The study of relationship between capital intensity and financial leverage with degree of financial distress in companies listed in Tehran Stock Exchange

Mohammad Reza Pourali\textsuperscript{1}, Mahmoud Samadi\textsuperscript{2}, Ensieh Karkani\textsuperscript{*3}

1. Assistant Professor of Accounting, Department of Accounting, Faculty of Management and Accounting, Chaloos Branch, Islamic Azad University, Chaloos, Iran.
2. Assistant Professor of Accounting, Department of Accounting, Tonkabon Branch, Islamic Azad University, Tonkabon, Iran
3*. M.A. Student of Accounting, Department of Accounting, Science and Research Branch, Islamic Azad University, Guilan, Iran.

*Corresponding Author email: Ensieh.karkani@yahoo.com

ABSTRACT: Many companies are faced with financial distress and bankruptcy, during the global financial crisis in recent years. A firm’s financial leverage has been recognized as one of the main factors that explain a firm’s financial distress. The second main factor is capital intensity, measured by total fixed assets scaled by total assets. The purpose of this research is to study the relationship between capital intensity and financial leverage with degree of financial distress. Statistics society are included the companies listed in Tehran Stock Exchange during the period 2007-2011. After sampling in deleting systematic 32 companies as 160 years-companies are selected. Degree of financial distress was measured by modified Altman's Z-Score. The analysis of data in both side of descriptive statistics and inferential by Eview6 system is done. The findings suggest a negative significant relationship between financial leverage and degree of financial distress (modified Altman's Z-Score). There is a negative significant relationship between capital intensity and degree of financial distress and the results showed that between capital intensity and financial leverage with degree of financial distress (modified Altman's Z-Score) of the companies listed in Tehran Stock Exchange is not significant relationship.

Key words: Capital Intensity, Financial Leverage, Degree of Financial Distress Capital, Tehran Stock Exchange

INTRODUCTION

When firms fail to commit their financial obligations and in fact cannot repay their debts, they face a financial distress. Financial economy’s literature studies determinants of financial distress, especially the bankruptcy. In this research, two factors of leverage and capital intensity will be studied from among these factors. The financial distress increases the firm’s risk and this increase more likely results in a financial distress. The capital intensity causes a decrease in the financial distress because the capital intensity is considered as an operational leverage which reduces operational costs by allocating much expense to fixed assets. In other words, since the firm has already distributed significant expenses among fixed assets, it uses these assets in the long term without any additional expense and consequently, the firm can completely reduce operational costs. On the other hand, the capital intensity which increases financial distress can exist when it causes many fluctuations in the expenses because decreased fixed expenses will not change according to the sale’s level. Nevertheless, by considering the fact that the market has efficiency in the segregation of non-cash items from cash ones, the argument for this intensive effect can be doubtful. Therefore, this study is aimed to decrease the effect of capital intensity according to the argument of decreasing the costs. In addition to the relationship between the financial leverage and capital intensity, and the degree of financial distress, this research studies potential contrasts between these two determinants.
Generally, there are two ways for the positive modification of the relationship between the financial leverage and financial distress through the capital intensity. One way is to decrease intensive effects of the financial leverage on the financial distress and the other one is to accelerate positive effects of the financial leverage on the financial distress and the increased level of capital intensity. The purpose of this study is the first argument, i.e. according to the side effects which can be provided by the capital intensity regarding the intensive effect of financial leverage on financial distress under investigation. It means that on the average, financial leverage expenses dominate the profits according to the financial distress and such expenses can be reduced when the level of capital intensity increases. For instance, the increase in the capital intensity can cause expenses to have a reduced amount of debts or debts to be reduced more intensely, because fixed assets are increased and act as additional sub factors in financial debts. This in turn can decrease the amount of the intensive effect on financial distress. Consequently, the positive relationship between capital intensity and financial leverage can be expressed by the degree of financial distress. In the present research, we study this relationship. Since both financial leverage and capital intensity play important roles, such a relationship should be observed more clearly. The capital intensity shows a significant positive influence. While the financial distress is increased by the financial leverage, the capital intensity independently decreases this degree. The amount of the negative effect of financial leverage on the degree of financial distress is decreased when the capital intensity is increased (Lee et al. 2011).

The main issue of this research is to discover what kind of relationship exists between capital intensity and financial leverage, and firms’ financial distress.

Research Literature

In the Oxford dictionary, the term “Distress” means pain, grief, lack of monetary resources and poverty. Also, in the financial literature, different definitions of financial distress have been provided. In one of the first studies on the financial distress theory, Gordon defined it as a decrease in the power of profitability of the firm which increases the possibility of inability in the original debt and its profit repayment (Gordon, 1971). Whitaker considered financial distress as a situation in which the firm’s cash flows is less than the total profit’s expenses relating to the long term debt. (Whitaker, 1999)

Weston (1992) From economical point of view, financial distress can be expressed as creating harm by a firm which in this situation, the firm is not successful. In this case, the profitability rate of the firm is less than the capital rate. Another mode of financial distress happens when the firm fails to contract the debt such as preserving the current proportion or equity proportion to the total assets based on the contract. Another mode of financial distress happens when the firm’s equity is a negative number.

It should be considered that financial distress will not necessarily lead to the bankruptcy, but bankruptcy is one of its effects, which is usually the last solution. In order to deal with financial distress, firms can restructure themselves (Raaie and Fallahpour, 2008).

According to Nido, financial distress is inability in debt payment or inability in payment of total debts against inability of liquidity (Taghavi and Pourali, 2010).

Lee et al. (2011) believe that firm’s leverage (financial leverage) is considered as a main factor in the firm’s financial distress and the fact that leverage will increase financial distress is a general assumption. According to Brealey and Myers (1986), leverage has a tendency toward the firm’s increased risk because financial markets have shown that leveraged firms will have more risks due to the potential expenses of financial distress (Lee et al. 2011).

The leverage is considered as an exploratory variable in the modeling of financial distress’s expenses and a positive relationship is expected to exist between the leverage and possibility of financial distress, and consequently between the leverage and financial distress’s expenses (Pindado& Rodrigues, 2005). The financial leverage increases bankruptcy’s expenses. A high leverage makes firms vulnerable in financial risks (Hsu and Jang, 2008).

Also, the analysis of financial leverage is related to the firm’s capital structure which uses the leverage ratio as the criterion of firms’ long term discontinued operations. In other words, this ratio measures firms’ abilities to repay long term debts. The financial distress provides special evidence for the relationship between financial leverage and financial distress or failure (Chancharat, 2008).

On the other hand, Jensen’s (1989) and Wruck’s (1990) points of view are different. These authors presented a new point of view that not only considers expenses, but also pays attention to potential profits of debts for financial distress processes which according to these opposite points of view, these opposite effects may neutralize each other and become insignificant in the explanation of financial distress’s expenses (Pindado & Rodrigues, 2005).
Although Jenson (1989) believed that there was an exchange between advantages and disadvantages of the leverage's influence on financial distress and by using an argument he claimed that profits were more important than expenses, Wruck (1990) claimed that strategically, the decrease of leverage may quickly reduce financial distress, but in this way it is not possible to make a decision with the maximum value because tax profits as well as organizational and motivational profits of the leverage will be disappeared (Lee et al. 2011).

Brealey and Myers (1984), and Shapiro and Titman (1989) believe that the capital intensity which is often measured by fixed assets divided by total assets or total sales indicates the operational leverage, and a larger capital intensity has a tendency toward increasing the firm's risks which originates from the notion that the firm with a higher level of fixed assets naturally experiences more fixed expenses and in proportion to these expenses, the firm's expenses from the sale's level have not changed which means that when the demand has fluctuations, profitability of capital firms has more fluctuations compared to firms which use less capitals (Lee et al. 2011).

The capital intensity may have a negative relationship with the firm’s risk so that the capital intensity becomes a representative for the firm’s ability to minimize the expenses and consequently a supporter for the firm’s cash flows against environmental uncertainty (Lubatkin&Chatterjee, 1994). In addition, another point of view proposes that capital intensity may have an improving role in the financial situation of the firm since capital firms keep a larger proportion of fixed assets compared to their opposite firms which can be used as an assurance that decreases the distress (Lee et al. 2011).

Long and Maltiz has shown that the investment opportunities of a firm determined its financial leverage and they had argued that by having high unobservable investment opportunities, firms could control the agency’s expenses through limiting the amount of risky debts, against which the idea was presented that firms which were not faced with a high ratio of observable investment opportunities such as observable capital equipment could support more debts than firms which faced unobservable assets with specific opportunities of the firm (Long&Maltiz, 1983).

Charalambakis argues that the observable asset is defined as the fixed asset divided by total assets, and if a firm has a large amount of fixed (observable) assets, these assets can be used as assurances for creditors. If the debt is assurance-based, it reduces the risk of lenders who use the expenses of the debt's agency and enhances the capacity of the firm's debt. Therefore, we expect that there is a positive relationship between the leverage and capital intensity (Charalambakis, 2008).

Available theories about the relationship between the amount of observable assets and capital structure generally express a positive relationship. According to findings of Jenson and McLing (1976), the expense of the agency due to the debt is created after the release of the debt which follows the firm’s tendency toward more risky investments, and will cause the wealth transfer from the creditor to the shareholder. If the amount of observable assets of the firm is high, they can be used as assurances for reducing the risk of credit providers resulted from enduring the expenses of the debt agency. So, it is expected that the high leverage has a relationship with the amount of observable assets. The results obtained from studies of Haris and Ravio (1990), and Williamson (1988) indicate that the leverage has a correlation with observable assets (RafieNasirAbadi, 2010).

Regarding the junction between the capital intensity and the leverage, other authors such as Lowe et al. (1994) and Anderson (1990) argued that the high amount of capital intensity indicates the high amount of firm’s fixed assets and it can be used as an assurance when the firm faces financial distress or debt commitments; A firm with a high amount of capital intensity may reduce the expenses of issuing debts.

**Research Background**

In a research named “financial ratios, multiple detection and prediction of firm’s bankruptcy”, Altman (1968) started his study to prepare a comprehensive multivariate model and finally provided a model for predicting the bankruptcy which was called Altman model. For measuring the firm’s financial distress condition, he made an equation with 5 financial ratios using the statistical method of multiple detection analysis. For classifying bankrupt and non-bankrupt firms in one year after the bankruptcy, this model showed the accuracies of 94% and 97%, respectively.

In a research named “patterns of investment and financial leverage” Lang and Maltiz (1983) by studying 500 American firms concluded that the firm’s risk had a significant positive correlation with the financial leverage, and the firm’s choice of the capital was dependent to the type of investment opportunities which the firm was faced with. They argued that firms with observable investments supported higher debts and in contrast, firms with unobservable investment opportunities decreased the debt capacity and financial leverage of the firm.

In a research named “capital intensity and the expense of firm’s capital”, Harris (1988) obtained a positive effect of capital intensity on the firm’s performance which was measured (after deducting direct expenses of goods from the net sale) by the ratio of operating profit margin.
In a research named “portfolio strategy expansion”, Lubatkin and Chatterjee (1994) tested the relationship between diversity strategy and the risk of security companies of America and New York in the period of 1970-1984 with a sample including 246 companies and they included the capital intensity variable as a control variable in the equation which influenced the risk, and concluded that there was a negative relationship between the capital intensity and the firm’s risk.

In a research named “the effect of firm’s strategies on the capital structure”, Lowe et al. (1994) believed that the capital intensity was related to the low profitability risk and it facilitated the increase in debts. Also, there is positive relationship between fixed assets and the leverage which was shown by Frend and Lang (1988), Lang and Maltiz (1985) and Anderson (1990) who believed that there was a relationship between high capital intensity and the increase of debts.

In a research named “Changes in the continuous investment and leaving the possibility of financial distress”, Kane and Richardson (2002) by investigating all security companies of New York in the period of 1989-1998 concluded that the contraction in investments of assets and equipment significantly improved the possibility of leaving the financial distress and in contrast, it intensified the distress when the management attempted to improve assets and equipment at the time of facing a distress.

In a research named “determinants of capital structure”, Tang and Jang (2007) using a generalized least-squares analysis studied the unique behavior of housing firms’ leverage compared to software firms and they found that capital intensity had a positive effect on financial leverage in the housing industry of America.

In a research named “costs of financial distress and capital structure”, Charalambakis and Espenlaub (2008) using the modified Altman z-score as a criterion for estimating the possibility of financial distress concluded that there was a positive relationship between the leverage and distress possibility.

In a research named “the effects of financial distress and capital structure on attempts of external managers”, Cho et al. (2010) studied the contrast between the profits of shareholders and debtors by studying attempts of external managers when a firm experienced financial distress or when faced a high financial leverage, and they concluded that external managers with higher financial distress made a lower attempt to control financial leverages.

In a research named “the curve-like effect of the capital intensity and firm’s performance”, Lee et al. (2010) studied the relationship between the capital intensity and firm’s performance and showed that capital intensity has a curve-like effect on the firm’s performance, and by increasing the capital intensity, the firm’s performance will decrease. In addition, at lower levels of capital intensity, capital intensity’s losses may reduce profits; and after a certain level of the capital intensity, the increase of capital intensity will increase the firm’s performance.

In a research named “study of the effect of capital intensity on the relationship between the financial distress in America’s restaurant industry”, Lee et al. (2011) studied the test of financial distress in America’s restaurant industry. The data collection includes America’s restaurant firms during 1990-2008. This study measures the financial distress degree by Z-cores and research results indicate a positive corrective effect of capital intensity on the relationship between the financial leverage and financial distress.

In a research named “study of effective factors on the amount of using financial leverage”, Sinaie and Nisie (2003) by paying attention to 88 firms in periods of 1992-1996 and 1997-2001 concluded that the hypothesis based on the reverse relationship between financial leverage and operational leverage (the proportion of fixed assets to total assets) was not supported.

In a research named “explanation of the pattern of accepted firms’ capital structure in Tehran Stock Exchange” during 1998-2002, Bagherzadeh (2003), concluded that capital structure of these firms depends on variables such as fixed assets, and size and profitability of the firm.

In a research named “study of determinants of capital structure”, Kordestanie and NajafiOmranie (2008) concluded that there was a significant negative relationship between the visibilities of assets and the debt ratio, according to data obtained from 93 accepted firms during 2006-2008.

RESEARCH METHOD

According to the research model which seeks for a behavioral pattern and uses past true information, the research design is causal – comparative or ex-post-facto and is a kind of applied research. In such researches, the researcher studies the cause and effect (dependent and independent variables) after they have occurred. In these researches, there is a statistical relationship between variables which the purpose of research is to study this relationship. Also, variables cannot be manipulated. Therefore, the present research is correlational and relationships between variables are studied through the multiple linear regression.
Method of Data Collection

According to the nature of this research, the library method is used. Then, for collecting data relating to research hypotheses, we studied the group of accepted firms in the stock exchange and after extracting necessary information through Tadbirpardaz and Rah AvardNovinsoftwares, database of stock exchange and data integration in Excel columns, and transferring them to Eviews6 software, we tested, analyzed and interpreted the results in order to make decision about research hypotheses.

The Statistical Population under Study and the Condition of Sample Selection

The statistical population of the research includes all accepted firms in Tehran stock exchange. The sample selection from among accepted firms in Tehran stock exchange is done by considering following criteria through a systematic elimination method:
1) the firm’s fiscal year should end in March and during the period of study, the fiscal year should not change;
2) before 2006, the firms should have been accepted in the stock exchange;
3) financial information of the firm must be available during the period of study (2007-2011);
4) the firm should not be an investment, intermediation, financial supplying and holding firm because these firms’ capital structure is different from that of other manufacturing firms;
5) firms should be subject to article 141 of the Business Law; article 141 of the Business Law: according to this article, if half of the firm’s capital is lost due to disadvantages, the board of directors has the obligation to call for an extraordinary general meeting of shareholders immediately to consult about the liquidation or survival of the firm. Since firms which are legally bankrupt are not actually bankrupt, in this research, firms which are subject to article 141 for two successive years are considered financially distressed (Pouali, 2010 and Hajiha, 2005)

Measurement variables

Independent variables

LEV represents a firm’s leverage, measured by the debt-to-asset ratio; CI represents capital intensity, measured by the mean-centered fixed-to-total assets ratio;

Moderator variable

LEV×CI represents an interaction term between LEV and CI

Control variables

SIZE represents a firm’s size, measured by the log of assets. PROFIT represents a firm’s profitability, measured by net income scaled by sale. Q represents a firm’s growth opportunity, measured by Tobin’s Q
Q=(the Marketvalue of common stock plus the liquidating value of outstanding preferred shares plus the value of short-term liabilities plus the value of long-term liabilities)/the book value of total assets and because there is no preferred stock in Tehran stock exchange its value is equal to zero. LA represents a firm’s holding of liquid assets, measured by current-to-total assets ratio.

Dependent variable

Z represents a firm’s degree of financial distress, measured by modified Altman’s Z-scores (MacKie-Mason, 1990)
Z=3.3 (EBIT/TA) + 1 (Sales/TA) + 1.4 (Retained Earnings/TA) + 1.2 (Working Capital/TA) where EBIT represents a firm’s earnings before interest and taxes; TA represents total assets

Research hypotheses

The basic research hypothesis: There is a significant relationship between the capital intensity and financial leverage, and the degree of firms’ financial distress.
The first sub-hypothesis: There is a significant negative relationship between the firms’ financial leverage and financial distress.
The second sub-hypothesis: There is a significant positive relationship between firms’ capital intensity and the degree of financial distress.

Descriptive Statistics of Research Data
Table 1. Descriptive Statistics of Research Data

<table>
<thead>
<tr>
<th>variable</th>
<th>Mean</th>
<th>Median</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Std. Dev.</th>
<th>Skewness</th>
<th>Kurtosis</th>
<th>Jarque-Bera Statistic</th>
<th>Prob</th>
</tr>
</thead>
<tbody>
<tr>
<td>LEV</td>
<td>0.971764</td>
<td>0.898466</td>
<td>0.378489</td>
<td>2.755327</td>
<td>0.366805</td>
<td>2.420551</td>
<td>10.62171</td>
<td>543.5115</td>
<td>0.000000</td>
</tr>
<tr>
<td>CI</td>
<td>0.225704</td>
<td>0.172758</td>
<td>0.000000</td>
<td>0.888846</td>
<td>0.195123</td>
<td>1.307585</td>
<td>4.238273</td>
<td>55.81625</td>
<td>0.000000</td>
</tr>
<tr>
<td>Z</td>
<td>0.289173</td>
<td>0.283877</td>
<td>-7.643552</td>
<td>9.604386</td>
<td>0.415686</td>
<td>9.584645</td>
<td>293.6582</td>
<td>258.2537</td>
<td>0.000000</td>
</tr>
<tr>
<td>LEV×CI</td>
<td>0.227653</td>
<td>0.153313</td>
<td>0.000000</td>
<td>1.265429</td>
<td>0.236797</td>
<td>2.047765</td>
<td>7.68650</td>
<td>25.00116</td>
<td>0.000004</td>
</tr>
<tr>
<td>LA</td>
<td>0.692926</td>
<td>0.768978</td>
<td>0.087988</td>
<td>0.973203</td>
<td>0.213329</td>
<td>-0.967557</td>
<td>3.074236</td>
<td>27.2537</td>
<td>0.000000</td>
</tr>
<tr>
<td>PROFIT</td>
<td>0.000439</td>
<td>0.000000</td>
<td>12.96830</td>
<td>-3.280000</td>
<td>1.342291</td>
<td>7.097736</td>
<td>64.19557</td>
<td>263.0939</td>
<td>0.000000</td>
</tr>
<tr>
<td>SIZE</td>
<td>13.23045</td>
<td>12.96766</td>
<td>10.03122</td>
<td>16.63756</td>
<td>1.427752</td>
<td>0.245656</td>
<td>2.674257</td>
<td>2.136554</td>
<td>0.314027</td>
</tr>
<tr>
<td>Q</td>
<td>1.414126</td>
<td>1.225700</td>
<td>0.779725</td>
<td>7.708719</td>
<td>0.705441</td>
<td>5.072699</td>
<td>41.69917</td>
<td>10607.37</td>
<td>0.000000</td>
</tr>
</tbody>
</table>

Az can be seen in Table 1, The skewness coefficient is positive for all research variables except LA which indicates a skew to the right and variables have a tendency toward small values. This coefficient is negative for LA variable which indicates a skew to the left and variable has a tendency toward large values. Also, the positivity of stretch coefficients indicates that it is longer than a normal distribution and data are average. Finally, since the calculated error level is less than 0.05, Jarque-Bera test shows an abnormal distribution for research variables except the size variable, but according to the high number of samples and the central limit theorem (CLT) the abnormality is not justified.

The Basic Hypothesis Test Using the Estimated Generalized Least-Square (EGLS) Method

In order to test the basic hypothesis, after carrying out Hausman test and selecting fixed effects, variables of the model were estimated using the estimated generalized least-square (EGLS) method.

The basic research hypothesis: There is a significant relationship between the capital intensity and financial leverage, and the degree of firms' financial distress.

According to the above hypothesis, statistical hypotheses of the research are classified as follows:

H₀: There is not a significant relationship between the capital intensity and financial leverage, and the degree of firms' financial distress.

H₁: There is a significant relationship between the capital intensity and financial leverage, and the degree of firms' financial distress.

The model below is used for testing this hypothesis:

\[ Z_{it} = \alpha_0 + \alpha_1 LEV_{it} + \alpha_2 CI_{it} + \alpha_3 LEV_{it} \times CI_{it} + \alpha_4 SIZE_{it} + \alpha_5 PROFIT + \alpha_6 Q + \epsilon_{it} \]

Table 2. The Basic Hypothesis Test

<table>
<thead>
<tr>
<th>variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob (P-Value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(C)</td>
<td>9.690662</td>
<td>0.813233</td>
<td>11.9162</td>
<td>0.0000</td>
</tr>
<tr>
<td>(CI)</td>
<td>0.527790</td>
<td>0.925855</td>
<td>0.570056</td>
<td>0.5697</td>
</tr>
<tr>
<td>(LEV)</td>
<td>-3.993586</td>
<td>0.396360</td>
<td>-10.7056</td>
<td>0.0000</td>
</tr>
<tr>
<td>(LEV×CI)</td>
<td>-0.408421</td>
<td>0.995442</td>
<td>-0.410291</td>
<td>0.6823</td>
</tr>
<tr>
<td>(Q)</td>
<td>0.201914</td>
<td>0.021773</td>
<td>9.273644</td>
<td>0.0000</td>
</tr>
<tr>
<td>(LA)</td>
<td>4.018218</td>
<td>0.417712</td>
<td>9.619585</td>
<td>0.0000</td>
</tr>
<tr>
<td>(SIZE)</td>
<td>-0.631276</td>
<td>0.041113</td>
<td>-15.84094</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

Adjusted R-squared: 0.70461, F-statistic: 29.87637, Prob(F-statistic): 0.000000

A z can be seen in Table 2, The hypothesis test results indicate that the statistic value F at the error level of 5 and the reliability of 95% are significant, and the assumption of linearity and significance of the model is accepted.

I- Distribution of a high number of average random variables is normal (or totally symmetric) – even if the automatic distribution of variables is not normal (Eslami bidgoli, 2007)
According to results obtained from the best fitness of basic hypothesis of the research, after deleting the additional profitability variable according to the obtained P-Value, there is not a significant relationship between independent variables of capital intensity and financial leverage, and the dependent variable of financial distress. Watson’s camera value of 1.77 shows no correlation between errors. According to statistical results obtained, the capital intensity does not improve the relationship between leverage and financial distress. Firms with a high leverage and capital intensity are not a good choice for firms which seek for more profits because they have high amount of risks and they are more likely to be financially distressed. Managers of firms with a high financial leverage must prevent high capital intensity and have enough liquidity for the financial crisis.

Testing the First Sub-Hypothesis Using the Estimated Generalized Least-Square (EGLS) Method

In order to test the First Sub-Hypothesis, after carrying out Hausman test and selecting fixed effects, variables of the model were estimated using the estimated generalized least-square (EGLS) method.

The first sub-hypothesis: There is a significant negative relationship between the firms’ financial leverage and financial distress.

According to the above hypothesis, statistical hypotheses of the research are classified as follows:

\[ H_0 = \text{There is not a significant negative relationship between the firms' financial leverage and financial distress.} \]

\[ H_1 = \text{There is a significant negative relationship between the firms' financial leverage and financial distress.} \]

The model below is used for testing this hypothesis:

\[ Z_{it} = \alpha_0 + \alpha_1 \text{LEV}_{it} + \alpha_2 \text{SIZE}_{it} + \alpha_3 \text{Q}_{it} + \alpha_4 \text{LA}_{it} + \epsilon_{it} \]

<table>
<thead>
<tr>
<th>variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob (P-Value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(C)</td>
<td>10.41701</td>
<td>0.891814</td>
<td>11.68069</td>
<td>0.0000</td>
</tr>
<tr>
<td>(LEV)</td>
<td>-4.248137</td>
<td>0.180344</td>
<td>-23.5569</td>
<td>0.0000</td>
</tr>
<tr>
<td>(Q)</td>
<td>0.203191</td>
<td>0.027977</td>
<td>7.262908</td>
<td>0.0000</td>
</tr>
<tr>
<td>(LA)</td>
<td>3.971733</td>
<td>0.023095</td>
<td>17.80285</td>
<td>0.0000</td>
</tr>
<tr>
<td>(SIZE)</td>
<td>-0.683205</td>
<td>0.053968</td>
<td>-12.65955</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

Adjusted R-squared: 0.881368
Durbin-Watson stat: 1.828824
F-statistic: 34.75073
Prob(F-statistic): 0.000000

Az can be seen in Table 3. The research results’ test show that the statistic value F at the error level of 5 and the reliability of 95% are significant, and the assumption of linearity and significance of the model is accepted. According to results obtained from the best fitness of the first sub-hypothesis of the research, after deleting the additional profitability variable according to the obtained P-Value, there is a significant negative relationship between the financial leverage, and the degree of financial distress. So, the first sub-hypothesis is supported. Also, the control variable of the firm’s size and other variables have a significant negative and positive relationship with the dependent variable of the degree of financial distress, respectively. The total variables used in the model could approximately explain 88% of dependent variable’s changes i.e. the degree of financial distress. Watson’s camera value of 1.82 shows no correlation between errors. According to statistical results obtained, high capital intensity of the firm decreases the degree of financial distress and in fact increases the possibility of the firm’s financial distress. These firms are not a good choice for investment. Firms’ managers must use a high financial leverage in order to prevent financial crises.

Testing the Second Sub-Hypothesis Using the Estimated Generalized Least-Square (EGLS) Method

In order to test the Second Sub-Hypothesis, after carrying out Hausman test and selecting fixed effects, variables of the model were estimated using the estimated generalized least-square (EGLS) method.

The second sub-hypothesis: There is a significant positive relationship between firms’ capital intensity and the degree of financial distress.

According to the above hypothesis, statistical hypotheses of the research are classified as follows:

\[ H_0 = \text{There is not a significant positive relationship between firms' capital intensity and the degree of financial distress.} \]

\[ H_1 = \text{There is a significant positive relationship between firms' capital intensity and the degree of financial distress.} \]

The model below is used for testing this hypothesis:

\[ Z_{it} = \alpha_0 + \alpha_1 \text{CI}_{it} + \alpha_2 \text{SIZE}_{it} + \alpha_3 \text{Q}_{it} + \alpha_4 \text{LA}_{it} \]
Azcan be seen in Table 4. The research results’ test show that the statistic value F at the error level of 5 and the reliability of 95% are significant, and the assumption of linearity and significance of the model is accepted. According to results obtained from the best fitness of the second sub-hypothesis of the research, after deleting the additional profitability variable according to the obtained P-Value, there is a significant relationship between the capital intensity and the degree of financial distress. But, because this relationship is negative and significant, the second sub-hypothesis of the research is not accepted. Watson’s camera value of 1.57 shows no correlation between errors. According to statistical results obtained, high capital intensity of the firm decreases the degree of financial distress and in fact increases the possibility of the firm’s financial distress. These firms are not a good choice for investment. Firms’ managers must have both capital intensity and enough liquidity to prevent financial crises.

**MANA Test**

In order to make sure about research results and non-artificiality of relationships in the regression and significance of variables, we decided to carry out MANA test and calculate the unit root of research variables in EGLS model. The aforementioned test was carried out using EViews 6 software and Levin, Lin and Chu’s tests (2002), Im, Pesaran and Shin’s test (2003), Fisher – Augmented Dickey-Fuller’s unit root test and Fisher-Phillips-Perron’s unit root test (1991).

Azcan be seen in Table 5. Results of MANA test indicated that CI, SIZE and LA variables are MANA using all methods, and also Z, PROFIT, LEV and LEV x CI are MANA using Luwin, Lin and Chu’ method. According to results obtained, the null hypothesis regarding the unit root of variables is rejected.

**Compare and discussion**

Results of testing the basic hypothesis showed that there is not a significant relationship between the financial intensity and financial leverage, and the degree of financial distress and these results are opposite of the results obtained by Lee et al. who studied 1311 firms during 19 years in America’s restaurant industry. They concluded that the capital intensity has a positive effect on the relationship between the financial leverage and financial distress. Also, there is a positive relationship between the capital intensity and financial leverage which was shown by Long and Maltiz (1985), Anderson (1990), and Tang and Jang (2007). They believe that there is a relationship between the high capital intensity and the increase in debts. Sinaie and Nisie rejected the reverse relationship between the financial leverage and operational one. These results are in contrast to results obtained in...
this research. Kordestanie and Najafi Omranie (2008) showed that there is a significant negative relationship between the capital intensity and financial leverage.

Results obtained from the first sub-hypothesis showed that there is a significant negative relationship between the financial leverage and the degree of financial distress. These results are consistent with the results obtained by Cho et al. (2011), Lang and Maltiz (1983), Charalambakis and Espenlaub (2008), Lee et al. (2011).

Results obtained from the second sub-hypothesis showed that there was a significant negative relationship between the capital intensity and the degree of financial distress which were consistent with the results obtained by Kane and Richardson (2002) and were in contrast to results obtained by Harris (1988), Lubatkin and Chatterjee (1994), Lee et al. (2010), and Lee et al. (2011).

**Suggestions of Research’ Findings**

1- In this research, no significant relationship has been observed between the capital intensity and financial leverage, and the degree of financial distress. This result was obtained because both capital intensity and financial leverage had negative effects on the degree of financial distress and increased the firm’s risk. Also, Capital intensity did not improve the effect of leverage on the degree of financial distress and did not decrease risks. It is suggested that if a firm has a high leverage, it should pay attention to the capital intensity as well because the high capital intensity cannot reduce the financial distress, and it is not possible to ignore the high financial leverage of the firm due to the high capital intensity.

2- In this research, a significant negative relationship has been observed between the financial leverage and the degree of financial distress i.e. the financial leverage had a negative effect on the firm’s financial health and with the increase of the firm’s financial leverage, its risks increased. 88% of changes in the degree of financial distress are influenced by the degree of financial leverage. It is suggested that at the time of investment and funding, the firm’s financial leverage is considered because the high financial leverage will cause the firm’s financial distress.

3- In this research, the second sub-hypothesis was rejected because there was a significant negative relationship between the capital intensity and the degree of financial leverage. This result was obtained because firms with high levels of capital intensity became more risky due to the stability of fixed expenses with changes at the level of sales and by demand’s fluctuations, the operational profitability level of firms with high capital intensity has a tendency toward wider fluctuations compared to firms with lower capital intensity which these high fluctuations in the profitability are in fact high risks. It is suggested that the firm’s capital intensity must be considered because the high capital intensity will increase the bankruptcy possibility and consequently the firm’s losses.

**Suggestions for Further Researches**

In spite of researches conducted both inside and outside the country in terms of financial distress, there are different issues which can be considered for future researches:

1- Conducting the research on different industries or on a special industry.
2- Studying the relative effect of capital intensity variable on the relationship between the financial leverage and the firm’s performance.
3- Studying the effect of financial leverage on the firm’s performance with different indices that exist for the evaluation of performance.

**Abstract and Conclusion**

In this research, the relationship between the capital intensity and financial leverage, and financial distress were studied. Research results indicate that there is a significant negative relationship between the financial leverage and the degree of financial distress, and also there is a significant negative relationship between the capital intensity and the degree of financial distress, but there is not a significant relationship between the capital intensity and financial leverage, and the degree of financial distress.

**REFERENCES**


