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<td>内田 滋</td>
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Effect of Higher Financial Leverage on Corporate Borrowers in Bangladesh

K. S. Sarwar Uddin AHMED† and Shigeru UCHIDA‡

Abstract:
The widespread practice of multiple banking is evident among the corporate borrowers of Bangladesh. In this respect, this paper aims to examine the impact of multiple borrowing and reliance on bank credit to the profitability of firms. In order to do this we have conducted multivariate analysis to construct a model for identifying the predicting variables of profitability. As a result of the study, we have found that equity exhibited positive and loan showed negative relationship with profitability, which indicates that firms having higher financial leverage are prone to be a losing concern in terms of profitability.

Keywords: multiple banking, multivariate analysis, logistic regression, financial leverage

1. INTRODUCTION

The banking sector of Bangladesh is characterized by problems of non-performing loans, capital inadequacy, provisioning shortfall etc., although it accounts for about 97 percent of the market in terms of assets (IMF, 2000), and in turn making the entire financial sector vulnerable to economic crisis. Even the different banking sector reform programs are not giving any significant results. The banking sector ailing with different problems is in turn hindering the industrial development of the country as the majority of the industrial firms rely on indirect financing from banks as shown in Figure 1 for the conceptual process. A most frequently cited reason for these problems is the widespread practice of multiple borrowing in the banking sector. Although numerous studies on theoretical aspects have been conducted to examine the effect of multiple borrowing, a few empirical studies can be found to check the effect of multiple borrowing relationships on the financial status of the borrowing firms. In one of our previous study, we have found there is enough evidence of widespread practice
Increased Loan Burden and Reluctance to Pay

Higher Ratio of Non-performing Loans

Writing Off of Bad Loans

Lower Earnings Due to Retail Transactions

Lack of Information Base to Process Loan Application

Higher Transaction Cost

Higher Interest Margin

Delay in Lending Decision

Reluctance to Provide Long-term Financing

Lack of Liability to Save the Troubled Firm

Problems of the Banking Sector

Overall Capital Inadequacy

Inadequate Supply of Funds to the Industrial Sector

Higher Saving-Investment Gap

Lower Industrial Growth and Earnings

Higher Demand for Investment

Lower Domestic Savings

Lower Domestic Income

Figure 1 Banking problems leading towards poor industrial growth cycle
Source: Compiled and reconstructed by the authors with reference to Alam, 1994; Alam and Jahan, 1999; and Choudhury and Moral, 1999.

of multiple borrowing among the corporate borrowers in Bangladesh and the results of the empirical analysis revealed that, although such practice enables firms to borrow at comparatively lower interest expense, but suffer from limited access to credit (Ahmed and Uchida, 2003).

On this background this study aims to further investigation on the matter through empirical model analysis to examine the impact of multiple borrowing and reliance on bank credit to the profitability of firms.
2. Data and Methods

The balance sheet data of 174 joint stock companies listed in the Dhaka Stock Exchange in the year 2001 are used to construct multivariate models for identifying the most influencing factors deciding the profitability of the corporate firms.

In doing so, we have conducted logistic regression analysis. A special form of regression in which the dependent variable is a dichotomous (binary) variable coded as 1 or 0. The general manner of interpretation is quite similar to linear regression, although some differences exist (Hair et al., 1998).

3. Multivariate Analysis

3.1 The Hypothetical Model

A hypothetical multivariate model is constructed to determine the factors, which influences the performance of the firms (Profitability). It comprises the variables that are hypothetically assumed to have an influence on profitability of a corporate firm (PRF), such as: total assets, total capital employed, sales volume, equity, loan from outside the firm, interest expense, percentage of holding share by financial institutions and number of banks. Accordingly, total assets (TAS), total capital employed (TCA) and sales volume (SAL) are included to test the influence of asset and operating status on the profitability of the firms (PRF). Next, equity (EQT) and loan (LOA) is included to test the impact of financial leverage. Finally, interest expense (REX), percentage of holding share by financial institutions (SHA) and number of banks (NBK) are involved to check how the share and presence of banking institutions affect the profitability of the firms. These factors, which are hypothesized to have influence on a firm’s profitability, can be summarized by the following conceptual model:

\[ \text{PRF} = \theta(\text{TAS}, \text{TCA}, \text{SAL}, \text{EQT}, \text{LOA}, \text{REX}, \text{SHA}, \text{NBK}) \]  

[1]

The dependent variable is whether the firm is profitable. The affirmative or positive (POS) is equal to 1, and 0 otherwise. Because of the discrete nature of the dependent variable, the ordinary least square regression can be used to fit a linear probability model, but its heteroskedastic nature of the error terms and the possibility to predict values beyond the range of 0 and 1, led us to use the logistic regression model. Accordingly, the logistic regression model, which can be developed to analyze hypothesized model in Eq. [1], takes the following shape:
\[
\ln\left[\frac{\text{prob(POS)}}{1-\text{prob(POS)}}\right] = b_0 - b_2(\text{TAS}) + b_3(\text{TCA}) + b_4(\text{SAL}) + b_5(\text{EQT}) + b_6(\text{LOA}) + b_7(\text{REX}) + b_8(\text{SHA}) + b_9(\text{NBK})
\]

The explanation of the variables and the descriptive statistics are presented in Table 1, containing their expected relationship sign with the profitability.

<table>
<thead>
<tr>
<th>Variable name</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>Description</th>
<th>Expected sign in regression model</th>
</tr>
</thead>
<tbody>
<tr>
<td>POS</td>
<td>0.67</td>
<td>0.47</td>
<td>The dependent variable is the profitability of firms (POS = 1 if five yearly average is in profit and 0 otherwise).</td>
<td></td>
</tr>
<tr>
<td>TAS</td>
<td>630.64</td>
<td>1097.05</td>
<td>Total assets of the company in million of Taka</td>
<td>+</td>
</tr>
<tr>
<td>TCA</td>
<td>350.90</td>
<td>611.90</td>
<td>Total capital of the company in million of Taka</td>
<td>+</td>
</tr>
<tr>
<td>SAL</td>
<td>460.99</td>
<td>1543.60</td>
<td>Total sales volume of the company in million of Taka</td>
<td>+</td>
</tr>
<tr>
<td>EQT</td>
<td>225.47</td>
<td>458.66</td>
<td>Total shareholders equity in million of Taka</td>
<td>?</td>
</tr>
<tr>
<td>LOA</td>
<td>117.56</td>
<td>243.18</td>
<td>Total loans taken from financial institutions in million of Taka</td>
<td>?</td>
</tr>
<tr>
<td>REX</td>
<td>23.72</td>
<td>45.67</td>
<td>Interest expense of the company in million of Taka</td>
<td>?</td>
</tr>
<tr>
<td>SHA</td>
<td>14.61</td>
<td>15.41</td>
<td>Percentage of share held by financial institutions</td>
<td>?</td>
</tr>
<tr>
<td>NBK</td>
<td>2.27</td>
<td>1.72</td>
<td>Number of banks the company maintains lending relationship</td>
<td>?</td>
</tr>
</tbody>
</table>

3.2 Descriptive Statistics and Model Selection

The results of the descriptive statistics are presented in Table 1 and logistic regression results are shown in Table 2. Two models are constructed by following two different logistic regression methods: the forced entry method and stepwise method, to examine the effects of respective variables on the overall predictability of the model.

The default method for conducting the logistic regression analysis is the forced entry method and is considered by some researchers as the only appropriate method for theory testing (Studenmund and Cassidy, 1987). However, stepwise methods are useful when adopted in situations in which no previous research exists on which to base hypothesis for
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Table 2 Results of the three models

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model 1 Coefficient (Wald Stat*)</th>
<th>Model 2 Coefficient (Wald Stat*)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-0.9048 (2.4687)</td>
<td>0.6808 (6.4043)</td>
</tr>
<tr>
<td>TAS</td>
<td>-0.0004 (6.0101)b</td>
<td></td>
</tr>
<tr>
<td>TCA</td>
<td>0.0105 (0.7138)</td>
<td></td>
</tr>
<tr>
<td>SAL</td>
<td>0.0030 (14.5676)b</td>
<td></td>
</tr>
<tr>
<td>EQT</td>
<td>-0.0102 (0.6655)</td>
<td>0.0005 (9.5327)b</td>
</tr>
<tr>
<td>LOA</td>
<td>-0.0111 (0.7875)</td>
<td>-0.0004 (8.2379)b</td>
</tr>
<tr>
<td>REX</td>
<td>-0.0017 (0.3406)</td>
<td></td>
</tr>
<tr>
<td>SHA</td>
<td>0.0043 (0.0442)</td>
<td></td>
</tr>
<tr>
<td>NBK</td>
<td>0.2289 (0.1982)</td>
<td></td>
</tr>
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</table>

| Initial log-likelihood value | 135.29                        | 135.29                           |
| Ending log-likelihood value  | 79.85                         | 116.19                           |
| Model Chi-Square             | 55.44                         | 19.10                            |
| Correct Predictions          | 84.62%                        | 76.07%                           |
| McFadden’s R²                | 0.41c                         | 0.14c                            |

Note: a The Wald stat is simply the square of the t-statistic
b Indicates that the coefficient is statistically significant at, at least 10% level
c McFadden’s R² is one of the Psedudo-R-Square, varies between 0 and 1, is calculated as follows:

\[ \text{McFadden’s R}^2 = 1 - \frac{\text{ending log-likelihood value/initial log-likelihood value}}{\text{initial log-likelihood value}} \]

testing (Menard, 1995) and we would explore to find a model that best fits the data.

Then, in Model 1 (see Table 2), we have incorporated all the variables mentioned in the hypothetical model and conducted regression analysis by using forced entry method. The results of the model indicate that, only assets and sales variable are statistically significant. On the other hand, capital, equity, loan, interest expense, share of financial institutions and number of banks are insignificant. According to the model chi-square statistic, the overall model is significant at the 0.01 level. The model reasonably predicts 84.62% of the responses correctly. And also the McFadden’s R² is calculated as 0.41.

Model 2 includes all the variables used in model 1 with the only difference of regression method applied. In model 2 we have applied stepwise method (Likelihood ratio statistic) where the computer begins the calculation with a model that includes only a constant and then add all the predicting variables one by one and retains only those predictors which best fits the model to the observed data.\(^1\) So, in this model equity and loan are the significant variables retained by the model. All other variables (predictors) are removed. The model chi-square statistic is also significant at the 0.01 level. The percent of corrected predictions is
76.07% and the McFadden’s $R^2$ is approximately 0.14.

In terms of superiority model 1 is better as both the percentages of corrected prediction and McFadden’s $R^2$ are higher in Model 1 than Model 2, but we opt to go for model 2 as there could be difficulty to find any suitable established theory in case of our hypothetical model and in that case stepwise method of logistic regression is more appropriate as we have discussed before.

3.3 Interpretation of the Results

In model 1 of our analysis, we have found that only assets and sales variables are significant. Where asset is negatively and sales is positively related with profitability. The direction of relationship of sales to profitability is acceptable, but the negative relationship between assets and profitability is not acceptable as it is contrary to established relationship of profitability. Accordingly our next alternative is Model 2, where the fitted logistic regression is:

\[
\text{Logit (PRF)} = 0.68 + 0.0005 \text{EQT} - 0.0004 \text{LOA}
\]  

The above estimated model can be interpreted as equity has a positive association and loan has a negative relationship with the dependent variable. A firm having higher proportion of equity and lower ratio of loan got higher probability of being profitable and vice versa.

3.4 Test of Multicollinearity

We have conducted collinearity diagnostics to test for collinearity in the logistic regression models. Accordingly, in model 1 we have found the presence collinearity between TCA and EQT. A common solution to this problem is to omit one of the variables. In our study, model 2 automatically omits the predictor TCA and retains EQT to find the best fitted model. In addition to this, collinearity test in model 2 revealed that, tolerance values were more than 0.1 (0.805), VIF values were less than 10 (1.242) and there were not so large difference in eigenvalues and condition indexes, indicating that the model is free from collinearity problem.

4. Concluding Remarks

In this study we have attempted to conduct an empirical analysis to see impact of multiple borrowing and bank credit on profitability of corporate borrowers of Bangladesh. The findings of the study can be summed up as follows:
1) Interest expense, share of the financial institutions and number of banks did not showed any significant relationship with the profitability of firms. Thus the effect of having multiple borrowing relationships on the corporate profitability cannot be confirmed through this empirical model analysis.

2) Whereas, equity exhibited positive and loan showed negative relationship with profitability, which indicates that firms having higher financial leverage are prone to be a losing concern in terms of profitability. Thus firms, which are taking bank loans more, are having comparatively more financial difficulties. Conversely, firms relying on equity capital more are comparatively more profitable.

However, with this study the impact of multiple borrowing on profitability cannot be confirmed empirically. Presence of missing data, which limited the valid data, might be one of the reasons for that. The authors plan to investigate into this matter with primary survey in future.

Notes
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†† Professor, Faculty of Economics, Nagasaki University.

1) For details see Field (2000).
2) The monetary unit of Bangladesh. 1 Taka is approximately equivalent to 1.8 Yen on Feb. 10, 2004.
3) For the affairs of technical theory and practice, see Menard (1995) and Field (2000).

References