# The explanation of Degree of Economic Leverage (DEL) for testing Beta coefficient in comparison with CAPM & D-CAPM

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*In this paper, we will intend to introduce the Degree of Economic Leverage (DEL) and its usage as one of the new techniques in explanation of Beta coefficient and identification of the systematic risk and profit planning equipment in leverage theoretical conceptual studies as well. Meanwhile, we will consider and analyze it through experimental testing for increasing its justification explanatory potency. These tests had done in automobile and automotive parts manufacture companies in Iran. The Degree of Economic Leverage is defined as the percentage change in a firm's sales resulting from a unit percentage change attributable to an exogenous economic disturbance. [Mandelker and Rhee] After theoretical conceptual studies by using Regression analysis and Pearson correlation testing, the research objective, which is the inverse and meaningful relation between interest rate and a firm's sales, was not achieved. From another hypothesis test it was confirmed that there is no relation between Degree of Economic Leverage and market return and expected return. Degree of Economic Leverage explains the expected return better than Degree of Operational Leverage and Degree of Financial Leverage. Degree of Operational Leverage explains market return better than the two other leverages. Also there is a meaningful difference between measure of the Beta calculating by DEL and the Beta computing by CAPM and D-CAPM.*

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## 1. Introduction

To better understand the role of sales variability minimization in managing a firm's systematic risk, the multiple dimensions of systematic risk must be conceptually analyzed. Hawawini and Viallet (1999) provided such an analysis in figure(1) by illustrating financial risk as the relation between earning after taxes (EAT) and earnings before interest and taxes (EBIT), and operational risk as the relation between EBIT and sales.

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Hawawini and Viallet further specified that sales vary as a result of the uncertainties in the economic, political, social, and competitive environment in which firms operate. Hence, they characterized economic risk as the risk faced by all firms and interpret the combined effect of economic risk and operational risk as business risk.

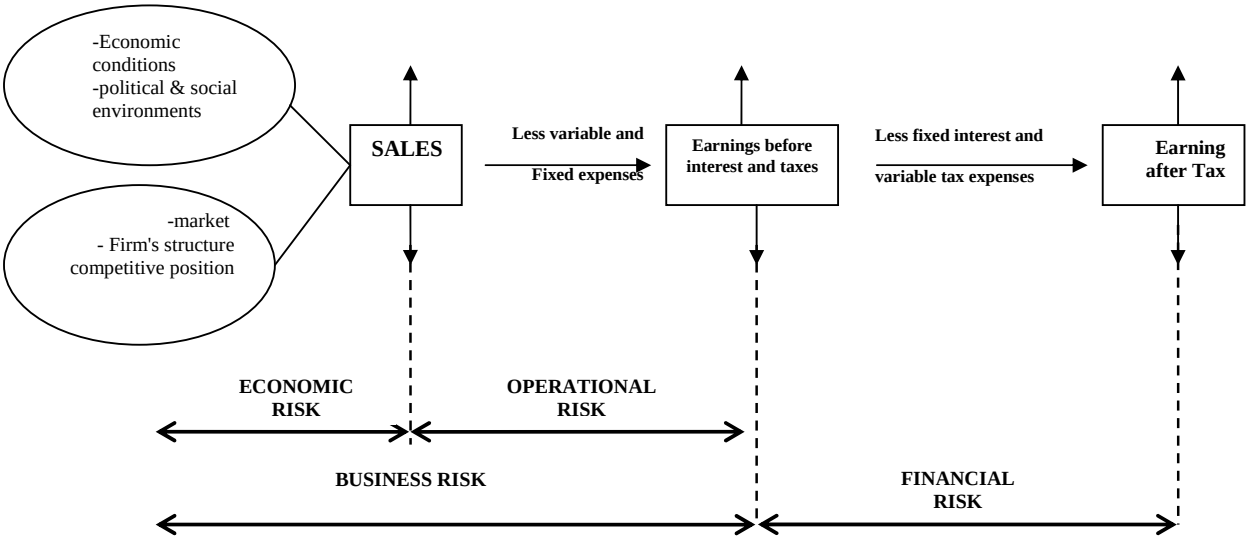


Figure 1. Analysis of Multiple Dimensions of Systematic Risk.
Hawawini and Viallet 1999: From Finance for Executives (1st ed.), by G.Hawawini and C.Viallet 1999.
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Mandelker and Rhee (1984) demonstrated that both operational risk and financial risk can be proxied through the respective use of the degree of operating leverage (DOL) and the degree of financial leverage (DFL). In this article, we extend that original work by separating economic risk from business risk, and we empirically represent the economic risk construct through the use of the term, degree of economic leverage (DEL).

Rhee (1986) was the first to decompose systematic risk into a three-component model: business risk, operating risk, financial risk. Rhee suggested that the business risk component is determined by the market-related portion of demand uncertainty, as evidenced by sales variability.
Blazenko (1999) recognized the susceptibility to and impact of economic shocks on sales and earnings. Given the information value of firm earnings, Blazenko hypothesized a relation between trading of a firm's shares and firm's sales and added an "economic perturbance" term to his model to account for this relation.

Whereas, nowadays, the financing for material mentioned as a strategy and all of the researched companies in the automobile industry apply this strategy, so we can expect increasing financial expenses as well as enhancing the

interest rate. Therefore, we can forecast if financial expenses increase, products cost will increase too. So we will have disadvantage goods and will lose sales. Thus, testing the effect of the interest rate as an exogenous economic disturbance seems to be necessary.

## Literature review

## Leverage

The use of fixed cost in an attempt to increase (or lever up) profitability. Its magnifying power can help or hurt a business. A firm, which has leverage, will earn or lose more than it would without leverage. Operating leverage presents any time a firm has fixed operating costs-regardless volume. So operating leverage arises from the firm's use of fixed operating costs. The degree of operating leverage of a firm at a particular level of output (or sales) is simply the percentage change in operating profit (EBIT) over the percentage change in output (or sales) that cause the change in profit.

Financial leverage is the practice of financing a portion of the firm's assets with securities bearing a fixed rate of return in hope of increasing the ultimate return to the common shareholders. The degree of financial leverage at a particular level of operating profit is simply the percentage change in earning per share over the percentage change in operating profit (EBIT) that causes the change in earning per share. Another kind of leverage, which we introduce as an extension of the exiting method of decomposing beta and assess its incremental explanatory power through empirical testing, is degree of economic leverage (DEL).

## Degree of Economic Leverage (DEL)

The Mandelker's and Rhee's model (1984) provided the theoretical framework for the Degree of economic leverage through their explicit deconstruction of beta into its component parts of intrinsic business risk and operating and financial leverage. The degree of economic leverage is the percentage change in a firm's sales resulting from a unit percentage change attributable to an exogenous economic disturbance ( $Z_t$ ). The evidence supports the DEL's role in explaining systematic risk at both the industry and portfolio levels, and mixed results at the firm level.

## Intrinsic Risk

The Rhee $\beta_j^o$ represents a firm's intrinsic risk after the business, operating, and financial risk are isolated. The Mandelker and Rhee $\beta_j^o$ represent a firm's intrinsic risk in the absence of operating and financial leverage.

## Classical Capital Asset Pricing Model (CAPM)

For over 30 years, academics and practitioners have been debating the merits of the CAPM, focusing on whether beta is an appropriate measure of risk. CAPM is the result of the formation and development of the capital market theory which was established by Markowitz with the introduction of portfolio

theory. Most of these discussions are by and large empirical; that is, they focus on comparing the ability of beta to explain the cross section of returns to that of alternative risk variables. Most of these discussions, however, overlook where beta as a measure of risk comes from, namely, from equilibrium in which investors display mean-variance behavior (MVB). In other words, from an equilibrium in which investors maximize a utility function that depends on the mean and variance of returns of their portfolio.

CAPM explains the relation between risk –return and asset according to market return. By this model, during a period of time, return rate of common stock is measured when stock price is available and the result is used as market indices for measurement of stock operation. In CAPM method, all of the assets are considered. But practically there are some problems for measurement of return of all the assets or gaining general market index. In order to meeting to the goals, common stock is used for explaining of the model. First hypothesis of CAPM is a kind of linear relationship between stock return of each activity and stock market return during some periods.

Model calculation formula, by at least squares sum *regression analysis) is as follows:

$$K_j = \alpha + \beta K_m + e$$

Where:

$K_j$ = return rate of common stock in company, $\alpha$ = constant value, $\beta$ = sensitiveness coefficient (beta), $e$ = error in regression equation, $K_m$ = return rate of market portfolio. According to mathematical expectation supposition, error is equal to zero in regression equation (points distances from estimated line).

In CAPM, beta coefficient is very important for experimental tests. Because it is used for portfolio assessment and it is useful. The main reason is that beta coefficient of a share is less constant towards portfolio beta from one period to another period. In addition, researchers have shown that beta of common share during a long period (more than a period) tends to one. CAPM has been formed on the base of market risk premium (risk premium) model. It means it is supposed that investors expect to gain higher return by accepting more risks. Also, they expect to gain acceptable return from the asset which can be risked. In CAPM, if we suppose short term treasury papers of a company as an asset which can be risked, according to this model, investors should gain a return more than return of treasury paper, because they accept more risk. According to CAPM supposition the equation is used for line calculation of securities market:

$$K_i = R_F + \beta(R_M - R_F)$$

Where:

$R_F$ = risk free rate of return, $\beta$ = beta coefficient, $R_M$ = return rate based on market index, $R_M - R_F$ = premium or excessive return of market (risk premium) towards risk free rate of return. CAPM explains that expected return rate of an asset is a function of two parts: risk free rate of return and risk premium.

So:
$K_i$ = Risk free rate of premium + Risk premium

The main variable of this model is beta coefficient that determines the amount of demanded premium (bonus) by investors for portfolio investment, for each of the securities; beta coefficient is measured according to sensitiveness coefficient of securities return rate towards market. CAPM can relate expected return rate of each of securities like $i$ (or P portfolio) with suitable standard of securities risk, i.e. its beta. Beta is suitable standard of risk that can not change it through variety and investors should consider its own portfolio management in decision processes.

The classical CAPM assumes that the cost of equity of a quoted company reflects the systematic, that is, non-diversifiable, risk that investors perceive the company has (measured by beta). Therefore,

$$C_E = R_F + \beta(R_M - R_F) + R_U$$

Where $C_E$ cost of equity capital, $R_F$ is the risk-free market rate, $R_M$ is the market return (the average return of all shares quoted on the market), $\beta$ (or beta) is the elasticity of the return of the company's shares to the market return, or, effectively, the slop of the returns of the company's shares and the historical returns of the market, and $R_U$ is the residual component, that is, it reflects the unsystematic risk, or risk not explained by beta. The term $(R_M - R_F)$ is referred to as the market risk premium.

In the classical CAPM framework, an investor's utility is fully determined by the mean-variance returns of the portfolio, i.e. the higher the return is and the lower the risk is, the better the investment would be. The risk of an asset $i$ if taken individually is then measured by the asset's standard deviation of returns ($\delta_i$), which is calculated as:

$$\delta_i = \sqrt{E\left[(R_i - \mu_i)^2\right]}$$

Where $R$ denotes returns and $\mu$ denotes mean returns of a stock. Standard deviation of returns is one of the risk factors that we will regress returns with.
When asset $i$ is just one out of the many in a fully-diversified portfolio, however, its risk is measured by its covariance with respect to the market portfolio ($\delta_{iM}$):

$$\delta_{iM} = E\left[\left(R_i - \mu_i\right) \times \left(R_M - \mu_M\right)\right]$$

Where M indexes represent the market portfolio. Beta as asset $i$ ($\beta_i$) then equals the covariance between asset $i$ and the market portfolio divided by the variance of the market portfolio:

$$\beta_i = \frac{\delta_{iM}}{\delta^2_M} = \frac{E\left[(R_i - \mu_i) \times (R_m - \mu_m)\right]}{E\left[(R_m - \mu_m)^2\right]}$$

## Downside Capital Asset Pricing Model (D-CAPM)

There are only a few non-CAPM based models, of which the best known and most relevant is developed by Estrada (2002). It overcomes one of the most serious weaknesses of the CAPM; specifically, that investors are assumed to be averse to variance or total risk. In fact, as already mentioned, investors are motivated by their aversion to downside risk, that is, downside and upside swings are not equally important for the investors, as his or her pivotal goal when selecting an investment target is a desire to avoid an economic loss. Estrada (2002) introduced the Downside Capital Asset Pricing Model (hereinafter referred to as the D-CAPM) to deal with the above mentioned problem. In general, the cost of equity calculated under the D-CAPM is higher than that of the CAPM and lower than that of the models double-counting the risk; therefore the D-CAPM should not only explain returns in developed countries, but in emerging market as well.

The usage of semi-variance and downside beta is the only difference between the D-CAPM and the CAPM. The formula of the cost of equity under the D-CAPM therefore is as follows:

$$C_E = R_F + \beta^D \times (R_M - R_F) + R_U$$

Where $\beta^D$ is the downside beta. If the portfolio is diversified, obviously, the term $R_U$ disappears from the models, as $R_U$ is the unsystematic risk, just like in the CAPM.

In the D-CAPM, mean-semi variance (or downside variance) returns of the investor's portfolio determines its utility. The risk of an asset $i$ taken individually is measured by the asset's downside standard deviation ($S_i$ semi deviation) of returns, calculated as;

$$S_i = \sqrt{E\left\{Min\left[(R_i - \mu_i), O\right]^2\right\}}$$

Where $\mu_i$ is the mean return of asset $i$, which can be replaced with any benchmark return.

Downside covariance (cosemivariance) of asset $i$ to the market portfolio is then:

$$\delta_{i,m} = E\left\{Min\left[(R_i - \mu_i), O\right] \times Min\left[(R_m - \mu_m), O\right]\right\}$$

Consequently, downside beta of asset $i$, equivalently to the CAPM beta, is equal to cosemivariance divided by the market's semivariance of returns:

$$\beta_i^D = \frac{\delta_{im}}{\delta_m^2} = \frac{E\left\{Min\left[(R_i - \mu_i), O\right] \times Min\left[(R_m - \mu_m), O\right]\right\}}{E\left\{Min\left[(R_m - \mu_m), O\right]^2\right\}}$$

## Financial Leverage and Risk

A stock's expected return, its dividend yield plus expected price appreciation is related to risk. Risk-avers investors must be compensated with higher expected returns for bearing risk. The presence of debt in a firm's capital structure has an impact on the risk borne by its shareholders. In the absence of debt, shareholders are subjected only to basic business or operating risk. This business risk is determined by factors such as the volatility of a firm's sales and its level of operating leverage. As compensation for incurring business risk, investors require the premium in excess of the return they could earn on a riskless security such as a Treasury bill. Thus, in the absence of financial leverage, a stock's expected return can be thought of as the risk-free rate plus a premium for business risk.

For investors to hold the shares of firms with debt in their capital structures, they must be compensated for the additional risk generated by financial leverage. The additional risk premium associated with the presence of debt in a firm's capital structure is the financial risk premium. The expected return on a firm's stock is the risk free rate plus a premium for risk:

Expected return = Risk-free rate + Risk premium
T
he risk premium consists of a premium for business risk and a premium for financial risk.

Expected return = Risk-free rate + Business risk premium + Financial risk premium

This relation can be formulated as follow:

$$R_s = R_f + BRP + FRP$$

Thus, the expected return on a firm's stock can be decomposed into three components. These components are:

1. the return on a risk less security, $R_f$
2. a premium reflecting a firm's basic business (or operating) risk in the absence of financial leverage, BRP
3. a premium for the additional risk created by the existence of debt in a firm's capital structure, FRP

This relation is illustrated graphically in figure (2).

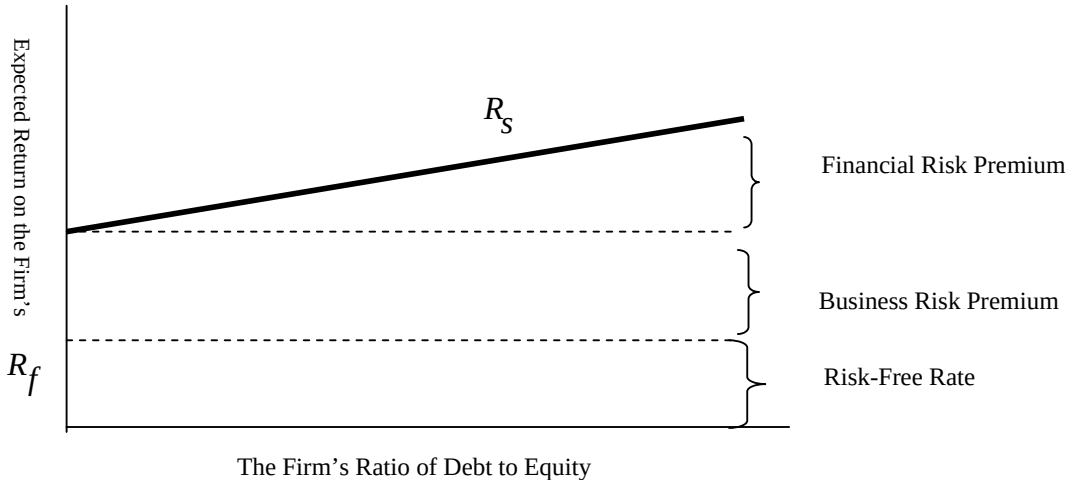


Figure 2. The Relation between a Firm's Financial Leverage and the Expected Return on Its Stock.
From: Kester, W., 2005. Case Problems in Finance. Mc Graw-Hill, first edition,473.

## The Effect of Financial Leverage on Beta

If a firm has no debt in its capital structure, the stock's risk premium consists solely of a business risk premium. The stocks beta therefore reflects the systematic risk inherent in the firm's basic business operations. With no financial leverage, this beta is the stock's unlevered beta, $\beta^U$ . This unlevered beta is the beta the stock would have if the firm had no debt in its capital structure. The presence of debt in a firm's capital structure results in additional risk inherent in the firm's basic business operations amplified by financial leverage. With financial leverage, the beta on a firm's stock reflects both business and financial risk. This beta is called levered beta, $\beta^L$.

Under the assumptions of the CAPM, there is a simple relation between levered and unlevered betas:

$$\beta^L = \beta^U (1 + \frac{D}{E})$$

Alternatively,

$$\beta^U = \frac{\beta^L}{1 + \frac{D}{E}}$$

A stock's levered beta is equal to its unlevered beta multiplied by a factor that includes the firm's ratio of debt to equity, $\frac{D}{E}$. Therefore a stock's beta (and its expected return) increases as its debt ratio increases. The increase in beta reflects the additional systematic risk generated by financial leverage. The resulting increase in expected return reflects the increase in the financial risk premium required by investors as compensation for additional risk.

The CAPM can be employed to decompose a stock's expected return into its basic components. This can be accomplished by combining the equation relating levered and unlevered beta and the basic CAPM expression, the SML. The general and CAPM version of this decomposition are:

$$R_S = R_F + \beta^U (R_M - R_F) + \beta^U (\frac{D}{E})(R_M - R_F)$$

Alternatively,

$$R_S = R_F + \beta^U (R_M - R_F) + (\beta^L - \beta^U)(R_M - R_F)$$

Thus, the expected return on a stock can be decomposed into:

1. The risk-free rate.
2. a business risk premium presented with no debt in a firm's capital structure
3. The additional risk premium created by the existence of debt in the capital structure.

## Evaluating Automobile Industry's Performance

In this research, we use sale's changes for evaluating performance because of the importance of sale on one hand, and on the other hand, the offered model is going to be DEL, which is defined as the percentage change in a firm's sales resulting from a unit percentage one attributable to an exogenous economic disturbance. (On which, the financing expenses is determined as exogenous economic disturbance in our research).

## Research Models

In this article, we use Mandelker and Rhee model to provide the theoretical framework for the DEL. As we mentioned the DEL is defined as the percentage change in the firm's sale resulting from a unit percentage change attributable to an exogenous economic disturbance.

1) $$DEL = \frac{\%\Delta Q}{\%\Delta Z} = \frac{\left(\frac{\tilde{Q}_{j,t}}{Q_{j,t-1}} - 1\right)}{\left(\frac{\tilde{Z}_{j,t}}{Z_{j,t-1}} - 1\right)}$$

and rearranging and solving for

$$\left(\frac{\tilde{Q}_{j,t}}{Q_{j,t-1}} - 1\right)$$

yields

$$\left(\frac{\tilde{Q}_{j,t}}{Q_{j,t-1}} - 1\right) = \left(\frac{\tilde{Z}_{j,t}}{Z_{j,t-1}} - 1\right)\left(DEL\right)$$

Inclusion of the DEL term in the Mandelker and Rhee decomposed function yields

2) $\beta_j = (DEL)(DFL)(DOL)\beta^o{}_j$

where

3) $$\beta_j^o = \frac{COV\left[\left(\frac{\pi_{j,t-1}}{Z_{j,t-1}}\right)\left(\frac{\tilde{Z}_{j,t}}{E_{j,t-1}}\right), \tilde{R}_{m,t}\right]}{\delta_{m,t}^2}$$

The first term within the covariance is a constant that represents the last period's earnings after taxes ($\pi_{j,t-1}$) that already reflect the economic disturbance ($Z_{j,t-1}$) that may have occurred in that period. The second term within the covariance includes an expectation that a firm's equity market value ($E_{j,t-1}$) already reflects anticipated future economic disturbance ($\tilde{Z}_{j,t}$). It is the covariance of the product of these two terms with the market return that represents the intrinsic business risk faced by the firm.

## Market Return ($R_M$) and Firm Return ($R_i$)

$R_M$ is extracted from Rahavard software which Tehran Stock Exchange's data is on it.

$$R_i = \frac{(1+\alpha)P_1 + DPS - P_0}{P_0} \times 100$$

Where $\alpha$ = percentage of raising capital

$P_1$ = stock price at the end of period

$P_0$ = stock price at the beginning of period

$DPS$ = dividend per share

## Risk-Free Rate ($R_f$)

$R_f$ is a risk less security such as a treasury bill. This rate is different in all around the world, and is consistent with financial equipment which applied it. For this purpose, the joint draft rate is used in this research. According to the Central Bank of Iran, this rate has been 17% from 21 March 2001 to 21 March 2005 and 15.5 % from 21 March 2005 to 21 March 2006.

## Research Hypothesis

In this research we are decided to explain degree of economic leverage (DEL) for testing beta coefficient in comparing with CAPM and D-CAPM.
For considering this subject, we plan hypothesis as follows:

1. There is a meaningful relation between interest rate and company's sale.
2. The explanatory power of the DEL through market return is more than DFL and DOL.
3. The explanatory power of the DEL through expected return is more than DFL and DOL.
4. There is a meaningful differentiation between accumulated beta by DEL and accumulated beta by CAPM and D-CAPM.

## Methodology and Research Objective

The objective of the present research is to demonstrate the degree of economic leverage as a determinate of systematic risk, and the assessment of the incremental explanatory power of the DEL through empirical testing.
Research method is according to survey method and is of a correlation type which it's main goal is to definite the relationship among some quantitative variables. Population of this research is all the accepted automobile and automotive parts manufacture companies in Tehran Stock Exchange which have operated since 21 March 1996 to 21 March 2006.

## Accumulation Tools of Data

Research tools are known as published financial reports. For accumulating these data, documents of "Rahavard" software has been used. This information has been published by Tehran Stock Exchange department.
Because data and information have been gathered from Tehran Stock Exchange department, they are reliable and in other words they are valid able. Also for calculation and transformation data to studied index, formula of DEL, CAPM and D-CAPM models are used and indicate reliability of variables data. So both measurement tool and studied data are valid able and reliable.

## Data Analysis Method

The obtained data were surveyed by the Excel and MINITAB software. For answering the questions and testing the research hypothesis, results of descriptive and deductive statistics have been analyzed. Research hypothesis have been tested by using deductive analyses like Spearman, regression, R-Squared and obtained results have been analyzed. For comparing the DEL model with the other models (CAPM and D-CAPM), comparing test analyses have been used.

## Analyzing the Data and Testing the Hypothesis

Data of under studying companies have been used within 5 years (2001 to 2005) for testing the hypothesis. First, under studying variables have been reviewed by using the normal test of Kolomogorov-Smirnov that the results show the data don't follow a normal distribution. Spearman Tests have been used for explaining the relation and calculating the correlation. The relations between independent and dependent variables are being investigated by Regression Analysis. The conceptual level 0.05 % is considered for the research hypothesis. All the stages have been tested by MINITAB Software.

## The First Hypothesis

Table 1: Testing correlation between sale & interest

**Correlations: R-%SALE; R-%I**
Spearman correlation of R-%SALE and R-%I = 0.189
P-Value = 0.076

In this hypothesis, the existence of a meaningful relation between the interest rate and sale of the automobile industry and manufacturing parts companies of Iran is investigated. By taking into consideration that the calculated amount of P from the Spearman correlation test, which was conducted for this hypothesis, is greater than 0.05 in a conceptual level, therefore the hypothesis of existing a conceptual relation between sale and interest rate with confidence level of 95% is not accepted and also the correlation amount of 0.189 obtained from Spearman correlation determines the week relation between these two variables.

## The Second Hypothesis

Table 2: Testing correlation between Market Return & DEL,DOL,DFL

**Correlations: R- DEL; R - Rm**
Spearman correlation of R- DEL and R - Rm = 0.160
P-Value = 0.132

**Correlations: R- DOL; R - Rm**
Spearman correlation of R- DOL and R - Rm = 0.026
P-Value = 0.808

**Correlations: R- DFL; R - Rm**
Spearman correlation of R- DFL and R - Rm = 0.017
P-Value = 0.874

In this hypothesis, explanation ability of degree of economic leverage with market return is higher than the considered degree of operational leverage and degree of financial leverage, first the relation between degree of economic, operational and financial leverages with market return are measured by Spearman correlation test and then the correlation amount between the variables obtained by this test are compared with one another. The obtained P amount for the entire variables in a conceptual level is greater than 0.05 that it proves the non-existence of a conceptual relation between these variables by the confidence level of 95%. But in relation to the explanation ability of these variables, because the obtained Spearman correlation coefficient between the degree of economic leverage and market return is higher than two operational and financial leverages, the explanation ability of this leverage with the market return is higher than the explanation ability of degree of financial leverage and degree of operational leverage. Therefore, our research hypothesis will be accepted, that is explanation ability of degree of economic leverage in relation with market return is higher than degree of operational leverage and degree of financial leverage.

## The Third Hypothesis

Table 3: Testing correlation between Expected Return & DEL,DOL,DFL

**Correlations: R - Rs; R- DEL**
Spearman correlation of R - Rs and R- DEL = 0.202
P-Value = 0.057

**Correlations: R - Rs; R- DOL**
Spearman correlation of R - Rs and R- DOL = -0.017
P-Value = 0.870

**Correlations: R - Rs; R- DFL**
Spearman correlation of R - Rs and R- DFL = 0.153
P-Value = 0.150

In this hypothesis, explanation ability of degree of economic leverage with expected return is higher than the considered degree of operational leverage and degree of financial leverage, first the relation between degree of economic, operational and financial leverages with expected return are measured by Spearman correlation test and then the correlation amount between the variables obtained by this test are compared with one another. The obtained P amount for the entire variables in a conceptual level is greater than 0.05 that it proves the non-existence of a conceptual relation between these variables by the confidence level of 95%. But in relation to the explanation ability of these variables, because the obtained Spearman correlation coefficient between the degree of economic leverage and expected return is higher than two operational and financial leverages, the explanation ability of this leverage with the expected return is higher than the explanation ability of degree of financial leverage and degree of operational leverage. Therefore, our research hypothesis will be accepted, that is explanation ability of degree of economic lever in relation with expected return is higher than degree of operational leverage and degree of financial leverage.

## The Fourth Hypothesis

In this hypothesis, responding to the main question of research is the purpose of research, that is we want to compare the calculated Beta by DEL with the calculated Beta by CAPM, D-CAPM model and the claim is that there is a conceptual difference between the calculated Beta by DEL and the calculated Beta by the two other methods. For this purpose, first by using the annual real data, we have calculated the amount of Beta from three methods of DEL, CAPM and D-CAPM for years 2001 to 2005 and then by using the average of five-year growth rate (1996-2000), we have predicted each of the variables for years 2001 to 2005 and the amount of Beta has been predicted from each three mentioned methods for this period of time. Finally, by using the real and predicted lever Beta ($B^l$), the amount of non lever Beta ($B^u$) and expected return ($R_s$) for these five years has been reality and predictability calculated and compared. The results have been summarized in table 4.

Table 4: Comparing Levered and Unlevered Beta and Expected Return in Real and Predictable Manner through DEL, CAPM, D-CAPM Models

| Variable | DEL | | | CAPM | | | D-CAPM | | |
|---|---|---|---|---|---|---|---|---|---|
| | Actual | Forecast | Difference | Actual | Forecast | Difference | Actual | Forecast | Difference |
| $B^l$ | **-0.01** | **0.001** | **0.01** | **2.20** | **-0.32** | **2.53** | **5.03** | **1.01** | **4.01** |
| $B^u$ | **0.0016** | **0.00005** | **0.0015** | **0.52** | **-0.05** | **0.57** | **1.24** | **0.21** | **1.02** |
| $R_S$ **(%)** | **16.70** | **17.01** | **0.31** | **8.97** | **-7.60** | **16.57** | **-0.92** | **93.7** | **94.6** |

Through comparing the real and predicted amounts in each three methods, we will attain this result that total predicted amounts of all variables (lever Beta, non lever Beta and expected return) are closer to the reality in compare with other two methods through helping of DEL method for all existent companies and our claim will be accepted in this hypothesis, that is the calculated Beta by DEL has a conceptual difference with the calculated Beta by CAPM, D-CAPM method. Furthermore, it is considerable that not only the calculated predicted return by DEL is closer to the reality in compare with the two other methods, but also we can say that the reason of this issue is the interference of the number of very important variables such as financial expense and net interest in the $\beta_j^o$ accounting method and as a result the calculated Beta amount.

## Other findings of the research:

Regarding the obtained results from testing the research hypothesizes and also studying the obtained results from other findings in relation with sensitiveness coefficient account by using degree of economic lever, this result can be obtained that: Nature risk in non-existence of financial and operational leverage is calculable that is the same leverage Beta and as a result the amount of the sensitiveness coefficient can be calculated by using financial, operational and economic leverages of a company and finally, the excepted return is calculated according to CAPM model and also the pattern of leverage Beta and non leverage Beta and this result is obtained that each two methods measure the same return. Consequently, the economic leverage, beside other leverages can have the complementary data for making decision about sale changes and profitableness of the automobile industry and manufacturing parts companies of Iran.

## Conclusion and Recommendation:

Results obtained by testing the hypothesis are as follows:

1. There is no meaningful relation between the rate of interest and sale of a company.
2. Explanation ability of degree of economic leverage with market return is higher than the operational and financial leverages.
3. Explanation ability of degree of economic leverage with expected return is higher than the operational and financial leverages.

4. Calculated Beta by the degree of economic leverage has a conceptual difference with calculated Beta by CAPM, D-CAPM models.

Regarding the results of research, it is suggested that:

1. The Beta Coefficient of degree of economic leverage is used for determining the systematic risk and predicting the expected return rate.
2. The economic leverage is used beside other leverages for making decision about sale changes and profitableness of companies.
3. The A-CAPM method be used along with the calculated Betas such as DEL, D-CAPM, and CAPM and compared with other amounts of calculated betas.
4. This research is extended to other industries. Furthermore, other variables other than the interest expense be recognized and tested as an economic disturbance.

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