

## Determinants of Firm's Leverage and Theoretical Examination: A Study on the Food and Allied Companies in Bangladesh

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### Abstract

Leverage helps to understand how much debt and equity employed by a firm to funds its operation and asset. Modigliani and Miller are the path breaker in this sector. In 1958 identified irrelevancy proposition of Firm Leverage decision. In 1963 they came with their new explanation to incorporate the effect of tax. There are some other popular theories. Jensen and Meckling agency cost theory, Scott trade off theory, Ross signaling theory, Myers and Majluf pecking order theory are the most popular one. There are several determinants in Firm Leverage used in different studies. In this study, we used some most popular determinants. They are profitability, tangibility, growth, operating leverage, liquidity, size. In this study, nine DSE listed food and allied companies' data are used to analysis the relation between determinants and leverage and Firm Leverage theories are also tested for those companies. Food and allied sector is a constant growing sector and good option for the investors. Nine A category companies' data are used for this study. For the data analysis descriptive data, hypothesis, correlation and regression method is used. Leverage mean of last seven-year data is 48.5%. That means there is a good combination of debt and equity. In the hypothesis, T-test: paired two sample for means is used. Null hypothesis only accepted for the tangibility determinants. That indicates there is a relationship between tangibility and leverage. In correlation matrix, it also showed that, leverage and tangibility have the strongest relation and the relation is negative. In regression model, only tangibility result is significant and the coefficient is negative. According to the result, pecking order theory, trade off theory and signaling theory play an important role in food and allied companies in Bangladesh. The analysis showed that, companies with high tangibility ratio try to finance their operations by internal finance rather than debt finance and supported theories also refer the same result.

**Keywords:** Capital structure, Profitability, Leverage, Tangibility and Liquidity.

### 1. Introduction

Nowadays Bangladesh is well known as a developing country with rapid growth economics. It has an ample scope for industrial development which would bring about positive outcome in the economy of our country. Industry development is necessary for the development of infrastructure development. Firm Leverage is one of the most common and important theory in the field of finance. It is the most essential element to establish a company. Firm Leverage theory refers the amount of debt and equity used by a firm to finance its operations and assets. It indicates how firms finance their overall operations and growth by using debts like long-term notes payable and equity like common stock. The main components of Firm Leverage are debt and equity. A manager always looks to find out the optimal Firm Leverage to maximize the value of the firm and minimize the cost of capital. The purpose of this study is to examine the relation between leverage and determinants of Firm Leverage decision of food and allied companies in Bangladesh.

Required data collected from 9 firms' financial statement from consecutive seven years, from their audited balance sheet and income statement. The purpose of the study is to analyzes the result both descriptive and

statistical analysis. Firm Leverage become one of the most controversial issue in the field of corporate finance since the phenomenal work of Modigliani & Miller. Most of the popular firm leverage researches are done under developed countries like Rajan and Zingales, 1995. Only a few popular works done in Bangladesh like Chowdhury, 2004; Lima, 2010; Sayeed, 2012. But the numbers are increasing.

### 3. Objective of the study

To get a better output, several hypotheses (HP) were tested. The tested hypotheses are given below:

These hypotheses will determine the Firm Leverage of food and allied firms in Bangladesh: -

Table 1. Hypothesis table

Null Hypothesis	Alternative Hypothesis
HP0: Leverage ratios and profitability are associated.	HP 1: Leverage ratios and profitability are not associated.
HP0: Leverage ratios and growth are related.	HP1: Leverage ratios and growth are not related.
HP0: Leverage ratios and tangibility are linked.	HP1: Leverage ratios and tangibility are not linked.
HP0: Leverage ratios and liquidity are associated.	HP1: Leverage ratios and liquidity are not associated.
HP0: Leverage ratios and operating leverage are related.	HP1: Leverage ratios and operating leverage are not related.
HP0: Leverage ratios and size are corelated.	HP1: Leverage ratios and size are not corelated.

### 4. Literature Review

There are several empirical studies regarding Firm Leverage decisions have been concisely reviewed here in terms of two segments both International evidence and Evidence from Bangladesh.

In the year 1995, Rajan and Zingales had a rigorous study in this area where they came with an outcome that the various factors of Firm Leverage of US companies are size, growth, profitability and tangible assets.

Lima (2010) likewise guaranteed that development rate, substantial quality, working influence, obligation administration limit, administrative proprietorship age and size have huge impact on Firm Leverage choices. They additionally reasoned that the organization cost hypothesis and static exchange off hypothesis are pertinent for the organizations in Bangladesh.

### 5. Methodology of the study

#### 5.1 Data collection

The number of inhabitants in the examination is the nourishment and associated firms in Bangladesh. For this investigation, sequential seven-year information will be considered. Along these lines 9 firms which have seven fiscal reports are fused right now. The organizations are browsed the rundown of Dhaka Stock Exchange (DSE) Food and Allied segment A classification firms. The organizations which used to gather the information are:

- Agricultural Marketing Company Ltd. (Pran)
- Apex Foods Limited
- British American Tobacco Bangladesh Company Limited
- Fu Wang Food Ltd.
- Gemini Sea Food Ltd.
- Golden Harvest Agro Industries Ltd.
- National Tea Company Ltd.
- Olympic Industries Ltd.

- Rangpur Dairy (RD) & Food Products Ltd.

### 5.2 Analysis of data

The gathered information through audit are utilized to broke down to both distinct and exact insights. Graphic examination race to dissect the essential highlights of the information in the example. Connection network is utilized to distinguish the relationship of every factor among them. Various relapses are likewise used to decide the most significant informative factors influencing the Firm Leverageof nourishment and united firms in Bangladesh. In association with this, the general model for this examination, as is for the most part found in the current writing is spoken to by

$$Y_{i,t} = \alpha + \beta X_{i,t} + \epsilon_{i,t}$$

The subscript (**i**) representing the cross-sectional dimension and (**t**) denote the time-series dimension. The left-hand variable which is the firm's debt ratios represents the dependent variable in the model. (**X<sub>i,t</sub>**) includes a number of independent variables estimated by the model.

Table 2. Variables and indicators

Measurement of variables	
Variables	Indicators
<b>Depended variable</b>	
Leverage	Total debt/Total asset
<b>Independent variable</b>	
Profitability	EBIT/Total asset
Tangibility	Fixed asset/Total asset
Growth	Annual change in total asset
Operating leverage	EBIT/operating revenues
Liquidity	Total current asset/Total current liabilities
Size	Natural logarithm of total asset

### 6. Scope of the study

The study mainly focuses on finding out the relationship between the leverage and the determinants of Firm Leverage (profitability, tangibility, growth, operating leverage, liquidity, size) of a specific sector food & allied sector nine listed A categorized company. Seven consecutive year financial data are used. Different statistical method used to find out the relation like hypothesis, correlation, regression.

### 7. Limitations of the Study

There is always a predetermined system-imposed limitation of time, exists in any research work. But with the cooperation of my supervisor, it has become possible to complete the research work satisfactory within the time limit. The limitation of the study is given bellow:

- The study is restricted to a sample of only nine food & allied companies.
- This study is limited to seven fiscal years for the analysis.
- Theories of books are for efficient market. These theories are not completely applicable for an inefficient market like Bangladesh.
- All data are secondary data.

### 8. Firm Leverage Theories

Firm Leverage refers that how a firm used different source of funds to finance its overall operations and growth.

There are two components of Firm Leverage— debt and equity. Debt collected in the form of bonds, note-payable etc. and equity is classified in the form of common stock, preferred stock or retain earnings. It helps us to understand how much debt and/or equity employed by a firm to fund its operations and asset. It also helps us to understand the risk level of the firm. In general, high debt finance companies consider high risk exposure.

### *8.1 Theories of Capital structure*

Modigliani & Miller (M&M) path breaking article in 1958 which identified irrelevancy proposition of Firm Leverage decision to firm value on an assumption of perfect world with no taxes, no transaction costs, no bankruptcy costs, equivalence in borrowing costs for both companies and investors, symmetry of market information, meaning companies and investors have the same information, no effect of debt on a company's earnings before interest and taxes. The article showed that the benefit from debt financing –financing at a low rate will be offset by the increase in cost of equity derived from high financial risk perceived by the shareholders and individual project risk has no relation to the sources of fund it uses. So market value of a company and cost of capital are independent to the extent of debt in the capital structure. In M&M they came with their new explanation to incorporate the effect of tax in the model is that value of the firm would be maximized if it uses 100% debt in its Firm Leverage since interest payments are tax deductible. In 1977 Miller new version of irrelevance theory reveals that Firm Leverage decision of a firm has no effect in real world of corporate and personal tax.

There are some other popular theories come into light after a wide array of research conducted. They are- agency cost theory, trade-off theory, signaling theory and pecking order theory.

#### **8.1.1 Agency cost theory**

Agency cost theory developed by Jensen and Meckling in 1976, refers that optimal Firm Leverage can be found by minimizing agency cost arising from conflict of interest among managers, owners and debt holders. First conflict between firm managers and shareholders. Firm manager directly deals with the agent on behalf of major shareholder interest. Most of the firm manager wants to run large with high probability of risk. This tends to undertake negative NPV projects. However, without a reward firm manager do not involve large and risky project even if they expect the project give positive NPV. This problem creates a conflict of interest between managers and shareholders. As a consequence, the agency cost problem arises. Sometime manager consumes firm valuable resources used their power (Jensen and Meckling, 1976). Second conflict between firm managers and debt holders. Managers are working for shareholders and they want to give priority shareholders interest. Manager invests risky project that will benefit for major shareholder not better for the bondholder. Bondholders also expect the manager invest safe and low return project that probability of risk is very low. Thus, firm can pay their debt on time. But firm manager chooses risky projects that indicated a high probability of losing capital. If they lose, no cash available to paid their loan. Most of the cases, shareholders prefer a firm manager invest risky project with high probability of success that they repaid their loan quickly and keep their ownership safe. If the risky project gave negative NPV, then shareholder has possibility of defaulter. They can't repay their loan on time.

Two ways are suggested to align managers interest with owners and debt-holders interest-

- The first one is to increase the participation of the owners so that they can equally influence the decision taken by the manager.
- The second one is to increase the use of debt financing to minimize consumption in the perk.

#### **8.1.2 Trade-off theory**

Trade-off theory developed by Sco, refers that firms seek to have an optimum debt– equity ratio where marginal rise in tax benefit equals to the marginal increase of agency and bankruptcy cost generated from an extra use of leverage. Financial manager taking firm debt- equity decision based on a trade-off between cost of financial distress and interest tax shields. But there is a controversy arises in the firm. Firm manager does not sure about

how valuable interest tax shield. And they do not predict what types of financial problem are harmful for companies. According to the trade-off theory assume that debt ratio will vary from firm to firm. Firm with protected, tangible assets and high taxable income to shield indicate a high target ratio.

### 8.1.3 Signaling Theory

Signaling Theory introduced in 1977, based on asymmetric information, refers that managers use leverage decision to give signal to the market because investors treat debt financing as a signal of high future performance and high future cash flows of the firm. Therefore, the type of financing a company uses can provide a signal of the firm's financial position and project prospects. When a company uses debt to fund a project, it could indicate that the company believes the project will provide returns quickly and sufficient enough to repay the debt so its current investors retain the benefits. If a company uses new equity to fund a capital project, it could be interpreted as either a signal that the company has no internal profits or is unable to raise any debt.

### 8.1.4 Pecking order theory

Pecking order theory introduced in 1984, states that there is no optimal Firm Leverage and managers follow a hierarchy of preferences for the issuance of new capital based on the cost of capital. They prefer retained earnings as the main source of financing due to its zero cost and then debt financing, followed by equity financing, because cost of debt is less than that of equity.

Profitable firm borrow less amount debt because they have a low target ratio. This firms prefer internal finance when internal fund is sufficient to maximize the firm value and firm do not indicate any adverse signal that may lower the share price.

Less profitable firm issue more debt because they have not enough internal funds to regulate the companies smoothly. So, they relied on external financing. This firms prefer external finance when internal fund is insufficient to run the firm. In such case, firm issue debt financing first. Then they go for equity finance.

Pecking order theories do not neglect taxes and cost of financial difficulties in case of determined capital structure. However, this theory assumes, those factors are less significant than firm managers' decision about internal and external finance to issue more new capital structure.

## 9. Determinants of Capital Structure

There are several determinants used in different studies on determinants of capital structure. But we choose the most popular and common six determinants to find out the relationship between the determinants and the leverage. The determinants we used in this study are:

- Profitability
- Tangibility
- Growth
- Operating leverage
- Liquidity
- Size

### 9.1 Profitability

Profitability is one of the most important determinants of Firm Leverage but there are different views in the relationship between leverage and profitability. Trade off theory and signaling theory, have showed positive relation with the leverage. In trade off theory managers try to increase their leverage to raises their profitability by achieving the tax shield. In signaling theory managers use debt financing to finance their profitable investments. On the other hand, pecking order theory referred negative relation between leverage and profitability. They think, profitable firms borrow fewer amounts of debt and internal financing as a first choice. The profitability of a firm calculates as a ratio:

**Profitability=EBIT/total asset**

### 9.2 Tangibility

One of the vital determinants of Firm Leverage is tangibility. Trade off theory showed a positive relation between leverage and tangibility. It used as collateral of borrowed fund. In agency cost problem suggest that tangibility has negative correlation with information asymmetry problem. Lower information asymmetry problem has lower dependence on debt and equity is more preferable. High tangibility capable firms high borrowing ability. Tangibility calculates as:

$$\text{Tangibility} = \text{Fixed asset} / \text{total asset}$$

### 9.3 Growth

Growth is the determinants which are related with all the four theories we used in this study. Singling theory and pecking order theory conclude a positive relationship in growth and leverage. They determine in their theories that companies with high growth have high debt capacity and tend to use external finance for their companies' growth. Jensen and Meckling 1976, agency cost theory and trade off theory provides different opinion about growth. They think there is a negative relation between growth and leverage. High growth firm tend to use low external finance to reduce agency cost between firm managers and debt holders. In trade off theory high growth companies used low debt ration because their target ratio is low. Growth ratio calculates as:

$$\text{Growth} = \text{Annual change in total asset}$$

### 9.4 Operating leverage

Operating leverage is the determinants which influence trade off and pecking order theory. In trade off theory, there is a positive relation between operating leverage and leverage ratio. Higher operating leverage indicates higher risk of the firms. Since the managers does not sure about how valuable interest tax shield and they do not predict what types of financial problem are harmful for companies. They take more risk and used debt finance. In pecking order theory show negative relation between operating leverage and leverage because high risk firm use low leverage to reduce risk. Operating leverage ratio calculate as:

$$\text{Operating leverage} = \text{EBIT} / \text{operating revenues}$$

### 9.5 Liquidity

Liquidity is one of the most important determinants of capital structure. But there is a controversy about the relation between liquidity and leverage ratio. Trade off theory refers that there is a positive relation between liquidity and leverage ratio. Firms with high liquidity are more capable to pay their debt. So highly liquid firm tend to use high debt finance. On the other hand, pecking order theory refers that there is a negative relation between liquidity and leverage. Highly liquid firms used internal finance rather than external finance. Liquidity ratio calculate as:

$$\text{Liquidity} = \text{total current asset} / \text{total current liabilities}$$

### 9.6 Size

Size of the firm is a determinant of capital structure. According to trade off theory there is a positive relation between size and leverage. Large size firms have low bankruptcy cost and high capacity to get external finance. Because of diversification large firms maximize their tax benefits form debt. In signaling theory, firm with high debt finance provide signals to the investors that the firm is in a profitable position and has the ability to quick repay of the loan. So it also refers that, there is a positive relation between size and leverage. But according to pecking order theory, there is a negative relation between size and leverage. Because large firms prefer internal finance first than external finance. Size calculates as:

Size=Natural logarithm of total asset

In the table below summarize the relations among the determinants of Firm Leverage (independent variables) and the theories of capital structure. Most popular four Firm Leverage theories are used in this table and the six mostly used determinants of Firm Leverage are used in this table. In this table (+) sign uses to indicate positive relation and (-) sign used to indicate negative relation.

Table 3. Theoretical expectation of variables

Theoretical Expectation				
Independent variables	Agency cost	Trade-off	Signaling	Pecking order
Profitability		+	+	-
Tangibility	+/-	+		-
Growth	-	-	+	+
Operating leverage		+		-
Liquidity		+		-
Size		+	+	-

## 10. Food and Allied Sector of Bangladesh

Food and allied sector is a growing sector in our country. This sector considers as one of the constant growth sectors in Dhaka Stock Exchange (DSE). The price return and change in turnover is positive in this sector for the last year. The foreign investment is increasing in this sector. There are eighteen (18) companies listed in DSE food & allied sector. In this eighteen companies nine companies are A category one is B category and the rest eight companies are Z category. In our study we use only the A category companies' information. The list is:

- Agricultural Marketing Company Ltd. (Pran)
- Apex Foods Limited
- British American Tobacco Bangladesh Company Limited
- Fu Wang Food Ltd.
- Gemini Sea Food Ltd.
- Golden Harvest Agro Industries Ltd.
- National Tea Company Ltd.
- Olympic Industries Ltd.
- Rangpur Dairy & Food Products Ltd.

### 10.1 Agricultural Marketing Company Ltd. (Pran)

Program for Rural Advancement Nationally (PRAN) group was born in 1980. They are the largest processors of fruits and vegetables in Bangladesh and well known for diversify activities. The main purpose is to enrich the agricultural sector since our economy is agricultural based and develop our native farmers. They are also one of the biggest exporter in our country. PRAN listed in DSE in 1996 and now their market category is A.

### 10.2 Apex Foods Limited

Apex foods limited incorporated their business on 1979. Apex sea food is the single largest processor and

exporter of frozen sea food of Bangladesh. They are well known in the worldwide for their high quality products. They export their product in North America, EU countries, Australia and Russia. Apex foods limited listed in DSE in 1981 and now their market category is A.

### *10.3 British American Tobacco Bangladesh Company Limited*

In 1998 Bangladesh Tobacco Company change their name as a British American Tobacco Bangladesh company limited and aligning the corporate identity with other operating companies in the British American Tobacco group. It is one of the world largest international business and sold their products more than 200 markets all over the world. They are well known for their quality tobacco and diversification according to consumer choice. They listed in DSE in 1977.

### *10.4 Fu Wang Food Ltd.*

Fu Wang food ltd. start their business in 1997 and certified in 1998. They introduce variety of products to cover the market. They have different food items like bred, biscuit, cake, toast, chocolate, instant noodles, drinking water, energy drink etc. Fu Wang food listed in DSE in 2000.

### *10.5 Gemini Sea Food Ltd.*

Gemini sea food ltd. start their business in 1982. The main target this firm is to provide quality product according customer requirement. They believe that “Hygienic Product Healthy Trade”. They export our quality products to U.S.A & EU countries like U.K, Germany, Denmark, Netherlands, Belgium and Russia etc. They listed in DSE in 1985.

### *10.6 Golden Harvest Agro Industries Ltd.*

Golden harvest Agro Industries ltd. is a company of Golden Harvest group. It is one of the pioneer frozen food manufacturing companies in our country. They are well known for their good quality and tasty frozen foods both locally and internationally. They export their product in USA, Canada, Australia, Middle East and the European countries. They listed in DSE in 2014.

### *10.7 National Tea Company Ltd.*

National tea company ltd. starts their business in 1978 as a joint venture and government and its financial organization holds majority of the share (51%) and the rest are owned by the general public. This company owned 12 tea estates which cover almost fifty percent of the total tea cultivation area. It sold 5.20 million kg. tea through Chittagong auction market annually. National Tea Company ltd. listed in DSE in 1979.

### *10.8 Olympic Industries Ltd.*

Olympic industries ltd. incorporates their business in 1979 as a battery manufacturer but later they diversify their business by manufacturing biscuits and confectionary items in 1996. Today they are the largest biscuit manufacturer in Bangladesh. They think quality of their products and loyalty to their customers make Olympic so popular. Olympic listed in DSE in 1989.

### *10.9 Rangpur Dairy & Food Products Ltd.*

They collect the raw milk from the northern part of our country and processed the raw milk in Ultra High Temperature (UHT). It also reduces the risk of infection. They use high quality packaging system to maintain the milk for long time. Rangpur Dairy & Food Products Ltd. listed in DSE in 2011.



## 11. Analysis of the Study

### 11.1 Descriptive statistics

In this study we examine the nine food and allied listed companies' seven-year data. Here we showed the mean, standard deviation, maximum and minimum value of the ratios.

Table 4. Data descriptions

Variable	Mean	Max	Min	Standard deviation
<b>Leverage</b>	0.485113	1.022036	0.047937	0.252917
<b>Profitability</b>	0.134335	0.514757	-0.03007	0.126493
<b>Tangibility</b>	0.445406	0.843248	0.046722	0.213776
<b>Growth</b>	0.159228	1.129147	-0.27103	0.229247
<b>Operating leverage</b>	0.127053	0.449611	-0.01945	0.112153
<b>Liquidity</b>	3.132551	77.13767	0.678286	9.592806
<b>Size</b>	20.58751	22.93377	16.39201	1.542438

Leverage means is 48.5% which indicates equity used in this sector as 51.5%. That means leverage and equity portion almost equal in this sector which indicates a good combination of debt and equity. Standard deviation is 25% in leverage ratio.

Profitability in these companies is positive and it is 13% which refers profitability of those companies is 13%. It is good sign for food & allied companies in Bangladesh. In profitability minimum value is -3% and maximum value is 51.5%, there is huge gap in these two values and that's why the standard deviation is 13.5%.

Tangibility is the fixed asset portion of a firm. Here the average is almost 44%. That means the firms have a large portion of fixed assets. In tangibility minimum value 4.7% and maximum value 84%. The standard deviation is 21%.

Growth is 16% which means that the firms growth last seven years is 16% which is positive and good enough. It refers that firms in this sector growing year to year. Standard deviation is 23%.

Operating leverage calculate as a EBIT to operating revenues. Operating leverage mean is 12.7% which means earnings of the firms after basic costs. So the earnings ratio of the firm over last seven years is positive and quiet satisfactory. Standard deviation is 11%.

Liquidity is 3.13 which means firms are not use their liquid asset efficiently and their performance is not satisfactory. They should use more their liquid asset in their business activities. Standard deviation is 9.6.

Size of the firm is another determinant of Firm Leverage calculates as a natural logarithm of total asset. The mean of the firm's total asset natural logarithm over last seven years is 20.58 and the standard deviation is 1.54.

### 11.2 Hypothesis

T-test: Paired two samples for means is used. Significance level is 5%.

Table 5. Hypothesis result

T-test: Paired two samples for means is used. Significance level is 5%.

Null Hypothesis	Alternative Hypothesis	Result
HP0: Leverage ratios and profitability are associated.	HP 1: Leverage ratios and profitability are not associated.	HP0 hypothesis rejected
HP0: Leverage ratios and growth are related.	HP1: Leverage ratios and growth are not related.	HP0 hypothesis rejected
HP0: Leverage ratios and tangibility are linked.	HP1: Leverage ratios and tangibility are not linked.	HP0 hypothesis accepted
HP0: Leverage ratios and liquidity are associated.	HP1: Leverage ratios and liquidity are not associated.	HP0 hypothesis rejected
HP0: Leverage ratios and operating leverage are related.	HP1: Leverage ratios and operating leverage are not related.	HP0 hypothesis rejected
HP0: Leverage ratios and size are corelated.	HP1: Leverage ratios and size are not corelated.	HP0 hypothesis rejected

H0 accepted or rejected based on the P value and the t-stat value of the result. If P value is lower than .05 than reject the null hypothesis and if P value is greater than or equal .05 than accept the null hypothesis. If t-stat value is greater than t critical value than reject the null hypothesis otherwise we accept the null hypothesis. According to these two conditions only tangibility and leverage null hypothesis is accepted. That means there is relationship between leverage ratios and tangibility. All other determinants relation with leverage is rejected because of lower P value and higher t-stat value.

### 11.3 Correlation

In this correlation matrix, showed the relation between the dependent variable (leverage) and independent variables (Profitability, tangibility, growth, operating leverage, liquidity, size). It also showed the internal relations among the independent variables.

Table 6. Correlation matrix

	Leverage	Profitability	Tangibility	Growth	Operating leverage	Liquidity	Size
Leverage	1						
Profitability	0.162528711	1					
Tangibility	-0.637004421	-0.100731037	1				
Growth	0.089690154	0.117833829	-0.17938	1			
Operating leverage	-0.5237648	0.002155883	0.597904	0.159278	1		
Liquidity	0.12614236	0.046138026	-0.09529	-0.06436	-0.08701	1	
Size	-0.252793763	-0.655249788	0.151824	0.072891	0.314651	-0.09575	1

The correlation matrix showed that leverage has positive relation with profitability. It indicates that firms which have high profitability ratio have preference to use debt finance. Leverage has also positive relation with growth and liquidity. Tangibility, operating leverage and size have negative relation with leverage.

**P value** is one of the most important determinants in the regression model. If P value is lower than or equal 0.05 indicates, there is a strong relationship between dependent and independent variable. In this table, only tangibility and liquidity P value is lower than 0.05. So these variables are considered significant.

**T-stat** is a statistic that indicates the size of an effect, from the standpoint of a bell curve (a probability distribution). The further away from Zero (0) the more likely that the effect is "statistically significant". In this table, only tangibility variables t stat value is greater than 2. So this variable is significant.

**Coefficient** represent the beta which refers risk. The first intercept coefficient represents the constant value of the regression model.

So the regression model is:

$$Y_{i,t} = \alpha + \beta X_{i,t} + \epsilon_{i,t}$$

If we elaborate the model:

$$Y_i = \alpha + \beta * \text{profitability} + \beta * \text{tangibility} + \beta * \text{growth} + \beta * \text{operating leverage} + \beta * \text{liquidity} + \beta * \text{size}$$

$$Y_i = 0.998598508 + 0.126890261 * \text{profitability} + (-0.564312855) * \text{tangibility} + 0.044125089 * \text{growth} + (-0.494013774) * \text{operating leverage} + 0.001445136 * \text{liquidity} + (-0.01107319) * \text{size}$$

#### 11.4 Testing of Firm Leverage theories

Theories showed the relation between the determinants and leverage ratios. They should be positive and negative. According to the different statistical analysis we find the relation between the determinants and the leverage ratio. Now we find out which theories fit for the determinants of Firm Leverage and leverage ratio of food and allied companies in Bangladesh.

In this table below, showed the relation between the determinants and leverage ratio according to theories and in terms of the data analysis.

Table 7. Determinants findings and supporting theories.

Theoretical Expectation					Findings	Supporting theory
Independent variables	Agency cost	Trade-off	Signaling	Pecking order		
Profitability		+	+	-	+	Trade-off, Signaling
Tangibility	+/-	+		-	-	Pecking order
Growth	-	-	+	+	+	Signaling & pecking order
Operating leverage		+		-	-	Pecking order
Liquidity		+		-	+	Trade-off
Size		+	+	-	-	Pecking order

The finding is that tangibility, growth, operating leverage and size follow pecking order theory. They have also negative relation with leverage except growth. The rest two profitability and liquidity follow trade off theory. Profitability and growth also follow signaling theory. They both are positive that means they provide the investors a positive signal.

## 12. Findings of the study

According to correlation matrix there is a positive relation between profitability and leverage ratio. The coefficient of profitability is also correct. That means high profitable firms prefer debt finance for their business operations. Because of high profitability they have the ability to pay the debt and also excess of loan.

Tangibility is the only determinants which has significant value in regression model and also show strong relation in correlation matrix. In hypothesis, tangibility H<sub>0</sub> also accepted. There is a negative relation between tangibility and leverage which indicates firms with high fixed asset tend to use internal finance. Though, they have easy access of loan because of large amount of fixed asset.

The relation between growth and leverage is not so significant. The correlation value is very low but correlation and coefficient value is positive.

Operating leverage has a strong negative relation with leverage. That means companies with high income prefer to use their internal finance like retain earnings rather than external finance.

Liquidity has very low value in correlation and insignificant in regression model. Though the value is very low but the relation is positive.

Size has a negative correlation with leverage. That refers that, large size companies use more internal finance and less external finance.

Packing order theory and trade-off theory have great impact on food and allied companies in Bangladesh. Packing order theory is followed because of internal financing like retain earnings and trade off theory followed because manager tend to take less risk that's why they try to avoid external financing. Signaling theory also play important role in this sector.

## 13. Conclusion

The determinants of capital are not strongly influence the leverage decision of food and allied sector in Bangladesh except tangibility. Tangibility is the determinants which has significant value and relation with leverage. There is a negative relation between leverage and tangibility. Companies high fixed asset have high tangibility ratio prefer internal finance compare to external finance for their business operations. In the theories of capital structure, packing order theory and trade-off theory have great impact on our food and allied companies in Bangladesh. Packing order theory suggest to use internal finance like retain earnings due to its zero cost and in trade off theory manager taking firm debt-equity decision based on a trade-off between cost of financial distress and interest tax shields.

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## Appendix

## Nine companies last seven years data

Year	Company name	Total debt	Total current liabilities	Total asset	Fixed asset	Total current asset	Operating revenues	EBIT
2017	Apex food ltd	1102179 663	1077907 226	1758501 536	3855338 16	1372967 720	16427721 07	4469543
2016		9261507 63	8831010 97	1545510 181	3599302 52	1185579 929	20319469 45	-20800413
2015		1157463 237	1104763 634	1779946 562	3307064 94	1449240 068	27517798 85	-53525355
2014		1130977 648	1040962 126	1693029 263	3726989 73	1320330 290	38446812 56	31319044
2013		1240793 403	1128293 403	1758652 867	3500994 01	1408553 466	33057172 80	20664243
2012		1019973 962	8774739 62	1571415 244	3490459 84	1222369 260	39333461 04	18734510
2011		1079963 920	9302018 88	1485155 738	2169777 00	1268176 843	32073147 33	9059599
2010				1136280 606				
2017	British American Tobacco	1646500 1	1363696 5	3534758 3	1541187 3	1993571 0	16563376 0	13926734
2016		1498131 2	1245028 6	2959083 1	1366501 5	1592581 6	14371166 4	13200527

2015		1561150 9	1410283 5	2707501 9	1201857 6	1505644 4	12680460 2	11534652
2014		9562208	8314769	1846379 8	8513167	9950631	10958171 0	9504368
2013		8001553	7029777	1503449 3	5861627	9172866	90174080	6912702
2012		7239749	6300705	1315104 9	5376634	7774415	75357351	5246089
2011		7128724	6323404	1336943 3	5315562	8053871	65986503	3145629
2010				1201956 5				
2017		4802167 54	3841025 20	1581852 767	5640893 36	9767634 31	58678768 7	101924432
2016		4432930 62	3866021 33	1482203 822	5585534 62	8736503 60	76710939 2	134364942

2015	Fu-Wang foods ltd.	3914561 48	3254515 90	1343232 984	5122796 20	7809533 64	81985185 0	169903795
2014		3406547 10	2625633 29	1179301 123	4799823 40	6493187 83	79440601 4	104922031
2013		2926293 79	2617136 38	1070394 684	4834268 76	5369678 08	78512652 5	107712285
2012		2601093 46	2601093 46	9998698 91	4751656 49	4747312 42	75845905 0	114100545
2011		2451310 79	2451310 79	8795389 42	3879200 56	4718147 28	70916856 8	117527552
2010				5428772 82				
2017	Pran(Agric ultural marketing com. Ltd.)	8892357 03	7258336 66	1463022 240	4741943 53	9888278 87	23803354 93	193375561
2016		9148193 65	6975322 12	1459268 485	5446370 29	9146314 56	20915538 54	190285679
2015		9886606 91	5398162 78	1505711 652	6580816 31	8476300 21	18865053 85	73888029
2014		6088439 75	5412394 63	1095910 217	3418084 93	7541017 24	17272176 69	74278680
2013		6510617 87	5655367 87	1137169 643	3389773 11	7981923 32	15544468 36	70621379
2012		7112438 21	5762903 21	1167556 801	3896744 99	7778823 02	14790834 63	69884451
2011		7424684 82	5917684 82	1172667 837	4158256 88	7568421 49	13163455 76	58060062
2010				1115683 180				
2017	Olympic	3707466 711	3408642 811	9120317 797	2363826 358	6756491 439	11290557 541	215312959 4

2016		3109495 848	2859716 979	7640768 208	1963251 175	5677517 033	10965042 877	211644008 0
2015		2382025 686	1988098 981	5763679 785	1909946 076	3853733 709	89961485 94	143117004 7
2014		2526239 640	1977232 044	5048637 186	1869464 492	3179172 694	79223538 76	118491576 9
2013		1767679 547	1517602 918	3693672 553	1432816 473	2260856 080	70931793 69	931270071
2012		1294469 294	1037540 875	2591236 306	1201849 350	1389386 956	60033420 18	697570228
2011		1005533 832	8622446 37	1850322 260	7742549 33	1076067 327	38851018 24	392222519
2010				1361913 744				

2017	Golden harvest agro industries ltd.	1026466 518	7055677 43	5044390 614	3573568 441	1470822 173	62443865 7	221338024
2016		9917837 36	4796108 99	4006564 213	2750054 728	1256509 485	52056381 3	214765123
2015		9575501 12	4692200 55	3440355 786	2112805 705	1327550 081	47207772 9	124412913
2014		6034123 35	4618579 23	2614274 832	1293112 465	1321162 367	41869057 5	156521438
2013		4279623 35	3600029 68	1549432 414	1024677 371	3752263 05	35071920 2	113056661
2012		2583723 00	1872380 64	1151988 069	9276869 81	2243010 88	30435398 2	136840856
2011		2658794 15	2016846 78	1283278 696	9112658 41	3256482 05	28365487 9	125846782
2010				1020135 468				
2017	Gemini sea food ltd.	7290579 44	7224131 98	7720125 28	3607012 3	7359414 05	13551241 37	70247040
2016		3389941 59	3323932 27	3625919 31	3765275 5	3249391 76	11121376 64	56276303
2015		3715539 50	3648100 30	3740189 41	4041399 0	3336049 51	90523889 5	43953578
2014		2197907 05	2121941 05	2150519 08	4077736 4	1742745 44	95454056 8	45400224
2013		3012788 79	2933009 19	2950073 07	4272013 0	2522871 87	76697116 2	34228981
2012		2065428 23	2208579	2171978 48	4683320 5	1703646 43	12162930 05	47546426
2011		1878526 40	1523589 72	2015683 95	4827785 6	2315680 54	10050265 43	42356847
2010				2348855 64				

2017	National tea company	1189238 971	5928652 70	2132951 221	1730819 005	4021322 16	98566997 4	104392614
2016		1170799 425	6565240 21	2072299 643	1621391 111	4509085 33	95934410 4	163120468
2015		9999104 50	4949059 54	1930693 798	1574521 010	3561727 88	34965317 0	20011608
2014		9714636 34	5124318 34	1804403 178	1448875 981	3555271 97	83773240 1	61597345
2013		9052079 34	4460937 22	1730513 915	1325131 628	4053822 87	85681691 0	181875020
2012		8023525 34	3551234 63	1528704 254	1215198 919	3135053 35	89197157 3	263175480
2011								

2011		7563258 91	2495284 31	1417909 243	1195648 702	2536954 84	92158467 5	285648206
2010				1323930 070				
2017	RD & food products ltd.	1236094 41	1071474 00	1104929 064	7048319 77	4000970 87	53243092 4	52549104
2016		9930816 6	8712380 6	1045252 046	6885111 74	3567408 72	49443387 1	42863417
2015		8319358 6	7322633 9	1012279 083	6745009 76	3377781 07	46858950 7	41440980
2014		5476659 6	4776429 8	9493098 64	6290847 28	3202251 36	46779555 8	48223587
2013		4296593 9	3733873 3	8963089 20	5888036 02	3075053 18	43242251 3	49893432
2012		5677442 3	5257078 0	8864774 35	5880305 02	2984469 33	39309637 3	44795983
2011		6052823 5	4275896 7	9789004 61	5236984 70	2754478 26	35401295 8	40198752
2010				8834958 73				

**Ratios**

No .	Year	Company name	Leverage	Profitability	Tangibility	Growth	Operating leverage	Liquidity	Size
1	2017	Apex food ltd	0.63	0.00	0.22	0.14	0.00	1.27	21.3
2	2016		0.60	-0.01	0.23	-0.13	-0.01	1.34	21.2
3	2015		0.65	-0.03	0.19	0.05	-0.02	1.31	21.3
4	2014		0.67	0.02	0.22	-0.04	0.01	1.27	21.2
5	2013		0.71	0.01	0.20	0.12	0.01	1.25	21.3
6	2012		0.65	0.01	0.22	0.06	0.00	1.39	21.2
7	2011		0.73	0.01	0.15	0.31	0.00	1.36	21.1
8	2010		0.47	0.39	0.44	0.19	0.08	1.46	17.4
9	2017	British American Tobacco	0.51	0.45	0.46	0.09	0.09	1.28	17.2
10	2016		0.58	0.43	0.44	0.47	0.09	1.07	17.1
11	2015		0.52	0.51	0.46	0.23	0.09	1.20	16.7
12	2014		0.53	0.46	0.39	0.14	0.08	1.30	16.5
13	2013		0.55	0.40	0.41	-0.02	0.07	1.23	16.4
14	2012		0.53	0.24	0.40	0.11	0.05	1.27	16.4
15	2017	Fu-Wang foods ltd.	0.30	0.06	0.36	0.07	0.17	2.54	21.2
16	2016		0.30	0.09	0.38	0.10	0.18	2.26	21.1
17	2015		0.29	0.13	0.38	0.14	0.21	2.40	21
18	2014		0.29	0.09	0.41	0.10	0.13	2.47	20.9



19	2013		0.27	0.10	0.45	0.07	0.14	2.05	20.8
20	2012		0.26	0.11	0.48	0.14	0.15	1.83	20.7
21	2011		0.28	0.13	0.44	0.62	0.17	1.92	20.6
22	2017	Pran(Agricultural marketing com. Ltd.)	0.61	0.13	0.32	0.00	0.08	1.36	21.1
23	2016		0.63	0.13	0.37	-0.03	0.09	1.31	21.1
24	2015		0.66	0.05	0.44	0.37	0.04	1.57	21.1
25	2014		0.56	0.07	0.31	-0.04	0.04	1.39	20.8
26	2013		0.57	0.06	0.30	-0.03	0.05	1.41	20.9
27	2012		0.61	0.06	0.33	0.00	0.05	1.35	20.9
28	2011		0.63	0.05	0.35	0.05	0.04	1.28	20.9
29	2017		Olympic	0.41	0.24	0.26	0.19	0.19	1.98
30	2016	0.41		0.28	0.26	0.33	0.19	1.99	22.8
31	2015	0.41		0.25	0.33	0.14	0.16	1.94	22.5
32	2014	0.50		0.23	0.37	0.37	0.15	1.61	22.3
33	2013	0.48		0.25	0.39	0.43	0.13	1.49	22
34	2012	0.50		0.27	0.46	0.40	0.12	1.34	21.7
35	2011	0.54		0.21	0.42	0.36	0.10	1.25	21.3
36	2017	Golden harvest agro industries ltd.		0.20	0.04	0.71	0.26	0.35	2.08
37	2016		0.25	0.05	0.69	0.16	0.41	2.62	22.1
38	2015		0.28	0.04	0.61	0.32	0.26	2.83	22
39	2014		0.23	0.06	0.49	0.69	0.37	2.86	21.7
40	2013		0.28	0.07	0.66	0.35	0.32	1.04	21.2
41	2012		0.22	0.12	0.81	-0.10	0.45	1.20	20.9
42	2011		0.21	0.10	0.71	0.26	0.44	1.62	21
43	2017		Gemini sea food ltd.	0.94	0.09	0.05	1.13	0.05	1.02
44	2016	0.93		0.16	0.10	-0.03	0.05	0.98	19.7
45	2015	0.99		0.12	0.11	0.74	0.05	0.91	19.7
46	2014	1.02		0.21	0.19	-0.27	0.05	0.82	19.2
47	2013	1.02		0.12	0.14	0.36	0.04	0.86	19.5
48	2012	0.95		0.22	0.22	0.08	0.04	77.14	19.2
49	2011	0.93		0.21	0.24	-0.14	0.04	1.52	19.1
50	2017	National tea company		0.56	0.05	0.81	0.03	0.11	0.68
51	2016		0.56	0.08	0.78	0.07	0.17	0.69	21.5
52	2015		0.52	0.01	0.82	0.07	0.06	0.72	21.4
53	2014		0.54	0.03	0.80	0.04	0.07	0.69	21.3
54	2013		0.52	0.11	0.77	0.13	0.21	0.91	21.3
55	2012		0.52	0.17	0.79	0.08	0.30	0.88	21.1
56	2011		0.53	0.20	0.84	0.07	0.31	1.02	21.1
57	2017			0.11	0.05	0.64	0.06	0.10	3.73

58	2016	RD & food products Ltd.	0.10	0.04	0.66	0.03	0.09	4.09	20.8
59	2015		0.08	0.04	0.67	0.07	0.09	4.61	20.7
60	2014		0.06	0.05	0.66	0.06	0.10	6.70	20.7
61	2013		0.05	0.06	0.66	0.01	0.12	8.24	20.6
62	2012		0.06	0.05	0.66	-0.09	0.11	5.68	20.6
63	2011		0.06	0.04	0.53	0.11	0.11	6.44	20.7

**Hypothesis**

t-Test: Paired Two Sample for Means		
	<b>Leverage</b>	<b>Profitability</b>
Mean	0.485113459	0.134335175
Variance	0.063966837	0.016000565
Observations	63	63
Pearson Correlation	0.162528711	
Hypothesized Mean Difference	0	
df	62	
t Stat	10.55596582	
P(T<=t) one-tail	8.84586E-16	
t Critical one-tail	1.669804163	
P(T<=t) two-tail	1.76917E-15	
t Critical two-tail	1.998971517	
t-Test: Paired Two Sample for Means		
	<b>Leverage</b>	<b>Tangibility</b>
Mean	0.485113459	0.445406088
Variance	0.063966837	0.045700274
Observations	63	63
Pearson Correlation	-0.63700442	
Hypothesized Mean Difference	0	

df	62
t Stat	0.745867839
P(T<=t) one-tail	0.229282948
t Critical one-tail	1.669804163
P(T<=t) two-tail	0.458565896
t Critical two-tail	1.998971517

t-Test: Paired Two Sample for Means		
	<b>Leverage</b>	<b>Growth</b>
Mean	0.485113459	0.159227798
Variance	0.063966837	0.052554099
Observations	63	63
Pearson Correlation	0.089690154	
Hypothesized Mean Difference	0	
df	62	
t Stat	7.940284723	
P(T<=t) one-tail	2.51173E-11	
t Critical one-tail	1.669804163	
P(T<=t) two-tail	5.02347E-11	
t Critical two-tail	1.998971517	
t-Test: Paired Two Sample for Means		
	<b>Leverage</b>	<b>Operating leverage</b>
Mean	0.485113459	0.12705305
Variance	0.063966837	0.012578328
Observations	63	63
Pearson Correlation	-0.5237648	
Hypothesized Mean Difference	0	
df	62	
t Stat	8.718548815	
P(T<=t) one-tail	1.13167E-12	
t Critical one-tail	1.669804163	
P(T<=t) two-tail	2.26333E-12	
t Critical two-tail	1.998971517	
t-Test: Paired Two Sample for Means		
	<b>Leverage</b>	<b>Liquidity</b>

Mean	0.485113459	3.132551199
Variance	0.063966837	92.02192553
Observations	63	63
Pearson Correlation	0.12614236	

Hypothesized Mean Difference	0	
df	62	
t Stat	-2.19708905	
P(T<=t) one-tail	0.015880062	
t Critical one-tail	1.669804163	
P(T<=t) two-tail	0.031760124	
t Critical two-tail	1.998971517	
t-Test: Paired Two Sample for Means		
	<b>Leverage</b>	<b>Size</b>
Mean	0.485113459	20.58751243
Variance	0.063966837	2.379115398
Observations	63	63
Pearson Correlation	-0.25279376	
Hypothesized Mean Difference	0	
df	62	
t Stat	-98.1951863	
P(T<=t) one-tail	4.70512E-70	
t Critical one-tail	1.669804163	
P(T<=t) two-tail	9.41024E-70	
t Critical two-tail	1.998971517	

**Regression**  
Summary Output

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*Regression Statistics*

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Multiple R	0.675622233
R Square	0.456465402
Adjusted R Square	0.398229552
Standard Error	0.001961972
Observations	63

**ANOVA**

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	df	SS	MS	F	Significance F
Regression	6	1.8103161860.301719364		7.838219976	3.79532E-06
Residual	56	2.1556277380.038493352			
Total	62	3.965943924			

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	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	0.9986	0.5218	1.9137	0.0608	-0.0467	2.0439	-0.0467	2.0439

Profitability	0.1269	0.2816	0.4506	0.6540	-0.4372	0.6910	-0.4372	0.6910
Tangibility	-0.5643	0.1580	-3.5717	0.0007	-0.8808	-0.2478	-0.8808	-0.2478
Growth	0.0441	0.1186	0.3721	0.7112	-0.1934	0.2817	-0.1934	0.2817
Operating leverage	-0.4940	0.3214	-1.5369	0.1299	-1.1379	0.1499	-1.1379	0.1499
Liquidity	0.0014	0.0026	0.5503	0.5843	-0.0038	0.0067	-0.0038	0.0067
Size	-0.0111	0.0241	-0.4591	0.6480	-0.0594	0.0372	-0.0594	0.0372

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