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# Impact of Financial Distress on the Leverage of Selected Manufacturing Firms of Ethiopia

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**Abstract**
Leverage ratio is known to play a significant implication in financial condition firms. The main objective of the study is to examine the relationship between leverage and manufacturing firms' financial distress in Ethiopia from nineteen-ninety nine to two thousand five. Random Effect technique, the panel data General Least Square regression method is used. The result shows that leverage has negative and significant influence on financial distress.Manufacturing firms should consider the optimal debt capacity of them. Minimize the bank loans through equity financing. Improve cash collection and reduce bad debt expenses as remedy for maintaining short term cash problem.
**Keywords:** Financial Distress, Leverage, Debt service Coverage, Ethiopia

## 1. Introduction.

Financial distress is defined as *"*the likelihood of bankruptcy, which depends on the level of liquid assets as well as on credit availability*"* Hendel (1996).

The Financial distress in the firm adversely affects the performance of the firm and results in lower debt service ratio. It can be said that the impact of financial distress on debt service coverage is negative and the early stage of financial distress could be revenue reduction. The profitability of the firm is decreasing and the liquidity ratio of the firms decline due to high leverage of the firm. Financial distress may have a negative effect on the leverage of a firm if they give rise to high leveraged or heavily indebted. The dynamic nature of financial distress assumes that while moving in and out of financial trouble, the company passes through separate stages, each of which has specific attributes and, consequently, contributes differently to corporate failure. Financial distress is time-varying which incorporates that once entering it, the company does not stay in the same state until it is liquidated or until it recovers. Changes in financial conditions affect the transition from one state of financial distress to another Hill and Perry (1996). If financial conditions become aggravated, the company most probably will face bankruptcy; if the performance of the company improves, it has a chance to overcome its financial difficulties and recover without defaulting.

Therefore, an analysis of the coherence of change of financial conditions with the financial status of the firm should exploit three main dimensions of the distress dynamics: behaviour over the *time window*, the impact on different *financial states,* and characteristic features of *performance at different distress stages*.

Corporate failure is shown as a three-dimensional process containing the time frame, financial states, and process stages. The time window covers the period from the first signs of slight deterioration in performance through accelerated impairment down to the deepest point and subsequent recovery.

## 2. Background of the study

Leverage is the total debts of the firms. The highly leveraged firms have high debt to equity ratio or high debt to total asset ratio. High leverage leads firms for insolvency due to the urging of current obligation of creditors which either leads for bankruptcy, or bankruptcy leads for liquidation or restructuring or reorganization.

The firm's FD is the early stage of business failure and the symptoms of FD are the firm is desperately short of cash, the firm's suppliers are pushing for faster payments but the borrowings are at or close to the maximum and the firm's monthly accounts, show that the business is losing money consistently (Brealey etal, 2000**)**.

Shleifer (1993) and Vishny (1997) found that complex capital structures make it difficult to isolate certain aspects of the causes of financial distress. This may result in inefficient excess liquidation due to coordination problems and information asymmetries.

Based on the trade-off theory, financial distress has gained consideration as an important determinant of a firm's optimal capital structure Opler and Titman (1994) the trade-off theory suggests that a firm can capitalize on advantages from increasing its debt level through tax benefits (i.e., interest expense is tax deductible). However, as a firm exceeds the debt level above a certain point, the firm's degree of financial distress begins to increase and costs associated with debt begin to overshadow benefits. Therefore, the firm attempts to maintain its capital structure at a balanced and optimal level to avoid the greater costs of debt compared to the benefits of debt.

Two questions are imminent in relation to the relationship among these variables; to what extent does

financial distress affect leverage or how firm's leverage leads for financial distress? And what is the net effect of financial distress on the leverage of those firms?

With this in mind, this study tries to see the relationship of financial distress and leverage of Ethiopian manufacturing firms using econometric methods. Regression techniques are employed to see the effect of FD on leverage. The paper is organized as follow; the next section deals with literature review on the interplay of the four financial variables. The third section covers the econometric analysis. Results are interpreted in the fourth section and finally, conclusions are drawn and recommendations are forwarded in the last chapter.

## 3. Literature review

### 3.1. Previous studies

Leverage is the portion of the fixed costs which represents a risk to the firm. Operating leverage, a measure of operating risk, refers to the fixed operating costs found in the firm's income statement, whereas financial leverage is a measure of financial risk, refers to financing a portion of the firm's assets, bearing fixed financing charges in hopes of increasing the return to the common stockholders.

The higher the financial leverage, the higher the financial risk, and the higher the cost of capital Shim and Siegel (1998).

The firms Leverage ratio show how heavily the firm is in debt. When a firm borrows money, it promises to make a series of interest payments and then to repay the amount that it has borrowed. If profits rise, the debt holders continue to receive a fixed interest payment, so that all the gains go to the shareholders. Of course, the reverse happens if profits fall. In this case shareholders bear all the pain. If times are sufficiently hard, a firm that has borrowed heavily may not be able to pay its debts. The firm is then bankrupt and shareholders lose their entire investment. Because debt increases returns to shareholders in good times and reduces them in bad times, it is said to create financial leverage.

In general, the more debt a firm uses in relation to its total assets, the greater its financial leverage. Financial leverage is the magnification of risk and return introduced through the use of fixed-cost financing, such as debt and preferred stock. The more fixed-cost debt a firm uses, the greater was its expected risk and return Gitman (1991).

Ogawa (2003) argues that corporate debt can affect investment by creating debt overhang. Debt overhang is defined as deterrence of new investment due to the presence of debt outstanding. It occurs when the face value of debt outstanding is greater than its market value. In this case some of the benefits from new investment will go to the existing creditors rather than to the new investors. An increase of debt to net worth raises external finance premium due to the associated increase in the probability of bankruptcy.

Due to the significant importance of the financial distress, understanding its determinants has had wide examination in the financial economics literature. Through the course of the investigation, the literature shows recognition that a firm's leverage is a main factor that negatively impacts the level of financial distress Opler and Titman (1994); Andrade and Kaplan (1998).

This relatively widely accepted notion has been challenged in the literature which contends that a firm's leverage positively, not negatively, impacts the degree of financial distress Jensen (1989) and Ofek (1993). Such mixed and inconclusive arguments involving leverage calls for further investigations and the current study aims to enrich the literature, especially by providing specific findings with regard to the lodging industry. Study findings suggest that leverage increases the degree of financial distress Lee et al. (2010).

Opler and Titman (1994) show that the financial distress of highly leveraged companies has its seeds in an industrial downturn. The performance decline is exogenous and driven by customers, competitors, and the management. Therefore, in periods of economic recession, exogenous risk factors are primary sources of financial distress, while managerial incompetence can be rather seen as a response to external shocks.

Initial under capitalization and assuming debt too early are the two important exceptions from the factors cited as reasons for failure of firms in the 1960's to the 1980's such as product timing, product design, inappropriate distribution or selling strategy, unclear business definition, over reliance on one customer, problems with the venture capital relationship, ineffective team, personal problems, one-track thinking, and cultural/social factors Janes (2003). Entry into financial distress is defined as the first year in which cash flow is less than current maturities of long-term debt. Cash flow is defined as net income plus non-cash charges. Inadequate cash flow is a necessary but not sufficient condition for payment default. As long as cash flow exceeds current debt obligations, clearly, the firm has the funds available to pay its creditors. However, inadequate cash flow to cover current debt obligations does not imply that the firm defaults. Firms have numerous options to obtain the cash needed to avert default, including utilizing cash reserves, reducing inventory levels, extending trade creditors, drawing upon bank lines of credit, restructuring debt payments prior to default, raising equity, and selling assets. If inadequate cash flow continues, eventually these options are exhausted and the firm defaults Whitaker and Richard (1999).

Conceptually, firms facing primarily financial distress are viable as going concerns, have business

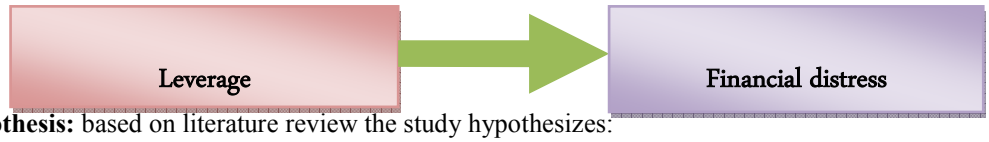
models that are without fundamental problems, but have high leverage and currently face difficulty repaying debts. Firms facing primarily economic distress also have difficulty repaying debts, but are also characterized by very low or negative operating performance and a business model with fundamental problems.

Several studies on financial distress acknowledge the distinction between financial distress and economic distress and employ proxies that are associated with one or the other. For example, Hotchkiss (1995) cites negative operating performance prior to filing as evidence of economic distress. Denis and Denis (1995) associate higher leverage with greater financial distress and less economic distress. Studies that more explicitly isolate the effects of financial versus economic distress include Andrade and Kaplan (1998) who study the effects of "pure financial distress" using a small sample of 31 highly levered transactions (HLTs).

They consider these HLTs financially rather than economically distressed in part because many firms in their sample exhibit above industry operating margins.

**Hypothesis**

This research emphasizes only on the relationship between leverage of the firms and financial distress.




**Hypothesis:** based on literature review the study hypothesizes:

***HQ****: there is a negative relationship between leverage and firm's debt service coverage as proxy for financial distress.*

If the more the firm's debt, the more the probability of the firm's financial distress. Bankruptcy is usually beginning with the default on debt servicing; thus, the higher the debt, the higher is the probability of default (sign -). If the higher the firms leverage, the lower the probability of covering its debt services and the higher the probability of financial distress. Therefore, there is negative relationship between leverage and debt service coverage as proxy for financial distress.

### 3.2. Theoretical framework

#### 3.2.1. Leverage and Financial distress

The impact of leverage on financial distress is significant. Leverage effects on financial distress has two sides of the process of financial strain influence, either operating side which causes operating risk or financial side which causes financial risk (Shim and Siegel (1998).

Furthermore, high leverage may facilitate FD on firms through inability to pay its debt and increasing insolvency and promoting bankruptcy. High leverage contributes to firm's FD by facilitating inability to meet the current obligation and deterioration of cash flow. Ogawa (2003) argues that corporate debt can affect investment by creating debt overhang. Firm's leverage is a main factor that negatively impacts the level of FD (Andrade and Kaplan 1998). Leverage increases the degree of firm's FD (Lee etal. 2010; Outecheva 2007). FD is seen as an intermediate state between solvency and insolvency. A firm is distressed when it misses interest payments or violates debt covenants (Purnanandam 2005).

The firm can capitalize on advantages from increasing its leverage through tax benefits. However, as firm's leverage above a certain point, the firm's degree of FD increase and costs associated with leverage overshadow benefits (Opler and Titman 1994).

Furthermore, the increase in leverage resulting from increase in total debt to total asset ratio increases the firm's insolvency, thus decreasing DSC. In addition to these effects, high TD to TA ratio also provide a firm with high probability of FD, which is often confirms in the each stages of FD will happen.

Thus, for a variety of reasons, leverage leads firms for FD. The reverse causation from FD to leverage is also intuitively straightforward. DSC increment improves a firm's leverage and hence financial distress probability would be minimal.

## 4. Methods of data collection and Analysis

In corporate finance financial distress are assumed to be a function of: (i) leverage of the firms; (ii) the liquidity of the firms, and (iii) other factors such as efficiency, firm size and so on.

This study examines the relationship between DSC performance and FD occurrence in Ethiopian manufacturing firms for the period from 1999 through 2005.CA to CL ratio, TD to TA ratio, GP to TS ratio, EBITD/TA and logTA and then EBIDA to TD ratio of those firms are modeled as a function of DSC and other explanatory variables.

A dynamic model type is formulated:

$$FD=\beta o+\beta 1LEVit+ \beta 2LIQit+ \beta 3PROFSit +\beta 4EFFit + \beta 5\ FSIZEit +\varepsilon it \quad (1)$$

LIQit = the firm's holding of liquid assets to cover short term debts;

PROFSit = the profitability of the firm;
SIZEit = the natural logarithm of the firm size measured in terms of volume of assets;
EFFit t = efficiency of the firm;
LEVit = the level of the firm leverage
In line with (Pranow etal, 2010)

DSC= (EBIDA)/ (TD).....(2)

EBIDA= is earning before interest depreciation and amortization
TD= principal plus interest or coupon

For the formulation of the above model (1) we used (Chris brook 2008) econometrics for finance is to capture idea.

Data used for this study are collected from individual manufacturing firms, beverage and metal manufacturing firms of Ethiopia. Annual data from manufacturing firms is collected for the period between 1999 and 2005. Study subject selection is dictated solely by data availability among manufacturing firms. For descriptive statistics of the raw data you may refer to Table 1. The liquidity, leverage, profitability, and efficiency amount as determinants (DSC) is used for this analysis as the ratio takes care of the differences.

Generalized Least Square techniques and Random Effect Methods are preferred to infer the better relationship between the variables under the situation. Hausman test is performed to choose from the two and Random Effect (RE) model is found to give superior result than the fixed effect model. In addition to that, the objective of the study is to determine the effect of the factors under consideration on manufacturing firms, not to explain the inter-firm difference. This makes RE more desirable than the FE. Following the works of (reference-model) Random panel effect (RE-GLS) regression method is applied to determine the significance of the effect of the explanatory variables on the dependent variables.

## 5. Empirical Results

### 5.1. Leverage Determinant

It is well known that the appreciation of the total debt in the firm relative to total asset (TD/TA) increases leverage (Altman 1983) hence, a positive link between the increases of TD to TA and leverage is expected. In other words appreciation of TD to TA ratio increases the leverage of the firms.

The negative coefficient of total debt to total asset for the regression output implies that the increase of the total debt relative to total asset affects the firm's leverage. Converse, the decrease of TD to TA helps the solvency of firms.

This is in line with both theoretical reasoning in corporate finance and findings of previous empirical studies (Pranow etal, 2010). The result shows the p-value 0.0000 & negative 0.4762632 percent. A one point increase in TD to TA results in a -0.4762632 percent increase in leverage. Though the coefficient is small, the effect is statistically significant. This implies TD to TA that targeting may help the solvency subsector of the firm.

## 6. Conclusions and Recommendations

In recent period manufacturing firms are heavily leveraged. Several factors appear to have contributed to this phenomenon including financial distress. However, to date there has not been that much attempt to investigate the role of financial distress on debt service coverage. Using Panel data for the Period of 1999-2005 for 11 Ethiopian manufacturing firms, this issue is investigated.

Total debt to total assets ratio has negative and significant effects on debt service coverage but inversely on leverage. It means that when the total debt to total assets ratio increases, leverage and debt service coverage will decrease. The results show that there is a negative relationship between leverage and financial distress; where high leverage leads for low debt service coverage and as result for financial distress.

High leverage in the firm affects the firm's debt service coverage and results in financial distress. The financial distress impacts on leverage and leads firms for inability to pay current obligation on scheduled time and leads for bankruptcy, liquidation or reorganization. Firms should have to know its optimal debt carrying capacity. The knowledge of optimal debt carrying capacity is significantly implication on the decision of the firms. The firm's debt should not be very small nor very large. It should be optimal. There is a calculation for optimal debt ratio for companies. Therefore, companies should go to financial experts and council them and ask them how to regularly check the optimal capacity of debt.

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## Appendix : Regression results

**Table 1.** Panel Data Regression Random Effect Model Result

```
Random-effects GLS regression                   Number of obs      =        76
Group variable: firms                           Number of groups   =        11

R-sq:  within  = 0.7630                         Obs per group: min =         6
       between = 0.9413                                        avg =       6.9
       overall = 0.9013                                        max =         7

Random effects u_i ~ Gaussian                   Wald chi2(7)       =    316.52
corr(u_i, X)       = 0 (assumed)                Prob > chi2        =    0.0000
```

| dsc | Coef. | Std. Err. | z | P>\|z\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| profit | .7778155 | .2222335 | 3.50 | 0.000 | .3422458 | 1.213385 |
| eff | .7198798 | .229787 | 3.13 | 0.002 | .2695056 | 1.170254 |
| liqud | .0623445 | .010382 | 6.01 | 0.000 | .0419961 | .0826928 |
| leve | -.4762632 | .0771539 | -6.17 | 0.000 | -.6274821 | -.3250443 |
| fsize | .0558841 | .0287628 | 1.94 | 0.052 | -.00049 | .1122583 |
| opervi | .0192333 | .0118305 | 1.63 | 0.104 | -.003954 | .0424207 |
| gcg | -.0026728 | .0069413 | -0.39 | 0.700 | -.0162775 | .010932 |
| _cons | -1.132389 | .4616602 | -2.45 | 0.014 | -2.037226 | -.2275517 |
| sigma_u | .06476254 | | | | | |
| sigma_e | .07073068 | | | | | |
| rho | .45603781 | (fraction of variance due to u_i) | | | | |

**Source**: regression result of panel data.

 

**Table 2. Hausman specification test for model fitness final**

```
. hausman fixed
```

| | Coefficients (b) fixed | (B) . | (b-B) Difference | sqrt(diag(V_b-V_B)) S.E. |
|---|---|---|---|---|
| profit | .7256655 | .7778155 | -.0521501 | .1282198 |
| eff | .5719943 | .7198798 | -.1478855 | .1418454 |
| liqud | .0668977 | .0623445 | .0045533 | .0063746 |
| leve | -.5033271 | -.4762632 | -.0270639 | .0296322 |
| fsize | .0859889 | .0558841 | .0301047 | .0330301 |
| opervi | .0219268 | .0192333 | .0026934 | .0051822 |

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(6) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 9.83
Prob>chi2 = 0.1318

**Table 3. BREUSCH AND PAGAN LAGRANGIAN MULTIPLIER TEST FOR HETROSKEDASTICITY**

Breusch and Pagan Lagrangian multiplier test for random effects

dsc[firms,t] = Xb + u[firms] + e[firms,t]

Estimated results:

| | Var | sd = sqrt(Var) |
|---|---|---|
| dsc | .0774336 | .2782689 |
| e | .0050028 | .0707307 |
| u | .0041942 | .0647625 |

Test: var(u) = 0
chi2(1) = 9.84
Prob > chi2 = 0.0017

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**Table 4. Tests for multicollinearity problem using correlation matrix**

| | dsc | profit | eff | liqud | leve | fsize | opervi | gcg |
|---|---|---|---|---|---|---|---|---|
| dsc | 1.0000 | | | | | | | |
| profit | 0.6747 | 1.0000 | | | | | | |
| eff | 0.5707 | 0.8477 | 1.0000 | | | | | |
| liqud | 0.5759 | 0.0254 | -0.1526 | 1.0000 | | | | |
| leve | -0.6523 | -0.1069 | 0.0625 | -0.7149 | 1.0000 | | | |
| fsize | 0.0502 | -0.4927 | -0.4103 | 0.1856 | -0.1202 | 1.0000 | | |
| opervi | 0.4917 | 0.4280 | 0.5637 | 0.0719 | -0.0697 | 0.2666 | 1.0000 | |
| gcg | -0.1072 | -0.0001 | -0.0685 | 0.0506 | 0.2245 | 0.0644 | -0.0011 | 1.0000 |

Autocorrelation Tests based on Durban Watson (DW)

Cross-sectional time-series FGLS regression

Coefficients: **generalized least squares**
Panels: **homoskedastic**
Correlation: **no autocorrelation**

Estimated covariances = 1
Estimated autocorrelations = 0
Estimated coefficients = 8

Number of obs = 76
Number of groups = 11
Obs per group: min = 6
avg = 6.909091
max = 7
Wald chi2(7) = 777.76
Prob > chi2 = 0.0000

| dsc | Coef. | Std. Err. | z | P>\|z\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| profit | .9177531 | .1723939 | 5.32 | 0.000 | .5798674 | 1.255639 |
| eff | .8445023 | .1778558 | 4.75 | 0.000 | .4959113 | 1.193093 |
| liqud | .0529561 | .0086854 | 6.10 | 0.000 | .035933 | .0699793 |
| leve | -.4800109 | .0693894 | -6.92 | 0.000 | -.6160115 | -.3440103 |
| fsize | .0692916 | .0183235 | 3.78 | 0.000 | .0333781 | .105205 |
| opervi | .0002053 | .0111451 | 0.02 | 0.985 | -.0216387 | .0220493 |
| gcg | -.0022535 | .0032756 | -0.69 | 0.491 | -.0086736 | .0041667 |
| _cons | -1.116937 | .2810325 | -3.97 | 0.000 | -1.667751 | -.5661236 |

.
. sum

| Variable | Obs | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| firms | 77 | 6 | 3.183014 | 1 | 11 |
| year | 77 | 2002 | 2.013115 | 1999 | 2005 |
| dsc | 77 | .3785697 | .2846163 | .0137864 | 1.142032 |
| profit | 76 | .2419149 | .1207847 | .0211472 | .4633958 |
| equity | 77 | .4861284 | .2224185 | .1729034 | .9391285 |
| eff | 77 | .1869522 | .1262358 | .0109197 | .4085041 |
| liqud | 77 | 2.135935 | 1.72031 | .4903508 | 9.23599 |
| leve | 77 | .5085471 | .2202952 | .0611014 | .8269072 |
| fsize | 77 | 18.39809 | .8091785 | 16.96834 | 20.65224 |
| opervi | 77 | 15.93089 | 1.398243 | 9.401043 | 18.23706 |
| age_in_year | 77 | 38.09091 | 28.83765 | 1 | 85 |
| gcg | 77 | 15 | 3.183014 | 10 | 20 |
| d1 | 77 | .4935065 | .5032363 | 0 | 1 |
| _est_fixed | 77 | .987013 | .1139606 | 0 | 1 |