysis. *Review of Economics and Statistics*, 55 (4), pp 503-507.

[5] Banz, R. W., 1981. The relationship between return and market value of common stocks. *Journal of financial economics*, 9(1), pp. 3-18.

[6] Bhandari, L. C., 1988. Debt/equity ratio and expected common stock returns: Empirical evidence. *The journal of finance*, *43*(2), pp. 507-528.

[7] Bhandari. L.C., 1988. Debt/Equity Ratio and Expected Common Stock Returns: Empirical Evidence. Journal of Finance, XLIII, pp. 507-528.

[8] Bhatti, A. M., Majeed, K., Rehman, I. U., & Khan, W. A., 2010. Effect of leverage on risk and stock returns: evidence from Pakistani companies. *International Research Journal of Finance and Economics*, *58*(58), pp. 32-49.

[9] Black, F., 1972. Capital market equilibrium with restricted borrowing. *The Journal of Business*, 45(3), pp. 444-455.

[10] Chan, K. C., and Chen, N.F., 1991. Structural and Return Characteristics of Small and Large Firms. *The Journal of Finance*, 46(4), pp. 1467-1484

[11] Fama, E. F., and French, K. R., 1992. The cross-section of expected stock returns. *Journal of Finance*, 47, pp. 427–465.

[12] Fama, E. F., and French, K. R., 1993. Common risk factors in the returns on bonds and stocks. *Journal of Financial Economics*, 33, pp. 3–56.

[13] Fama, E. F., and French, K. R., 1995. Size and Book-to-Market Factors in Earnings and Returns. *Journal of Finance*, 50(1), pp. 131–155.

[14] Hall. M. and Weiss. L., 1967. Firm Size and Profitability. *The Review of Economics and Statistics*, 49 (3), pp. 319-331.

[15] Hamada, R. S., 1969. Portfolio analysis, market equilibrium and corporation finance. *The Journal of Finance*, *24*(1), pp. 13-31.

[16] Hoque, S., Aziza, T., Khatun, M., and Islam, M. N., 2017. Leverage, Risk, and Profitability: Empirical Evidence from Selected Manufacturing Sectors of Bangladesh. *Management*, *31*(1), pp. 99-115.

[17] Khasawneh, M. B. F., 2017. Empirical Test of Fama and French Three-Factor Model in Amman Stock Exchange. In *6th Eurasian Multidisciplinary Forum, EMF 2017 27-28 April, Vienna, Austria*, p. 78.

[18] Lintner, J., 1965. The Valuation of Risk Assets and Selection of Risky Investments in Stock Portfolios and Capital Budgets. *Review of Economics and Statistics*, 47(1) 47, pp. 13-37.
[19] Markowitz, H., 1952. Portfolio Selection. *The Journal of Finance*, 7(1), pp. 77-91.
[20] Maroney, N., Naka, A., and Wansi, T., 2004. Changing risk, return, and leverage: The 1997 Asian financial crisis. *Journal of Financial and Quantitative Analysis*, *39*(1), pp. 143-166.
[21] Masulis. R.W., 1983.The Impact of Capital Structure Change on Firm Value: Some Estimates. *The Journal of Finance*, 38 (1), pp. 107-126.
[22] Mehta, K., and Chander, R., 2010. Application of fama and french three factor model and stock return behavior in indian capital market. *Asia Pacific Business Review*, 6(4), pp. 38-56.
[23] Mohanty,P., 2002. Evidence of Size Effect on Stock Returns in India. *Vikalpa: The Journal of Decision Makers*,.27(4), pp. 27-37.
[24] Novak, J. and Petr, D., 2010. CAPM Beta, Size, Book-to-Market, and Momentum in Realized Stock Returns. *Journal of Economics and Finance*, 60(5), pp. 447-460.
[25] Ozdagli, A.K., 2009. Financial Leverage, Corporate Investment, and Stock Returns, *Working Paper Serie*s, Federal Reserve Bank of Boston, 9(13), pp. 1-34.
[26] Reinganum, M. R., 1981. A new empirical perspective on the CAPM. *Journal of financial and quantitative analysis*, 16(4), pp. 439-462.
[27] Ross, S. A., 1976. The Arbitrage Theory of Capital Asset Pricing. *Journal of Economic Theory*, 13(3), pp. 341-360.
[28] Sharpe, W. F., 1964. Capital Asset Prices: A Theory of Market Equilibrium under Conditions of Risk. *Journal of Finance*, 19(3), pp. 425-442.
[29] Wang,W.G., 2018. The Variation of Fama-French Three-Factor Beta Risks by Interval Test in Taiwan Stock Market: Theory and Evidence, *International Research Journal of Finance and Economics*, 165, pp. 90-109.
[30] Wong, K. A., 1989. The firm size effect on stock returns in a developing stock market. *Economics Letters*, 30(1), pp. 61–65.