Performance Analysis of Financial Soundness and Determinants of Profitability of Pharmaceutical Industry in Bangladesh

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Abstract: The pharmaceutical industry, registering an amazing double-digit growth rate in sales over the last decade, has emerged as one of the largest sectors in the economy of Bangladesh. The financial performance of this sector is, in recent times, receiving much attention among the stakeholders. This research, attempted to analyze the financial consistency of pharmaceutical companies and evaluate the profitability determinants of this sector. In this effort, the study aimed at measuring the financial soundness of pharmaceutical industry by using Altman's Z-score model. It also examined the determinants of profitability of the industry by testing a number of hypotheses using statistical techniques. Based on the outcomes, the study explained the industry's contribution and recommended policies for the stakeholders. Finally, the study concluded with discussing the possible avenues for further research in this sector.

Keywords: Profitability, Pharmaceutical Industry, Financial Soundness, Multiple Discriminant Analysis, Multiple Regression.

1. Introduction

The pharmaceutical industry has materialized as one of the major segments in the financial system of Bangladesh by achieving an amazing double-digit growth rate in terms of sales over the last decade. With the gradual increase in health education, progress of healthcare related infrastructure and the increase in purchasing power of public, the pharmaceutical sector is growing at a convincingly high pace. The industry has been contributing towards boosting up the economy radically, and investors are also recognizing it to be promising. The financial performance of this sector is, in recent times, receiving much attention among the stakeholders.

Over the last two decades, the sector practiced healthy growth in the local market as well as in the export market. In general, Bangladeshi pharmaceutical companies have grown stronger in terms of quality product, attractive design, safe packing, timely delivery and competitive price. The leading companies are maintaining international standards in all spheres of their business activities. The industry is one of the largest and oldest sectors in the country in terms of capital investment. With the growth prospect in both domestic and international market, Bangladeshi pharmaceutical companies are also preparing themselves to face the challenges of Trade-Related Aspects of Intellectual Property Rights (TRIPS) agreement, the implementation of which is inevitable from January 1, 2016. The advantages of Bangladesh over most other LDCs in Pharmaceutical business are its large size of internal market, low production cost, and the opportunity to use a large pool of efficient, qualified and highly innovative scientific manpower at low cost. There is also growing

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demand from low and middle income countries, which are the main markets for Bangladesh's pharmaceutical exports. The companies continue to create increased number of employment in the country. All these features make pharmaceutical an attractive sector for investment in developing productive capacity. Numerous empirical studies examining financial performance and investigating the variables that affect the financial success of pharmaceutical industry in different countries have been published. However, specific research on pharmaceutical industry in Bangladesh is very limited. This research, therefore, attempts to analyze the financial soundness of pharmaceutical companies and evaluate the profitability determinants of this sector.

The research will add value to the existing literature in Bangladesh through its efforts to explore the financial performance of the pharmaceutical industry, and the factors that should methodically affect a pharmaceutical firm's profitability. In addition, the outcomes of the study will have significant recommendations for different stakeholders, especially researchers, policy makers and management authority of Bangladeshi pharmaceutical companies, regulators, investors in capital market, career seekers, etc.

The study is an analytical one mainly based on secondary data. The data set consists of a sample of ten Pharmaceutical companies of Bangladesh listed in Dhaka Stock Exchange (DSE), the main stock market of the country. The period of study is comprised of ten years from 2002 to 2011. This research empirically used accounting measures to examine whether the elements, which have been established as traditional measures of the financial performance of pharmaceutical industry over the world, also specifically apply to the pharmaceutical industry in Bangladesh. In order to examine and identify the financially sound and distressed firms in the industry, Professor Altman's (1968) Multiple Discriminant Analysis (MDA) analysis has been employed here. In addition, the prime intention of the research was to identify and analyze the relative explanatory power of firm-specific factors and economic factors on profitability. The study involved descriptive statistics, correlation and multiple regression analysis in the course of determination and investigation of the variables influencing profitability. Here, profitability is the dependent variable which is measured in terms of net profit after tax. Firm size, growth, advertising intensity, inventory turnover ratio and leverage ratio are used as independent variables; firm listing age, market share, export and per capita income are the control variables. On the basis of the outcomes of the statistical analysis, the study arrived at conclusions and recommended policies for the stakeholders. Finally, based on the limitations of the research, the study discussed possible avenues for future investigation in this sector.

2. Objective of the Study

The study aimed at:

- testing financial soundness of the individual pharmaceutical companies as well as the overall industry by using Z-score model of professor Altman (1968).

- examining the determinants of profitability of the pharmaceutical industry. To consider the influence of every individual independent variable on the dependent variable (profitability) simultaneously, the technique of multiple regression analysis was utilized.

- providing recommendations to improve the profitability conditions of the Pharmaceutical companies in Bangladesh.

3. Rationale for the Study

Among the manufacturing industries in Bangladesh, pharmaceutical has attained considerable technological development. According to Saad (2012), "Pharmaceutical sector is technologically the most developed manufacturing industry in Bangladesh and the third largest industry in terms of contribution to government's revenue". VanDuzer (2003, p. 27) states that, "the existing industry is the largest among least-developed countries". TRIPS agreement facilitates Bangladesh pharmaceutical firms with patent-free production and export rights until 2016 with limited exporting advantages. With the significant growth prospect of this industry in both domestic and international market, local pharmaceutical companies have to prepare to meet the TRIPS challenges after the deadline of 2016. The Department of Patents, Designs & Trademarks, and the Directorate General of Drug Administration, the regulatory agencies of this sector in Bangladesh, need to be ready to assist the pharmaceutical firms through smooth progress of the processing, and regulation of pharmaceutical patents.

The research focused exclusively on Bangladeshi pharmaceutical industry to identify the relative significance of some well-known determinants of profitability in Bangladeshi context. The study also focused on the financial performance of the listed companies within this industry. Very few studies have analyzed both the financial soundness and profitability determinants of pharmaceutical industry in Bangladesh perspective. To date, most studies have considered mere problems and prospects of the sector or the impact of TRIPS agreement on it. This research will add value to the existing literature in Bangladesh and help recruit professionals to work in this area. This study also has important implications for investors' investment decisions in the pharmaceutical sector in the capital market. Further, the analysis, results and policy implications presented in this research can help the policy makers and management authority of the Bangladeshi pharmaceutical industry in re-sketching their financial policies. Based on the study, regulatory agencies will also get input for developing capacity necessary for the compliance with TRIPS for pharmaceutical patent which is due from 2016.

4. Literature Review

"Strategy scholars are trying to understand the factors that allow some (but not all) firms to sustain relatively high profit levels over time" (Porter, 1985; Jacobson, 1988; Rumelt, 1991 cited in Roberts, 1999, p. 655; Hunt and Morgan, 1995). According to Ruiz (2003, p. 69), "some studies have been done for different countries. Their main characteristic is the fact that they are applied works on industrial or developed countries. Some of them are: The United States, Canada, Germany, France, Italy, Japan and United Kingdom".

Firm profitability and its determinants are a well addressed research topic in the industrial field (Stierwald, 2009). "The focus of [the] debate has been on the appropriate measure of profitability" (Leahy, 2012, p. 37). As stated in Leahy (1998, 2004 cited in Leahy, 2012, p. 40), "the results vary

according to the measure of profitability employed, i.e., the significance of the independent variables may depend on the profitability measure employed".

The investors' objectives are purely based on the profitability and financial performance of the company. So, before making investment decisions, investors consider several factors which influence the corporate performance. According to Roberts (1999), "debates about performance measurement are found in the strategy literature (Venkatraman and Ramanujam, 1986), the economics literature (Scherer and Ross, 1990), and the pharmaceutical economics literature (Schwartzman, 1976)". According to (Subhash and Aggarwal, 2008), performance appraisal of a company can be attempted in terms of growth and profitability. However, growth, when used as a measure of firm performance in the empirical literature, demonstrated mixed outcome. Delmar et al. (2003) explained the reasons behind that as the heterogeneous nature of growth itself and the use of different measurement tools by researchers for estimating growth.

According to Scherer and Ross (1990, p. 416 cited in Roberts, 1999, p. 659), "profit is the surplus of revenue over cost, including the cost of attracting capital from other uses". They recommended for accounting rates of return, Tobin's q ratio, and the price–cost margin as measures of profitability (Roberts, 1999). But, currently, value added measures such as Economic Value Added (EVA) and Market Value Added (MVA) have emerged as a replacement of the traditional accounting based measures. As stated by Nord (2011, p. 6), "as a measurement for profitability, market value is appropriate because it encompasses not only future expected net cash flows, but also the volume of shares that a firm has". However, Kramer and Pushner (1997) illustrated in their study that the market emphasizes more on Profit than EVA. Most of the empirical studies have used net profit margin and return on capital employed to measure profitability as these variables express the efficiency of a firm in terms of its profits (Esposito and Esposito 1971; Kaur 1997; Feeny and Rogers, 1999; Kakani et al., 2001). Recognizing such empirical debates, this study supported for net profit after-tax to gauge firm-level profitability.

Financial distress is a situation where a company either fails or finds it difficult to pay its debt obligations. Sometimes financial distress can lead to bankruptcy (Masum and Johora, 2012). Models of insolvency are employed to examine the financial stability of a company. Such models are important for managers as they can help them to keep an eye on the company's performance trend over time, and reduce the possibilities of failure by detecting problems and adopting corrective measures (Chung, Tan and Holdsworth, 2008). Lenders can use such models to envisage the probability of default of the firm (Jones, 1987). Regulatory organizations can also monitor the concerned companies with regard to their bankruptcy possibilities. Empirical models used financial ratio analysis through univariate and multivariate approach to examine insolvency position of companies. Beaver (1966) introduced a univariate approach and initiated the investigation of corporate failure through ratio analysis. Following Beaver's (1966) univariate approach, Altman (1968) introduced Multiple Discriminant Analysis to examine corporate failures through the analysis of five categories of ratios. Researchers used Altman's MDA approach to predict the financial distress of different industries (Ismail and Goentoro, 1997; Majumder and

Rahman, 2011; Masum and Johora, 2012). The Z-score model of MDA by Professor Altman is used in this study to evaluate the financial soundness of pharmaceutical industry in Bangladesh.

Largely, past studies employed multiple regression analysis to ascertain the determining factors of firm profitability (Subhash and Aggarwal, 2008; Nord, 2011; Malik, 2011; Olweny and Shipho, 2011; Sakthivel, 2011; Bhunia, Bagchi andKhamrui, 2012). In addition to financial variables, consideration of macroeconomic variables is also important as it would help identify the role of government financial policy on performance of companies (Sakthivel, 2011). Past studies demonstrate that a number of factors impact the profitability position of a firm which are: age (Subhash and Aggarwal, 2008; Malik, 2011), size (Subhash and Aggarwal, 2008; Lucius, Giorgis and Lee, 2008; Stierwald, 2009; Malik, 2011), free cash flow (Nord, 2011), leverage ratio (Bothwell, Cooley and Hall, 1984; Kakani et al., 2001; Malik, 2011), liquidity (Olweny and Shipho, 2011; Bhunia, Bagchi and Khamrui, 2012), market share (Shepherd, 1972a; b; Bothwell, Cooley and Hall, 1984; Subhash and Aggarwal, 2008), risk (Nord, 2011), etc. Empirical studies have also revealed that research and development expenditures have positive influence on firm profitability (Chan, 2001; Roberts, 2001; Lucius, Giorgis and Lee, 2008; Subhash and Aggarwal, 2008; Shah, Stark and Akbar, 2008; Ehie, 2010; Pindado, 2010; Nord, 2011). Similarly, "advertisement and marketing expenditure helps in increasing profitability by helping a firm to build and cash its intangible assets at its brand name" (Comanor and Wilson 1967; Esposito and Esposito 1971; Shepherd 1972a, 1972b; Kaur 1997; Kakani et al. 2001 cited in Subhash and Aggarwal, 2008).

From the review of empirical literature it is evident that firm profitability is one of the vital areas of research. At the global level, highly valuable studies are available on pharmaceutical industry and related sectors. Most of the empirical research involving judgment of industry profitability had been carried out in industrially developed countries (Golec and Vernon, 2006; Austin, 2006; Lucius, Giorgis and Lee, 2008; Nord, 2011; Leahy, 2012). However, the studies done on Bangladesh pharmaceutical industry are relatively few in number. As stated by Habib and Alam (2011), specific studies on Bangladesh pharmaceutical industry are limited. VanDuzer (2003) focused on the challenges and opportunities of TRIPS patent rules for pharmaceutical industry in Bangladesh and proposed strategies that might be adopted to further develop the national pharmaceutical industry. Habib and Alam (2011) tried to identify the major problems of production, operations, quality control, marketing and export in the pharmaceutical sector, and recommended policies to overcome these problems. Their study also identified the prospects of pharmaceutical industry in Bangladesh. Until now, there was limited analytical study that examined the performance and profitability determinants of pharmaceutical industry of Bangladesh. Salauddin (2001) used analysis of financial statement, mean, standard deviation (S.D.) and co-efficient of variation (C.V.) to assess the profitability position of pharmaceutical industry in Bangladesh. The study of Majumder and Raman (2011) reviewed the financial performance of Bangladesh pharmaceutical industry through ratio analysis, Altman's (1968) MDA, and statistical instruments such as descriptive statistics.

Therefore, some of the past studies focused on the problems and prospects of pharmaceutical industry. Others have researched the financial performance in terms of ratio analysis or Altman MDA analysis. No previous study concentrated on the determinants of profitability of this sector in Bangladesh. Hence, this study is the first empirical evidence in the context of Bangladesh which incorporates the sketch of both financial soundness and the determinants the profitability of firms in this sector. The findings of this research are expected to append positive contribution for the stakeholders of pharmaceutical sectors. Similarly, researchers interested in working on the pharmaceutical sector as well as on overall profitability of any sector can use this research as a reference tool.

5. Methodology

This study is an analytical one which concentrated mainly on investigating the financial consistency and the profitability factors of the pharmaceutical industry in Bangladesh. Currently 11 pharmaceutical companies are listed under the Pharmaceutical and Chemical Sector in Dhaka Stock Exchange. Among them, ten Pharmaceutical companies are included in the data set for this study. Only three years data of Beacon Pharmaceuticals Limited is available, and these data differ significantly from the industry as well as individual firms in the industry. Thus, to avoid any bias in the analysis, Beacon is not considered in the data set. Acomplete list of the sample companies as well as their short names used in the data set is presented inTable 1 in the Appendix . The data set comprised of a sample size of 100 covering a period of ten years from 2002 to 2011.

The study used both primary and secondary data, but mostly secondary data. Required secondary data have been collected from respective companies' annual reports, monthly publications of DSE; websites of DSE, respective pharmaceutical companies, Directorate General of Drug Administration, Bangladesh Pharmaceutical Society, etc. Relevant information from different books, journals and online publications was used in developing the variables and attributes. Sources of primary data included personal interviews and discussions with executives of different pharmaceutical firms, and informal discussions with authors of other publications of this sector.

The study involved the tabulation, analysis and interpretation of collected data using different statistical tools to assess the condition of the firms under study.To measure the financial soundness of the firms, Multiple Discriminant Analysis developed by Professor Altman (1968) had been used. In addition, the study indented to identify and analyze the relative explanatory power of firm characteristics on profitability. Specifically, this research investigated the impact of firm-specific factors (age, size, growth, market share, advertising intensity, inventory turnover ratio, leverage ratio) and economic factors (per capita income and export) on firm profitability represented by net profit after tax. In the process of the examination, the study employed descriptive statistics, correlation matrix and multiple linear regression analysis. To find out the major factors that affect the profitability position of the firms, five hypotheses were taken and a multiple regression was run to test those hypotheses statistically. Based on the results, this paper reached conclusion explaining the contribution of the research and policy propositions for different parties having interest in this sector. The conclusions are preliminary and hence, further research is suggested.

6. Empirical Analysis

A number of accounting and statistical tools, such as MDA, descriptive statistics, correlation, multiple regression, etc. are used in the examination of financial consistency and determinants of profitability of pharmaceutical industry of Bangladeshi. The results of numerous analyses are depicted in a number of tables in Appendix A.

6.1. Testing Financial Soundness of Pharmaceutical Industry of Bangladesh

In order to evaluate the overall financial soundness of the industry the MDA model has been used in the study. MDA has been applied in different disciplines since its first utilization by Fisher (1936). The Z-score formula under this model for evaluating financial soundness and forecasting bankruptcy probabilities of a firm was developed by Dr. Edward I. Altman in 1968. According to Altman (1968, p. 592), "the MDA technique has the advantage of considering an entire profile of characteristics common to the relevant firms". The MDA approach employs a pool of financial ratios using a weighting system calculated by Altman. Altman categorized the variables into five groups of ratios which are: liquidity, profitability, leverage, solvency, and activity ratios. From the original group of variables, five most suitable ratios are selected for predicting the probability of a company to become bankrupt. The Z-score formula is presented by Altman (1968, p. 594) as:

"$Z = 0.012X_1 + 0.014X_2 + 0.033X_3 + 0.006X_4 + 0.999X_5$

Where, X_1=Working Capital/Total Assets, X_2=Retained Earnings/Total Assets, X_3=Earnings before Interest and Taxes/Total Assets, X_4=Market Value of Equity/Book Value of Total Debt, X_5=Sales/Total Assets, Z=Overall Index.

Firms having a Z-score above 2.99 (Z >2.99) are in the 'safe zone' and are likely to be financially sound; these firms clearly fall into the non-bankrupt class. A score less than 1.80 (Z <1.80) means that the company is in the 'distress zone' and likely to declare bankruptcy in the next two years. Companies having Z-scores between 1.8 and 2.99 (1.8 < Z <2.99) are considered to be in the 'gray zone' or 'ignorance area' in which financial distress may or may not be impending. This indicates, they may face bankruptcy in the next two years, but could avoid it if circumstances change. Therefore, a high Z-score is desirable for a financially sound company.

The ratios of working capital to total assets, retained earnings to total assets, earnings before interest and taxes to total assets, market value of equity to book value of total debt, and sales to total assets are measured in order to compute the Z-score for the selected pharmaceutical companies under study. Table 2 represents both year-wise and average Z-Score position of the sample pharmaceutical companies as well as the entire industry during the study period. Average Z-Score of the companies range from 2.011 (IBNSINA) to 0.030 (BEXPH). The industry average Z-score over the period is 0.691 with a standard deviation of 0.030. None of the companies have a Z-score to be in the safe zone according to the score specified (Z > 2.99) by Professor Altman. Only IBNSINA is in the 'grey zone' with a Z-score 0f 2.011 (1.8 < Z <2.99) indicating that the company may face bankruptcy in the next two years, but could avoid it if necessary steps are taken. Among the other firms, RENATA, GLAXO, ACI, AMBPH, LIBRA, PHAID and SQRPH

have Z-scores of 1.161, 1.514, 1.060, 1.019, 0.862, 0.819 and 0.773 respectively. Their scores are above the industry average, but still these firms are in the distress zone. ORION and BEXPH are also in the distress zone having scores of 0.576 and 0.321 respectively, which are even lower than the industry average. Average Z-score of the industry ranges from 0.663 (in 2003 and 2006) to 0.738 (in 2002) which indicates that the overall industry has been in the distress zone throughout the period. Therefore, it can be summarized from the Z-score analysis that over the study period the individual firms as well as the total industry has not been financial sound, which indicates the possibility of bankruptcy of the industry.

6.2 Determinants of Profitability of Pharmaceutical Industry in Bangladesh

The prime intention of this research is to identify the determinants of profitability of the pharmaceutical companies in Bangladesh. This study has focused on a number of variables as the determinants of profitability and developed the following hypotheses:

Hypothesis 1: There is significant positive relationship between firm growth and profitability.

Hypothesis 2: Advertising intensity has a significant positive association with profitability.

Hypothesis 3: There is a significant positive association between firm size and profitability.

Hypothesis 4: Leverage ratiohas a significant negative relationship with profitability.

Hypothesis 5: Inventory turnover ratio has a significant positive impact on profitability.

This study will empirically examine the hypotheses stated above through multiple regression analysis. The dependent variable of the model is net profit after tax and the independent variables are firm growth, advertising intensity, firm size, leverage ratio (debt to equity ratio), inventory turnover ratio, firm listing age and market share. The control variables used here are firm listing age, market share, per capita income and export. Therefore, the regression equation is as follows:

Net Profit = β_1 + β_2 (Firm Size) + β_3 (Firm Listing Age) + β_4 (Leverage Ratio) + β_5 (Market Share) + β_6 (Firm Growth) + β_7 (Inventory Turnover Ratio) + β_8 (Advertising Intensity) + β_9 (Per Capita Income) + β_{10} (Export) + e

6.2.1 Variable Definition

***Net Profit after Tax (NPAT)*:** Profitability is measured here by net profit after tax. Net profit after tax is evaluated here as net profit after tax of each year divided by total assets of previous year.

Firm Size (SIZE): Firm size is calculated as the natural logarithm of a firm's total assets.

Firm Listing Age (AGE): Firm AGE is an algebraic expression of the natural logarithm of a firm's listing age in DSE.

Leverage Ratio (LEVERAGE): The leverage ratio (Debt to Equity Ratio) is computed by dividing total debt of a firm by its total equity.

Market Share (MKTSHR): MKTSHR is calculated as sales revenue of an individual firm for a given year divided by the total sales revenue of all the firms included in the data set for the same year.

Firm Growth (GROWTH): GROWTH is computed as the percentage change in sales of a firm from year to year during the study period.

Inventory Turnover Ratio (INVTO): Inventory turnover ratio is obtained by dividing cost of goods sold by average inventory.

Advertising Intensity (ADVINT): In order to address the issue of differences in the size of the sample firms, advertising expense is normalized by dividing advertising expenses by sales revenue.

Per Capita Income (PCI): Gross National Income (GNI) based per capita income in Bangladesh during the study period is considered here.

Export (EXP): Export amount is normalized by dividing export of a given year by total assets of previous year.

6.2.2 Descriptive Statistics: A summary of the data is presented in Table 3 which depicts the descriptive statistics of data without normalization. As shown in Table 3, Average NPAT is 8.29% with a standard deviation of 7.74%. Maximum value of NPAT is 24.11% and minimum value is -28.73% during the period. Firm SIZE has a maximum value of BDT 23033340533 and minimum value of BDT 57104573. Average firm SIZE of the industry is BDT 3547045730 with a standard deviation of BDT 5255079046. Average firm AGE is 25.80 years with a range of 17 to 36 years. The LEVERAGE ranges from 25.63 to -29.25. Industry average LEVERAGE is 1.07 with a huge standard deviation of 6.07. MKTSHR has an average value of 9.96% with a significant standard deviation of 10.30%. Maximum and minimum value of MKTSHR is 35.30% and 0.18% respectively. Firm GROWTH ranges from 139.08% to -36.18%. The average GROWTH rate is 17.97% and standard deviation is 21.53% which is significantly high. Industry average INVTO is 3.73 and industry standard deviation is 2.88. Advertising Expenditure (ADVEXP) ranges from maximum BDT 688,156,000 to minimum zero. Average ADVEXP is BDT 90,111,157 with a standard deviation of BDT 152,247,610. Annual average PCI is BDT 1428 with a standard deviation of BDT 312. Maximum PCI is BDT 1940 and minimum is BDT 990. Industry average EXP is BDT 43,168,032 with a standard deviation of BDT 90,950,902.

Table 4 depicts the descriptive statistics of the variables after normalization of firm listing age, firm size, advertising expenditure (as advertising intensity), per capita income and export.

6.2.3 Correlation Matrix: It is essential to check for the existence of multicollinearity before the multiple regressions is run. To examine the correlation among all employed independent variables and the dependent variable, a correlation matrix is presented in Table 5. As depicted in the table, when the value of export is considered without normalization,correlation between export and firm size is very high (r = 0.889) and multicollinearity exists between them. But if the logged value of

export is considered, the correlation between these two variables becomes low (r=0.467) and the multicollinearity problem no longer exists. Since in regression analysis normalized value of export is used, both firm size and export are included in the analysis. The table also illustrates that correlation among other variables are low representing no multicollinearity problem.

6.2.4 Multiple Regression Analysis Findings: In order to consider the influence of each of the independent variables on the dependent variable (Net profit after tax), the sophisticated statistical technique multiple regression analysis has been used in this section. Table 6 illustrates the summary statistics of the regression analysis. According to table 6, R-Square shows that 52.89% variations in net profit after tax can be explicated through the variation in the independent variables. The adjusted R-square has the value of 48.17% which is a little less than the R-square. The value of F-statistics (less than .05) demonstrates the statistical significance of the model. Results show that all the independent variables except LEVERAGE and SIZE are positively related with profitability. In fact, all of the coefficients have the predicted signs except for SIZE. However, not all of them are significant. Therefore, the statistically significant explanatory variables at the 95% confidence level are GROWTH, LEVERAGE ratio and ADVINT. The insignificant variables are SIZE and INVTO.

The study reveals that firm growth is the most forceful and vital factor in the industry, that influences profitability as measured by net profit after tax. This result supports *Hypothesis 1* that assumes, there is a significant positive association between firm growth and profitability. The slope coefficient of this variable was 0.0319 indicating that 1 unit increase in firm growth would contribute to an increase of 0.0319 units in net profit after tax.

Advertising intensity is another explanatory variable having a highly significant positive relationship with net profit after tax. This result supports *Hypothesis 2*, which suggests that advertising intensity has a significant positive association with profitability of the pharmaceutical industry. The slope coefficient of this variable shows that a 1% increase in advertising intensity could increase profitability by 0.1210%.

Leverage ratio, as measured in terms of debt-equity ratio, is found to be a statistically significant determinant of profitability, having a considerably high negative relation with net profit after tax. This result supports *Hypothesis 4*, which suggests that leverage ratio has a significant negative relationship with profitability of the pharmaceutical industry. The coefficient of this variable (0.00125) indicates that a 1% increase in leverage ratio could decrease net profit after tax by 0.00125%.

Past studies have shown varying results regarding the relationship between firm size and profitability. Some of the empirical research revealed a weak negative relationship or no relationship at all (Marcus, 1969), whereas some others identified a positive relationship between firm size and profitability (Hall and Weiss, 1967) and explained that large firms should be more profitable and reap economic benefits more than small firms. In this study firm size is found to have a negative relationship with profitability, although this variable was initially assumed to have positive association. The statistically insignificant negative relationship between firm size and

profitability, thus, rejects *Hypothesis 3*. One explanation for this inconsistent result could be that large firms in Bangladesh pharmaceutical industry are facing diseconomies of scale. Inventory turnover ratio is also found to have insignificant relationship with profitability and thus, rejects *Hypothesis 5*.

However, despite having positive association with profitability, a number of variables appeared to be statistically insignificant. The analysis failed to prove the existence of significant association of profitability with firm age, market share, export and per capita income. Therefore, the control variables in the study, AGE, MKTSHR, EXP and PCI, appeared to be insignificant, which suggests that these variables do not have a direct influence on profitability.

7. Contribution and Policy Implications

Pharmaceutical sector represents a vital appendage for the industrial development in Bangladesh (Majumder and Rahman, 2011). Therefore, Performance of these manufacturing enterprises deserves special attention. This research is a unique endeavor to examine both the financial soundness of pharmaceutical industry and the determinants of profitability of the firms in this sector.

The MDA analysis illustrates that the bankruptcy possibility is high for the industry and individual companies. In a similar study, Islam and Mili (2012, p. 80) identified the causal factors behind such a situation as "unsound financial management, inadequate working capital, slow conversion of receivables and inventory into cash, lower position of sales, higher amount of debt, no professional distribution house, restrictions on patent rights, fixed mark-up system, contrary policy of the government, vulnerability of environmental risk and increased cost of production...". Therefore, it can be recommended that regulatory organizations should partner with pharmaceutical companies, and take immediate measures to conquer these limitations, and hence, build a long-term viable industry.

The study shows that firm growth is the most crucial determinant of profitability of pharmaceutical firms in Bangladesh. This implies, the higher the growth, the higher the profitability. Growth rates of companies vary based on their life cycle stages, and firms can do little to keep control over growth stages. However, while adopting strategies, individual firms should be vigilant about the life cycle stages to which they belong. They should emphasize the product quality, process and services to ensure growth equipped with the practices of good governance. In addition, a sustainable and growing pharmaceutical industry should be founded in Bangladesh in order to take the advantage of TRIPS after 2016 when the TRIPS' era is scheduled to end (World Bank, 2008). While TRIPS offers Bangladesh a short-term window of advantage, long-term international success will depend on price and quality, which should be ensured for achieving this sustainable growth. To compete in the world market in the long run, firms will also have to ensure incredibly sound performance based on a stable financial condition. DGDA should perform its responsibilities to ensure the safety, effectiveness, and quality of drugs as well as the significance and accuracy of product related information, which are very crucial for long term growth of the industry.

Advertising contributes to higher sales for pharmaceutical firms. In the pharmaceutical industry, advertising provides information that people want and consumers prefer the pharmaceutical companies to get in touch with them directly. Advertising is found to be very crucial for the profitability of pharmaceutical firms in Bangladesh. Moreover, in the face of the TRIPS challenge, it is essential for these pharmaceutical firms to preserve the local market demand. Therefore, pharmaceutical companies should emphasize advertising more and enhance the allocation of funds for advertising expenses in order to attract consumers, grow market share, build reputation/brand and win over prescribing doctors. Both electronic and print media should be used for this purpose. Public, especially those in rural areas should be educated about health care as well.

The highly significant negative relationship between leverage ratio and profitability indicates that firms are not getting a better return from the investments of their borrowed funds. This increases their financial and bankruptcy risk. Moreover, according to Altman MDA analysis in the study, Z-scores indicate very poor condition of individual pharmaceutical firms as well as of the overall industry in terms of financial soundness. Thus, the possibility of bankruptcy of firms and/or the industry is very high. Therefore, firms should reduce their leverage and be cautious in setting their debt-equity ratio. In addition, they should also be able to attain better returns from investing the borrowed funds. Regulatory authority cannot directly impose any restriction on setting the leverage ratio of firms. However, they can constantly monitor the leverage condition of the firms and provide some assistance guidelines in keeping balance in the debt-equity ratio, reducing their financial and business risks, and maintaining stability of their financial conditions.

Investors aim at selecting firms with future profitability. Based on the findings of this study, investors can learn about the factors which are crucial for the profitability of the pharmaceutical sector and make investment decisions accordingly. They can decide to invest in high growth, less levered firms. Also they can invest in the firms that spend more for advertising. Their investment decisions, based on the information provided in the study, will be reflected in the price of shares of the respective companies in the capital market.

Prospective employees will have a signal of the financial performance and stability of the pharmaceutical firms. They can also identify which firms in the industry have a better growth prospect. All this information can assist a job seeker in choosing employer companies appropriate for the individual's career goals.

8. Conclusion

Pharmaceutical industry in Bangladesh has achieved impressive progress with a consistent double digit annual average growth rate. The study intended to examine the financial steadiness of pharmaceutical industry and the relative significance of a number of firm-specific and economic variables on the profitability of firms. The results show that the insolvency possibility of almost every company is very high. Consequently, the industry also has a high possibility of bankruptcy within the next two years. To address the situation, government should come forward and ensure persistent, progressive and mutual efforts of the regulatory organizations and the pharmaceutical companies. Investment of more funds in this industry can produce more profits than before.

Additional funds should be raised through capital market and prospective investors should be made aware of the opportunities of this industry. Ample investment in working capital, accelerated transformation of inventory and accounts receivables into cash, recovery of debt and increase in sales are essential for achieving better financial power in the sector.

Growth, advertising intensity and leverage ratio have been proved to be the most significant determinants of profitability of pharmaceutical companies in Bangladesh. Long term and sustained growth of the firms and the overall industry has to be achieved both in the local and international markets. Firms should spend more funds for advertising and make consumers aware of their products. Reducing leverage and ensuring better return from the investment of borrowed funds are also essential for lowering the financial and business risks of the firms. In addition, these measures will help in meeting the inevitable challenges of TRIPS. Synchronization of firms with DGDA has a crucial role in policy implications.

By adopting the recommended measures, the firms can improve their overall performance and thus, support in the realization of the unlimited potential of pharmaceutical companies of Bangladesh. Therefore, with the efficient management policies and government assistance, companies can accelerate their own performance and contribute to the economic growth of Bangladesh as a whole.

8.1 Scope of Further Research: This study is subject to several limitations, most of which suggest for more extensive research. The analysis could be more extensive with a larger set of data. Such comprehensive study could be performed by including more companies in the data set and/or increasing the time duration over which this study focused.

In the pharmaceutical industry innovation is crucial to the growth of a firm. The output of the innovation efforts attempted by a firm should be reflected in the growth of the firm. Thus, expenditures on R& D should be vital for such success in innovation. It is interesting that R & D expenditures do not constitute a separate expenditure head in the financial reports of the pharmaceutical firms in Bangladesh. Further research can be done on identifying the rationale behind this and also on examining the influence of R&D expenditure on the profitability of the pharmaceutical sector in Bangladesh.

Another interesting finding is that firm size was found to be insignificant with a negative relationship with profitability. Future research is required to re-examine the methods of measuring firm size and the reasons for which this variable is proved to be insignificant. Further exploration also needs to be performed on the regression analysis to determine why the relationships of some other variables were found to be insignificant with profitability. The exact measure of firm profitability could also be attempted to be better illustrated with some other dependent variables instead of net profit after tax.

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