

Article

## Effect of Asset and Equity Structures on Financial Distress: A Study on Private Commercial Banks in Bangladesh

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**Abstract:** *A bank is an institution with operations directly related to the public. Banking operations are so affected by the faith of the customers or the general public. A sound banking system is highly required for a stable financial system in a country. As of now, banks are facing a critical situation in Bangladesh. This research aims to examine the impact of asset and equity structures on commercial banks' financial difficulty based on the eight-year annual data set (2014 to 2021) of selected commercial banks of Bangladesh. Partial Least Square (PLS) regression has been utilized in order to perform data analysis. Overall, the result reveals that the average Z-score of selected commercial banks is .4659, which falls in the distress zone. So, it is argued that, with the increase in external equity capital and more investment in fixed assets, commercial banks are falling into a risk of financial distress. Commercial banks face financial distress with decreasing internal equity capital and current assets.*

**Keywords:** Equity structure, Asset structure, Financial distress, Altman Z model, Partial Least Square.

### 1. Introduction

The banking business in Bangladesh has changed very significantly over the last few years. Very recently, it has been noted that the people of Bangladesh have been suffering from a dilemma of whether they should make investment of their funds in banks or somewhere else because of incompetent banking, lack of appropriate monitoring, and approval of new banks rather than strengthening existing banks in meeting objectives. These problems are creating difficulties in making investment decisions and have forced clients to reconsider whether Bangladesh's private commercial banks are financially solvent enough to sustain the economy. At present commercial banks in Bangladesh are at risk of bankruptcy due to capital structure, financial structure, equity structure, and asset structure. The combination of various types of financing employed by the firms is called Capital structure (Fabozzi & Drake, 2009; Zazulina et al., 2021). Pandey (2009)

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said that the two main components of capital structure, debt, and equity, establish the most significant claims on the company's assets. It has been analysed that bankruptcy is an alarming issue for the banking sector in Bangladesh. Experts have said that the banking sector of Bangladesh is at great risk due to the disbursement of excessive loans to large-scale businesses. They have also complained that commercial banks are giving loans to large business firms, at the same time, they are highly ignoring the small and medium enterprises (SMEs) sector. Though powerful businesspeople are reluctant to pay their loans on time, they don't face any action or sometimes face little action by the banks due to less power, which in turn causes liquidity crises as well as financial distress problems. Due to some external and internal factors banking sector of Bangladesh has been facing financial crises. Different researches also suggest that Debt Maturity, Financial Leverage, Asset and Equity Structures, and firm size affect the Financial Distress of corporations around the world. Financial leverage with increasing levels brings financial distress to the business organizations (Altman, 1968; Zayed et al., 2021; Zayed et al., 2022). The literature review indicates that past empirical studies in this sector have identified the impact of capital structure based on distinct financial distress indicators. Velnampy (2013) showed that capital structure reduces big businesses' financial difficulty. In Bangladesh, the banking industry faces challenges in liquidity crises, credit risks, new investment opportunities and also financial distress. Various internal and external factors are highly responsible for being a bank in financial distress. The effect of asset and equity structures on the bankruptcy of Commercial Banks listed with the Dhaka stock exchange is, moreover, not justified adequately. Therefore there is a research gap on the pattern and level of effect of equity structure and asset structure on the bankruptcy of Commercial Banks listed in Dhaka Stock Exchange. Thus, the purpose of this study is to ascertain how the asset and equity structures of commercial banks that are listed on the Dhaka Stock Exchange (DSE) affect their financial hardship.

## **2. Literature Review**

According to corporate finance theory, corporations can obtain equity funding from both internal and external sources (Brealey & Myers, 2006; Vygodchikova et al., 2021). Internal sources include retained earnings and reserves, which are money that are generated internally but are not given to the owners as dividends. On the other hand, debt is excluded from external equity, which includes any capital acquired from outside the country (Smith Jr, 1988; Kader et al., 2021; Mia et al., 2023). In order to determine how various sources of equity capital affected the growth rates of 871 Australian manufacturing SMEs over the course of a five-year period between 1994 and 1998, Forsaith and McMahon (2002) performed a study of those companies. The ratio of retained earnings with total assets served as a proxy for internal equity, while the ratio of issued share capital to total capital was used to symbolize external equity. The regression findings indicated a substantial positive coefficient on the internal equity variable after adjusting for company size and GDP growth, whereas at the 10% significance level, it was found that the external equity coefficient was substantial and negative. The findings showed that

while external equity was detrimental to businesses, internal equity sped up growth. The outcomes were in line with Cosh and Hughes' (1994) findings, which showed that using internal equity was beneficial for the businesses in their research of 217 UK enterprises from 1982 to 1988. Furthermore, the results are consistent with the capital structure's pecking order concept. Park and Pincus (2001) utilized the ARIMA models to examine how equity structure impacted the businesses' earnings response coefficient in a sample of 195 US enterprises (ERC). The explanatory factors, in this case, were the interaction between the internal equity-external equity ratio, leverage, and unexpected earnings (UX); the dependent variable was the cumulative abnormal returns.

Pouraghajan, Malekian, Emamgholipour, Lotfollahpour, and Bagheri (2012) contend that an organization's asset structure reflects the way in which it decides to manage its investments in assets. Assets may often be either tangible or intangible. Physical assets, including real estate, machinery, and equipment, are referred to as tangible assets. On the other hand, intangible assets are not material and comprise things like patents, copyrights, and intellectual property (Babalola, 2013; Rahman et al., 2021; Shahriar et al., 2021). Asset tangibility, which measures the percentage of fixed assets in asset investments, was employed in the study to quantify asset structure. The tangibility of an asset affects a company's financial difficulties in a variety of ways, according to empirical data. According to Akintoye (2009), businesses are less likely to experience financial difficulties if they retain a sizeable portion of their asset investments as tangible assets. According to the author, a company with a high level of physical assets is better able to create huge quantities of goods and hence increase sales income. As a result, such businesses can sustain their profitability over time. Ebel (2008) asserts that the tangibility of assets has a positive correlation with debt ratios in the cross-sectional test when using the trade-off theory. According to the author, companies with high tangibility typically borrow more money since they have a higher debt ceiling. In contrast to their counterparts who maintain their assets in liquid form, enterprises with greater degrees of tangibility are more troubled, as demonstrated by Campello and Giambona (2010). Contrary to popular assumption, tangibility does not necessarily indicate a greater capacity to pay back debt, according to the authors. Instead, creditors often see tangible assets as being more illiquid and difficult to seize in the event of default. Companies with a high degree of physical assets would find it difficult to get debt financing from lenders in such situations, which would reduce their output. Jaisheela (2015) studied a Z-score analysis of 27 Indian leasing enterprises showed that 22% were in the danger zone and 27% had a very high likelihood of being ill. Vaziri et al. (2012) studied financial institutions, using 100 banks from Europe, the USA, and Asia as instances. To predict bankruptcy, they employed many models, including the Z score. According to their findings, all models can reliably predict bankruptcy before filing, although the z-score model was able to do so better than the other models. Distress analyses have been conducted in Bangladesh on a number of industries, including banking, the capital market, insurance businesses, SMEs (Jahur & Quadir, 2012; Hasan et al., 2019),

cement companies (Hossain & Huq, 2014), pharmaceutical companies (Islam & Mili, 2012), and some other industries. Ahmed and Alam (2015) analyzed the Z-score analysis of 15 commercial banks operating in Bangladesh, revealing that the majority of them are in the distress zone.

Chowdhury and Barua (2009) employed the Z score model to predict Z category companies listed on the DSE's (Dhaka Stock Exchange) bankruptcy risk. Their results indicated that 41 companies were in the distress zone due to poor operational performance and a lack of managerial strength, while 53 companies were out of danger. They also talked about whether Bangladesh may use the z-score model. William H. Beaver was a pioneer in identifying modern corporate failure prediction models. Altman divides the businesses into two categories, bankrupt and non-bankrupt, which are mutually exclusive (Altman, 1968). Altman (1968) developed the first version of the Altman Z model, which was  $Z=0.012 X_1 + 0.014 X_2 + 0.033 X_3 + 0.006 X_4 + 0.999 X_5$ . Altman (1983) and Altman et al. (1995) continuously modified the Z score model to address new characteristics and corporate landscape. Altman (1983) developed a model formula for individual businesses that was  $Z= 0.717X_1+0.847X_2+3.107X_3 + 0.420X_4+ 0.998X_5$ . Altman (1995) revised and further refined the Z model to forecast business failures for companies in emerging markets, developing countries, and for non-manufacturers, that was  $Z = 6.56X_1 + 3.26X_2 + 6.72X_3 + 1.05X_4$ . (Where  $X_1$  denotes working capital relative to total assets,  $X_2$  denotes Retained Earnings relative to total assets,  $X_3$  denotes EBIT relative to total assets, and  $X_4$  denotes book value equity relative to total liabilities). This model is used to forecast business failures for companies in emerging markets, developing countries, and non-manufacturers. The restriction that the Z score was exclusively applicable to industrial businesses was then disproved. The Altman Z score is very useful for a variety of research endeavors. Pustynick (2009) asserts that the Altman Z score demonstrates the firm's robustness and solvency in terms of its financial status. Nandi and Choudhary (2011) employed the Altman Z score model to create an internal credit rating for Indian banks based on six years of data, with the goal of predicting future defaults. In 2013, Cheing (2013) conducted a confirmatory analysis using Euro Banks, utilizing data from the preceding five years and selecting four troubled banks. Stepanyan (2014) found the model to be quite helpful in his analysis of the US airline industry. In a study, Pam (2013) conducted on the Nigerian banking sector, it was discovered that the main factors that make up Altman's Z-score—liquidity, profitability, operating effectiveness, and total assets turnover—are an important instrument for assessing a bank's financial difficulty.

Based on the above literature review, it is found that most of the studies are carried out to predict the financial distress or bankruptcy risk of different financial and non-financial companies in Bangladesh. However, empirical research has not yet shown how asset and equity structures affect commercial banks' financial difficulty from Bangladesh's standpoint. This study aims to analyze the possible effect of equity structure and asset structure on the financial distress of Commercial Banks

in Bangladesh (Hossain & Zayed, 2016; Hossain et al., 2019; Nanayakkara & Azeez, 2013).

### **3. Statement of the Problem**

Bankruptcy is an alarming issue for the banking sector in Bangladesh. Experts claim that the enormous loans given to large-scale businesses have put Bangladesh's banking industry in serious danger. Additionally, they have expressed dissatisfaction over banks favoring huge corporations over small and medium-sized firms. Strong businesspeople who fail to make their payments on time leave the banks unable to take action, which leads to problems with liquidity and financial difficulties. Due to some external and internal factors banking sector of Bangladesh has been facing financial crises. Additionally, several studies indicate that the financial distress of corporations is influenced by factors such as firm size, financial leverage, debt maturity, asset structure, and equity structure. According to the findings of Pratheepkanth (2011), and Kodongo et al. (2014), capital structure has little bearing on financial distress indicators. In Bangladesh, the banking industry faces challenges in liquidity crises, credit risks, new investment opportunities and also financial distress. Various internal and external factors are highly responsible for being a bank in financial distress. Furthermore, there is little justification for the impact of the equity and asset structures of commercial banks listed on the Dhaka stock exchange on financial hardship. As a result, there is a lack of data about the pattern and strength of the relationship between asset and equity structure and financial distress in Bangladeshi commercial banks. The purpose of this study is to ascertain how the asset and equity structures of commercial banks that are listed on the Dhaka Stock Exchange (DSE) are impacted by financial distress.

#### **3.1 Objectives of the Research**

The goal of the study is to determine how Bangladeshi commercial banks' financial distress is impacted by their asset and equity structures. To meet this broad objective, the specific objectives of the study are as follows:

- To determine the impact of the internal equity to total equity ratio on commercial banks' financial distress in Bangladesh.
- To investigate the impact of the external equity to total equity ratio on commercial banks' financial distress in Bangladesh.
- To ascertain the impact of the ratio of fixed assets to total assets on the financial distress experienced by Bangladeshi commercial banks.
- To determine the effect of the current asset to the total asset ratio on the financial distress of Commercial Banks in Bangladesh.

### **4. Research Methodology**

Secondary data for this study is taken from the unconsolidated annual financial

statements of specifically selected conventional commercial banks. Consolidated financial statements have been utilized in cases where stand-alone statements were not available.

#### 4.1 Research Design

This research is quantitative research and analytical in nature. To conduct the study, 19 conventional commercial banks out of 23 listed conventional commercial banks in DSE were selected as the sample. Non-probability convenience sampling is used to select 19 conventional commercial banks on the basis of availability of information and access to the information.

#### 4.2 Data and Variable Selection

To determine how equity and asset structure affect commercial banks' financial distress in Bangladesh, descriptive statistics, correlation, and partial least square regression were used. Table 1 provides the details of the dependent variable, and Table 2 shows the details of independent variables respectively.

**Table 1: Dependent Variable and its Assessment**

Z-Score	$Z=6.56X1 + 3.26X2+6.72X3+1.05X4$
Where:	
Z-Score = Financial default index (emerging market companies for non-manufacturers),	
X1 = Total assets divided by working capital,	
X2= Total assets divided by Retained earnings,	
X3 = Total Assets divided by Earnings before Interest and Taxes,	
X4= Total liabilities divided by Book value of equity.	
<b>Zones of discrimination: Z &gt; 2.99: Safe zone, 1.81 &lt;Z &lt;2.99: Zone of ignorance or Grey zone, Z &lt;1.81: Distress zone.</b>	

Source: (Altman et al., 1995)

The Z Score was selected as a statistical model primarily because of its strong prediction ability, which it generated over a long period of time for banks. Since the goal of our analysis was to employ the pre-existing model to confirm its validity as a predictor for Bangladesh's private commercial banks, the variable weightings remained unchanged.

**Table 2: Independent Variables and their Assessment**

Variable	Variables Name	Hypothesized relationship with financial distress
IETE	Internal Equity to Total Equity	+/-
EETE	External Equity to Total Equity	+/-
FATA	Fixed Asset to Total Asset	+/-
CATA	Current Asset to Total Asset	+/-

Source: Authors' Compilation

### 4.3 Analytical Method

Given that panel data models frequently have nonspherical errors, which can include any or all of the following

- Contemporaneous Correlation
- Panel heteroskedasticity
- Serial Correlation

Instead of using the original data, partial least squares (PLS) regression applies least squares regression to a smaller collection of uncorrelated components that serve as the predictors. Developed from principal component regression, partial least squares (PLS) aid in the construction of models that predict several dependent variables. Partial least squares regression has been used in many domains where predictive linear modeling—especially with a large number of predictors—is necessary, such as chemistry, finance, psychology, medicine, and pharmaceutical science. In particular, in chemometry, partial least squares regression has become a standard method for simulating linear interactions between multivariate variables (De Jong, 1993). Partial least squares regression is an extension of multiple linear regression models. A linear model, in its most basic form, characterizes the (linear) connection that exists between a set of response variables (Y) that are reliant on a group of factors that predict (the X's).

$$Y_{it} = \beta_0 + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_4 X_{4it} + e_{it} \text{ ----- (1)}$$

Where;  $Y_{it}$  = Z score,  $X_{1it}$  = Internal Equity to Total Equity,  $X_{2it}$  = External Equity to Total Equity,  $X_{3it}$  = Fixed Asset to Total Asset,  $X_{4it}$  = Current Asset to Total Asset,  $\beta_0$  = Value of X-intercept which is constant.  $\beta_1, \beta_2, \beta_3$  &  $\beta_4$  = Proportionate change in dependent variable due to independent variables,  $i = 1$  to 19 Commercial Banks,  $t = 2014 - 2021$ ,  $e$  = Error term.

### 4.4 Computational Approach

PLS is a predictive method that may be used instead of structural equation modeling, canonical correlation, or ordinary least squares (OLS) regression. It is especially helpful in situations when there are more predictors than instances or when the correlation between the predictor variables is strong. PLS combines multiple regression characteristics with principal components analysis. It initially extracts a set of latent components from which it attempts to provide an explanation for as much of the covariance between the independent and dependent variables as is feasible. The values of the dependent variables are then predicted using a regression phase that makes use of the decomposition of the independent variables. A linear model with the formula  $Y = XB + E$  is generated via partial least squares regression. Here, X represents a n cases by p variables predictor (design) matrix, B represents a p by m regression coefficient matrix, E is a noise term for the model that shares the same dimensions as Y, and Y is a n instances by m variables response matrix. Usually, the variables in X and Y are centered by subtracting their means, then scaled by dividing by their standard deviations. See Geladi and

Kowalski (1986) for more information on scaling and centering in partial least squares regression. Partial least squares regression is used to create the model, producing the  $p$  by  $c$  weight matrix  $W$  for  $X$  such that  $T=XW$ . In other words, the weight vectors of the  $X$  columns are reflected in the columns of  $W$ , which leads to the development of the matching  $n$  by  $c$  factor score matrix  $T$ . To maximize the connection between the factor scores and the responses, each of these weights is assessed. Next, loadings for  $Y$ , or weights for  $Y$ , are built so that  $Y=TQ+E$  by using traditional least squares procedures for the regression of  $Y$  on  $T$ . When  $Q$  is known, the prediction model is complete because  $Y=XB+E$ , where  $B=WQ$ , is the result.

## 5. Results and Discussion

Table 3 provides descriptive statistics of the data gathered for this investigation. The Excel data analysis tool has been used to calculate summary statistics.

**Table 3: Descriptive Statistics for Variables Included in Study**

Variables	N	Minimum	Maximum	Mean	Std. Deviation
IETE	152	.37	.91	.5822	.10869
EETE	152	.09	.63	.4178	.10869
FATA	152	.02	.58	.4066	.08595
CATA	152	.42	.98	.5934	.08595
Z Score	152	-1.67	3.28	.4659	.73091
Valid N (list-wise)	152				

*Source:* Estimated.

Table 3 shows that the average Internal Equity to Total Equity ratio for 19 conventional commercial banks in Bangladesh over the past 8 years (2014-2021) was about .5822, whereas the average ratios of external equity to total equity, fixed asset to total asset, and current asset to total asset were, in that order, .4178, .4066, and .5934. The average Z score value of 19 listed conventional commercial banks was .4659 over the study periods. The Z score value stands at “**Z <1.81: Distress zone**”. It can be interpreted that the banking business in Bangladesh was in a financial distress situation over the year 2014 to 2021.



**Table 4: Pearson Correlation**

Correlations						
		IETE	EETE	FATA	CATA	Z Score
IETE	Pearson Correlation	1	-1.000**	-.153	.153	.255**
	Sig. (2-tailed)		.000	.060	.060	.002
	N	152	152	152	152	152
EETE	Pearson Correlation	-1.000**	1	.153	-.153	-.255**
	Sig. (2-tailed)	.000	.060		.060	.002
	N	152	152	152	152	152
FATA	Pearson Correlation	-.153	.153	1	-1.000**	-.459**
	Sig. (2-tailed)	.060	.060	.000		.000
	N	152	152	152	152	152
CATA	Pearson Correlation	.153	-.153	-1.000**	1	.459**
	Sig. (2-tailed)	.060	.060	.000		.000
	N	152	152	152	152	152
Z Score	Pearson Correlation	.255**	-.255**	-.459**	.459**	1
	Sig. (2-tailed)	.002	.002	.000	.000	
	N	152	152	152	152	152
**. Correlation is significant at the 0.01 level (2-tailed).						

Source: Estimated.

Table 4 shows the correlation matrix for the dependent variable and independent variables. From the table, it is found that all of the independent variables are significantly correlated with the dependent (Z score) variable. The Z score exhibits a negative correlation with the external equity to total equity ratio and the fixed asset to total asset ratio, whereas the Z score displays a positive correlation with the internal equity to total equity and the current asset to total asset ratio among the independent variables. The correlation between the independent variables—the fixed asset to total asset ratio and the current asset to total asset ratio—is noteworthy and significantly negative, both with a value of -1.00. The correlation between the external and internal equity to total equity ratios is also extremely negative. Bryman and Cramer (2001) viewed that a multicollinearity problem exists when the correlation exceeds 0.80. There is multicollinearity among the independent variables when taking the viewpoint into account, which could change the outcomes. To achieve precise results, when the number of variables in a dataset exceeds the number of compounds, and the variables under investigation exhibit correlation, the partial least square regression model may be employed. The output

of the partial least square regression model has been presented in the following Tables: 5, 6, and 7, respectively.

**Table 5: Proportion of Variance Explained**

Proportion of Variance Explained					
Latent Factors	Statistics				
	X Variance	Cumulative X Variance	Y Variance	Cumulative Y Variance (R-square)	Adjusted R-square
1	.567	.567	.245	.245	.240

*Source:* Estimated.

Here this model can generate 5 latent factors. However, latent factor 1 explained the maximum variance of both dependent and independent variables. From the above table, it is found that 56.7% of the variance is explained by the X (independent) variable, whereas 24% of the variance is explained by the Y (dependent) variable.

**Table 6: Parameter**

Parameters	
Dependent Variable	
Independent Variables	Z score
(Constant)	.017
IETE	.758
EETE	-.758
FATA	-1.741
CATA	1.741

*Source:* Estimated.

Parameters denote the association between dependent variable and independent variables. The internal equity to total equity ratio and the current asset to total asset ratio are shown to be positively related to the Z score in the above table, meaning that a rise in either of these ratios will result in an increase in the Z score. If the Z score increases, the financial distress risk of commercial banks decreases. The Z score has a negative correlation with both the Fixed Asset to Total Asset ratio and the External Equity to Total Equity ratio. Z score falls as the ratios of fixed assets to total assets and external equity to total equity rise. The danger of financial difficulty for commercial banks rises when the Z score falls.

**Table 7: Variable Importance in the Projection, Weights and Loadings**

Variables	Variable Importance in the Projection (VIP)	Weights	Loadings
IETE	.683	.341	.386
EETE	.683	-.341	-.386
FATA	1.239	-.619	-.595
CATA	1.239	.619	.595
Z score		.330	1.000

*Source:* Estimated.

In Table 7, it has been found that the VIP of the ratios of current assets to total assets and fixed assets to total assets is 1.239. that is the highest value among the four independent variables. It indicates that the Fixed Asset to Total Asset ratio and Current Asset to Total Asset ratio have more importance in projecting the model. The lowest VIP is .683 indicating that the Internal Equity to Total Equity ratio and External Equity to Total Equity ratio have less importance in projecting model. Weights indicate the association between dependent and independent variables. Table 7 shows that the Fixed Asset to the Total Asset ratio and the Current Asset to the Total Asset ratio have a strong negative and positive correlation with the Z score, with the largest weight being  $\pm .619$ . The lowest weight is  $\pm .341$ , which indicates that the Internal Equity to Total Equity ratio and External Equity to Total Equity ratio are less positively and negatively associated with the Z score. The Z score is negatively impacted by the independent variables Fixed Asset to Total Asset ratio and External Equity to Total Equity ratio. Z score is positively impacted by both the internal equity to total equity ratio and the current asset to total asset ratio.

## 6. Conclusion

This study aims to ascertain how Bangladeshi commercial banks' financial crisis is impacted by their asset and equity structures. When estimating the impact of four factors on financial distress (Z score), the internal equity to total equity ratio, external equity to total equity ratio, fixed asset to total asset ratio, and current asset to total asset ratio have all been taken into account. Among these factors, the ratios of fixed assets and current assets relative to total assets are highly negatively and positively associated with the Z score, whereas the Internal Equity to Total Equity ratio and External Equity to Total Equity ratio are less positively and negatively associated with the Z score. The average Z score of selected commercial banks over the study period is .4659, which falls in the Distress zone. So, it can be noted that the banking companies in Bangladesh are facing bankruptcy risk. Z score has been observed to decline when the ratios of fixed assets to total assets and external equity to total equity rise. Hence, it can be interpreted that with the increase in external equity capital and more investment in fixed assets, commercial banks are falling at risk of financial distress. Additionally, it has been discovered that the Z score rises

when the ratios of current assets to total assets and internal equity to total equity rise. Hence, commercial banks face financial distress with decreasing internal equity capital and current assets. Commercial Banks are the vital sectors of an economy. Different macroeconomic and firm-specific factors are responsible for being financially distressed position of commercial factors. The entire economy will suffer if the variables have a negative impact on commercial banks. The banking sector has made a significant contribution to the expansion of Bangladesh's economy, so the government of the country should adopt the appropriate laws and regulations to safeguard it. The government can support Bangladesh Bank (BB), the central bank, in developing and implementing lending regulations that regulate commercial banks' lending decisions and reduce the risk of financial difficulty for these banks in Bangladesh.

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