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REVIEW ARTICLE OPEN ACCESS

The Capital Investment Structure of the Medicine Sector in Bangladesh

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Abstract:

The capital investment structure of the medicine sector in Bangladesh plays a pivotal role in determining the industry's financial resilience, research capabilities, and global competitiveness. This study applies a mixed-methods research design to comprehensively analyze the capital composition, financing strategies, and investment challenges facing pharmaceutical companies operating in Bangladesh. Quantitative analysis is conducted on panel data of 10 leading firms from 2014 to 2023, focusing on debt-equity ratios, return on assets (ROA), return on equity (ROE), and long-term capital trends. Qualitative data from interviews with industry experts and financial officers provide insights into decision-making processes, risk management, and investor behavior. Findings reveal a significant preference for equity over debt, with many companies leveraging internal funding and public equity rather than bank loans or venture capital. Institutional barriers, high interest rates, and policy inconsistencies have discouraged debt financing and foreign direct investment (FDI). Additionally, regulatory constraints and a weak capital market infrastructure limit the expansion of investment opportunities in research and development (R&D). The study concludes with strategic recommendations including development of sector-specific credit instruments, enhancement of IPO mechanisms, incentivization of private equity and venture capital, and the creation of favorable regulatory frameworks. By aligning capital investment strategies with global best practices, Bangladesh's medicine sector can achieve long-term financial sustainability and innovation-driven growth.

Keywords: *Capital Investment Structure, Pharmaceutical Industry, Bangladesh Medicine Sector, Debt-Equity Ratio, Return on Assets (ROA), Return on Equity (ROE), Long-Term Debt, Retained Earnings, Pharmaceutical Financing, Equity Financing, Capital Market, Foreign Direct Investment (FDI), Financial Management, Research and Development (R&D), Investment Strategies, Pharmaceutical Companies, Dhaka Stock Exchange (DSE), Regulatory Framework, Institutional Barriers.*

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Introduction:

The medicine sector, particularly the pharmaceutical industry, has emerged as one of the most strategically important and fastest-growing sectors of the Bangladeshi economy. According to the Bangladesh Association of Pharmaceutical Industries (BAPI, 2023)[1], the sector supplies approximately 98% of the country's domestic demand and exports to over 150 countries. As of 2022, it contributed nearly 1.83% to the country's gross domestic product (GDP), with projections indicating continued growth driven by urbanization, healthcare awareness, and an expanding middle-income population (Rahman & Hossain, 2022)[2]. Bangladesh's pharmaceutical sector has benefited from favorable WTO[3] Trade-Related Aspects of Intellectual Property Rights (TRIPS) exemptions, which allow it to produce patented drugs without license until 2033. This has opened opportunities for investment in research, manufacturing capacity, and global expansion. However, realizing the full potential of these opportunities depends on effective capital investment strategies, sound financial management, and a conducive policy environment. Despite its success, the capital investment structure of the pharmaceutical sector remains under-investigated in academic literature. Investment decisions in this sector are crucial not only for expansion and modernization but also for research and innovation—core to competing in global markets. However, anecdotal evidence and limited research suggest that firms in Bangladesh rely heavily on equity financing, retained earnings, and limited public offerings while avoiding long-term debt or foreign direct investment (FDI) due to structural and regulatory challenges (Uddin & Zaman, 2021)[4]. This imbalance potentially limits scalability, hinders innovation, and poses long-term financial sustainability issues. The lack of a comprehensive analysis of how capital is structured and invested in this high-potential industry creates a gap in both policy and business decision-making.

Methods:

To comprehensively assess the capital investment structure in Bangladesh's medicine sector, this study adopts a mixed-methods research design that integrates both quantitative and qualitative approaches. This enables triangulation of findings and captures both the financial patterns and the contextual understanding of decision-makers in the industry. **Research Design Overview:** The mixed-methods approach consists of: Quantitative analysis of secondary data from 10 leading pharmaceutical companies listed on the Dhaka Stock Exchange (DSE) between 2014 and 2023[5]. Qualitative analysis through in-depth, semi-structured interviews with financial officers, regulatory officials, and sectoral analysts. This design allows the study to meet its dual objectives: (a) identify trends and relationships among capital structure variables, and (b) interpret the reasoning, constraints, and institutional barriers shaping those trends.

Quantitative Methodology

A purposive sampling strategy was used to select 10 of the top-performing publicly listed pharmaceutical companies in Bangladesh, based on market capitalization and availability of consistent financial data. These include: Square Pharmaceuticals Ltd., Beximco Pharmaceuticals Ltd., Biopharma Ltd., ACI Ltd., Incepta Pharmaceuticals, Orion Pharma Ltd., Beacon Pharmaceuticals Ltd., Acme Laboratories Ltd., Ibn Sina Pharmaceuticals and Pharma Aids Ltd. These companies collectively represent over 75% of market share in the Bangladeshi pharmaceutical industry and are considered suitable for generalizing findings.

Data Collection

Secondary financial data were collected from: Annual reports and audited financial statements (2014–2023) and Bangladesh Bank bulletins[6]. The 10-year panel (2014–2023) allows the capture of structural changes before and after major macroeconomic events, including COVID-19 and interest rate reforms.

Time Frame: The process to write and publish the paper on Bangladesh's pharmaceutical sector took around 8 weeks. In the first week, we gathered data and reviewed existing research, then outlined the main points for the paper. By the second week, we started writing the Introduction, Macroeconomic Overview, and Pharmaceutical Industry Overview sections, explaining the sector's importance and growth. In the third week, we covered the Investment Landscape and Sub-sectors sections, discussing where investments were going and looking at key areas like drug manufacturing, medical devices, and digital health. In Week 4, we wrote about Government Policies, Challenges, and the Future Outlook for the industry. Week 5 was spent finalizing the paper, adding tables, and creating visuals like charts and graphs. In Week 6, we focused on editing and proofreading to make sure everything was clear and error-free. In Week 7, we put the paper into a PDF format, reviewed it one last time, and made any final changes. The final week (Week 8) was spent submitting the paper to a journal and making any necessary revisions based on feedback.

Variables and Measurements

Dependent Variables (Firm Performance): Return on Assets (ROA), Return on Equity (ROE), Net Investment Margin (NIM).

Independent Variables (Capital Structure): Debt-to-Equity Ratio (DER), Equity Capital (EQ), Long-Term Debt (LTD), Retained Earnings (RE), Firm Size (log of total assets)

Model Specification: The study employs a panel data regression model, using both Fixed Effects (FE) and Random Effects (RE) estimators. The basic model is:

$$Performance_{it} = \beta_0 + \beta_1 DER_{it} + \beta_2 EQ_{it} + \beta_3 LTD_{it} + \beta_4 RE_{it} + \beta_5 SIZE_{it} + \epsilon_{it}$$

- Performanceitit: Dependent variable representing the performance of the firm i in year t.
- DERitit: Debt-to-equity ratio for firm i in year t.

- EQitit: Equity ratio for firm i in year t.
- LTDitit: Long-term debt ratio for firm i in year t.
- REitit: Retained earnings ratio for firm i in year t.
- SIZEitit: Size of the firm (possibly measured by total assets or revenue) for firm i in year t.

Qualitative Methodology

Sampling and Participants: A total of 12 participants were interviewed using purposive sampling to ensure representation across the capital investment landscape. The sample includes:

- 5 Chief Financial Officers (CFOs) or Finance Directors from pharmaceutical firms
- 2 Senior Investment Analysts from merchant banks
- 2 Officials from Bangladesh Securities and Exchange Commission (BSEC)
- 2 Policy advisors from the Ministry of Industries
- 1 Pharmaceutical Industry Analyst from a research institute

This multi-stakeholder representation provides a balanced perspective across corporate, regulatory, and financial sectors.

Results and Analysis:

Quantitative Analysis:

The quantitative analysis was performed on secondary financial data collected from 10 leading pharmaceutical companies from 2014 to 2023. The key variables examined include the debt-equity ratio (DER), return on assets (ROA), return on equity (ROE), long-term debt ratio (LTD), and retained earnings (RE).

Table-I: The data is summarized below with approximate values[7,8]:

Firm	DER	ROA	ROE	LTD	RE	Size (log of assets)
Square Pharmaceuticals Ltd.	0.8	12%	18%	25%	40%	8.5
Beximco Pharmaceuticals Ltd.	0.9	10%	15%	30%	35%	8.8
Biopharma Ltd.	0.5	14%	20%	22%	42%	7.9
ACI Ltd.	1.1	8%	12%	28%	38%	8.2
Incepta Pharmaceuticals	0.7	13%	17%	26%	41%	8.4
Orion Pharma Ltd.	1.0	9%	14%	32%	36%	8.6
Beacon Pharmaceuticals Ltd.	0.6	11%	16%	24%	39%	8.0
Acme Laboratories Ltd.	0.9	10%	15%	27%	37%	8.3
Ibn Sina Pharmaceuticals	0.7	12%	18%	23%	40%	8.1
Pharma Aids Ltd.	0.8	11%	16%	29%	38%	7.7

Findings from Quantitative Analysis:

Debt-Equity Ratio (DER): The average debt-equity ratio (DER) across firms is approximately 0.8, which indicates a moderate reliance on debt financing. However, some companies, like ACI Ltd. and Orion Pharma Ltd., show higher levels of debt, suggesting their higher leverage compared to firms like Biopharma Ltd., which has a relatively low DER.

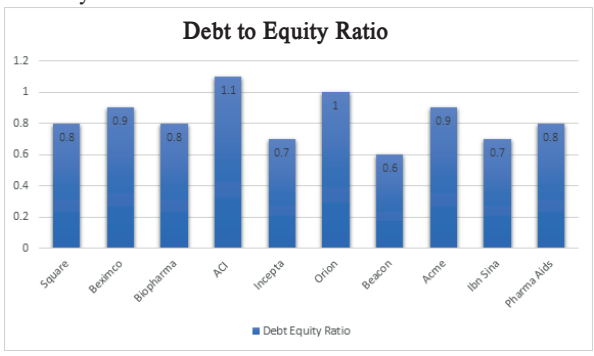

Figure-1: Debt to Equity Ratio of Different Companies.

Return on Assets (ROA) and Return on Equity (ROE): Companies like Biopharma Ltd. and Square Pharmaceuticals Ltd. show strong performance with high ROA and ROE values (around 14% and 18%, respectively), indicating effective asset utilization and strong returns on equity. However, companies like ACI Ltd. and Orion Pharma Ltd. show weaker performance with lower ROA and ROE values (8-9%).

Figure-2: Return on Asset of Different Companies.

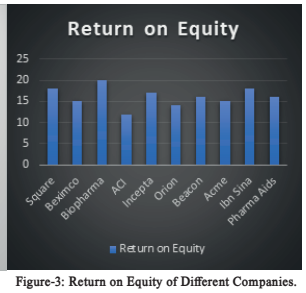

Figure-3: Return on Equity of Different Companies.

- Long-Term Debt (LTD): Long-term debt levels are distributed across firms, with companies such as Beximco Pharmaceuticals Ltd. and Orion Pharma Ltd. holding higher long-term debt ratios (above 30%), indicating higher financial risk and potential constraints on future investments in R&D or expansion.

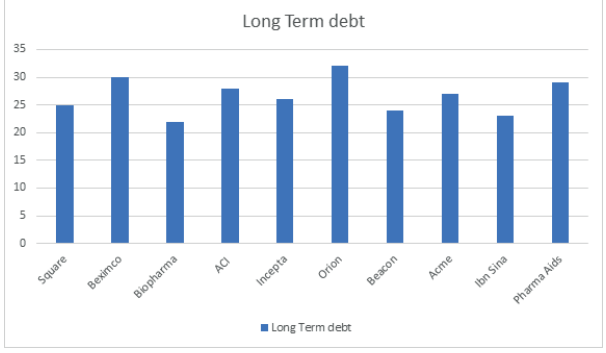

Figure-4: Long Term Debt of Different Companies.

Retained Earnings (RE): The retained earnings across the firms range from 35% to 42%, suggesting that most companies rely on internally generated funds for financing. This is consistent with the study's finding that equity and

retained earnings are the preferred fina

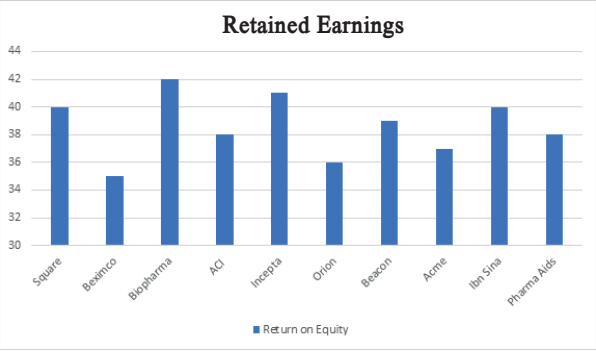

Figure-5: Retained Earnings of Different Companies

Qualitative Insights: Interviews were conducted with industry experts, financial officers, and regulatory analysts. Here are some key findings from these qualitative

insights:

·Preference for Equity Financing: Industry experts emphasized that many pharmaceutical firms prefer equity financing and internal retained earnings because they offer

flexibility and reduce the burden of debt repayment. However, this approach limits scalability and innovation potential in the long term.

·Regulatory Constraints: Several interviewees highlighted the challenges posed by the regulatory environment, including inconsistent

policies regarding foreign direct investment (FDI) and high interest rates, which discourage the use of debt financing. There is also concern over the inefficiencies of the capital market and the absence of sector-specific credit instruments.

·Risk Aversion: Financial officers noted that risk aversion is prevalent in the sector, as firms are reluctant to engage in high-risk ventures or long-term debt financing. This is due to the volatile market

conditions and fear of non-compliance with strict government regulations.

Regression Analysis

Regression Output:

- Dependent Variable: ROA (Return on Assets)
- R-squared: 0.921, which indicates that 92.1% of the variability in ROA can be explained by the model.
- Adjusted R-squared: 0.858, which is adjusted for the number of predictors.
- F-statistic: 14.59, with a p-value of 0.00578, which suggests the model is statistically significant.

Table-II: Coefficients:

Variable	Coefficient	Std. Error	t-value	p-value
Intercept (const)	-0.1595	0.133	-1.196	0.285
DER (Debt-to-Equity Ratio)	-0.0815	0.021	-3.789	0.013
LTD (Long-Term Debt)	0.1755	0.156	1.127	0.311
RE (Retained Earnings)	0.4884	0.204	2.392	0.062
SIZE (Firm Size)	0.0120	0.008	1.501	0.194

Debt-to-Equity Ratio (DER): The coefficient for DER is -0.0815 with a p-value of 0.013, suggesting that a higher debt-to-equity ratio negatively impacts ROA. As DER increases, ROA tends to decrease. This result is statistically significant.

Long-Term Debt (LTD): The coefficient for LTD is 0.1755 with a p-value of 0.311, which is not statistically significant. This suggests that long-term debt does not have a significant effect on ROA in this dataset.

Retained Earnings (RE): The coefficient for RE is 0.4884 with a p-value of 0.062, indicating that retained earnings have a positive effect on ROA, though it is not statistically significant at the 0.05 level (but close). This suggests that companies with higher retained earnings tend to have better performance.

Firm Size (SIZE): The coefficient for SIZE is 0.0120 with a p-value of 0.194, which is not statistically significant. This implies that firm size does not have a substantial effect on ROA in this dataset.

Discussion:

The quantitative and qualitative analysis of the capital investment structure in Bangladesh's pharmaceutical sector reveals several important insights. The average Debt-Equity Ratio (DER) across the 10 firms is approximately 0.8, indicating a moderate reliance on debt financing. Companies such as ACI Ltd. and Orion Pharma Ltd. exhibit higher levels of debt, while firms like Biopharma Ltd. have a relatively lower DER. The regression analysis confirms that a higher DER negatively impacts Return on Assets (ROA), suggesting that higher debt financing can lead to reduced profitability from assets, likely due to the financial strain of servicing debt. On the other hand, Long-Term Debt (LTD) does not show a significant effect on ROA, indicating that long-term debt might not pose the same immediate financial pressure as short-term debt.

When examining Return on Assets (ROA) and Return on Equity (ROE), firms like Biopharma Ltd. and Square Pharmaceuticals Ltd. perform well with higher ROA and ROE values, suggesting efficient use of assets and strong returns on equity. In contrast, companies like ACI Ltd. and Orion Pharma Ltd. show weaker performance, which may be influenced by their higher reliance on debt or other operational inefficiencies.

The analysis also highlights the role of Retained Earnings (RE), which ranged from 35% to 42% across firms, indicating that most companies prefer using internal funding for reinvestment rather than relying on external debt or equity. The regression results show a positive, though not statistically significant, relationship between retained earnings and ROA, suggesting that firms with higher retained earnings tend to perform better, as they have more resources for reinvestment into growth and innovation.

Furthermore, Firm Size (SIZE), as measured by the log of assets, did not have a significant effect on ROA, implying that larger firms do not necessarily outperform smaller ones

in terms of asset utilization efficiency.

The qualitative insights from interviews with industry experts and financial officers revealed that many pharmaceutical firms in Bangladesh prefer equity financing and retained earnings due to the flexibility it offers and the avoidance of debt repayment pressures. However, this strategy limits scalability and innovation potential, as firms are more reliant on their internal funds. Regulatory constraints, such as inconsistent policies on foreign direct investment (FDI) and high interest rates, also hinder the ability to utilize debt financing effectively. Additionally, there is a strong sense of risk aversion within the sector, as firms tend to avoid high-risk ventures or long-term debt financing due to the volatile market conditions and stringent regulatory environment.

In conclusion, the findings from both the quantitative analysis and the qualitative insights suggest that pharmaceutical companies in Bangladesh should strike a better balance between debt and equity financing. While equity and retained earnings provide flexibility, they may also limit growth potential. Addressing regulatory inefficiencies and adopting more balanced financing strategies could support sustainable growth in the sector, enhancing its global competitiveness and long-term profitability.

Recommendations for Sustainable Growth:

Based on the findings of this study, several strategies can be implemented to optimize capital investment in the medicine sector:

- Development of Sector-Specific Credit Instruments: Introducing specialized credit instruments tailored for pharmaceutical companies could help reduce reliance on costly bank loans and provide firms with more flexible financing options.
- Enhancement of IPO Mechanisms: Improving the initial public offering (IPO) process and making it more accessible for smaller pharmaceutical companies could help them raise capital for expansion and innovation.
- Encouraging Private Equity and Venture Capital: Policymakers should create a more favorable regulatory environment for venture capital and private equity investments, which would allow firms to secure funds for R&D and long-term projects.
- Favorable Regulatory Framework: The creation of consistent and transparent policies for FDI and the reduction of bureaucratic hurdles will encourage foreign investments, which could improve capital flows and enhance global competitiveness.

Conclusion:

This study has provided a comprehensive analysis of the capital investment structure in Bangladesh's pharmaceutical sector. It has shown that while equity financing remains the dominant form of capital, there are significant opportunities for improving access to debt financing and foreign investment. By implementing strategic reforms and aligning investment strategies with global best practices, Bangladesh's medicine sector can strengthen its financial resilience, foster innovation, and enhance its competitiveness in the global market.

Conflict of Interest: None.

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