



## Dynamic Measuring the Impacts of Financial Fragility on the Performance of Non-Financial Firms Listed at the Pakistan Stock Exchange

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Paper ID: 12A1M

Volume 12 Issue 1

Received 12 August 2020

Received in revised form 26

September 2020

Accepted 05 November 2020

Available online 09

November 2020

### Keywords:

Firm performance;  
Financial fragility;  
Fixed effect; Random  
effect; Pooled OLS;  
Non-fragile firm;  
Financial equity.

### Abstract

Financial fragility (FFR) is of great importance due to its impacts on the dynamics of firms. This paper explores the presence of FFR and its impacts on the performance of manufacturing firms listed at the Pakistan Stock Exchange (PSX) for 2010-2019. The sample data set is split based on median values of fragility, age, and size of the firms, and then classified as fragile, non-fragile, large, small, old, and younger firms. Using the fixed effect, random effect, and pooled OLS techniques to examine relationships among the variables, the Return on Assets, and Tobin's Q ratios are used as performance measures that show the negative relationship with FFR. Firms with good equity ratios are good performers due to their financial strength. Younger firms are better performers than older firms are, but FFR plays an adverse role for all firms. Larger firms' performances are better, compared to smaller firms. The presence of fragility does not hamper the performance of large size firms while small-size firms are more affected. The study results suggest utilizing retained earnings and reducing dependence on debt financing to improve the financial performance of fragile firms.

**Disciplinary:** Financial and Management Sciences.

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### Cite This Article:

Ahmad, M. M., Qureshi, S. A., Bilal, M., Naveed, Rana, A. M. (2021). Dynamic Measuring the Impacts of Financial Fragility on the Performance of Non-Financial Firms Listed at the Pakistan Stock Exchange. *International Transaction Journal of Engineering, Management, & Applied Sciences & Technologies*, 12(1), 12A1M, 1-10. <http://TUENGR.COM/V12/12A1M.pdf> DOI: 10.14456/ITJEMAST.2021.13

# 1. Introduction

The prosperity of the firms originates due to versatile interactions taking place between different alternatives and features of the organization. It is also argued that the performance of the firm is influenced by its strategies to capture market share, acquisition of financial resources, Research, and Development, investment decisions, and management of financial resources. More important among these is the financial management policy formulating diverse decisions regarding investing, financing, operating, and disbursement of dividends (Bottazi et al., 2007). However, Beck (2012) is of the view that factors that assist financial progression may also lead to financial shocks leading towards financial fragility (FFR). Another viewpoint, Carletti (2008) explains important determinants of FFR that includes asymmetric information, and agency issue among the savers (depositors), and managers (entrepreneurs) of the firms resulting in uncertainty of the financial position of banks. Due to which depositors (savers) pressurize banks to take excessive risk. Such circumstances result in financial fragility.

Modigliani and Miller (1958) ascertain that financing decisions are irrelevant due to perfect capital markets. However, researchers at the micro-level attempted to investigate the relationship between real, and financial decisions of corporations. Contrary to Modigliani, and Miller (1958) Hubbard (1998) proved that a relationship persists among investment and financial position of corporations. Additionally, Hericourt & Poncet (2009) shed light on the fact that FFR occurs due to internal funds, and imperfection in the capital market could be the major cause of difference amongst the costs of both internal as well as external financing.

Pakistan is among the developing countries, and improvements in the manufacturing sector are inevitable for the progress of the economy. Presently, most of the firms in the manufacturing sector are not performing up to the mark, and their performance is declining (Ministry of Finance of Pakistan, 2018). Some important areas like financial fragility and credit constraints could be the cause of weak financial performance. Therefore, the present study aims to address some important questions; does financial fragility deteriorate the firm performance? How financial fragility affect different size firms, and how the performance of younger/older firms is affected by financial fragility? Additionally, results are of great concern for the credit market policy decision-makers for formulating specific guidelines for a variety of firms operating under non-financial sectors in the economy.

# 2. Literature Review, and Hypothesis Development

Financial markets are assumed to be perfect in theory; however, in reality, imperfections prevail in the credit markets that create volatility (Coricelli & Mastern, 2004). Literature highlights the distortion affects FFR on the dynamics of firms which leads to sluggish growth, and investment of corporations (Clementi & Hopenhyan, 2006). Hence due to fragility firms are unable to expand their business operations at national, and international levels. Minetti and Zhu (2011) explained that financial fragility hinders firms to enter international markets.

In developing economies, the survival and growth of the firms are critical because financial markets are not easily accessible. Financial fragility act as a barrier for better investment, and performance of the firm (Stein, 2003). It has a negative impact on firm performance and behaves as a decisive factor in devising a firm's capital structure. Fragile firms incur the direct costs for financial advisers, lawyers, and accountants. Vitali et al. (2011) stated that with the increase in the debt of the firm, the default risk increase, and banks lend the money to fragile firms at higher interest. This higher financial cost decreases the firm profitability and overall performance. They further argued that the probability of the financial fragility of that firm is more in the future than the probability of being healthier.

Thus, the hypothesis is developed as

*H<sub>1</sub>: The presence of financial fragility is harmful to accounting as well as the market performance of the firms.*

Ages of the firms have been studied and discussed by many researchers in finance literature as a control variable. Some of the authors used age to measure financial constraints (Kaplan & Zingales, 1997), and others used it for diversification (Villalonga, 2004). Baker et al. (2003) utilized age to measure the financing constraints and found that the younger firms are more constrained as compared to the older firms. Many of the other researchers empirically tested the impact of age on the firm's performance. Older firms performed better than the younger firms due to more experience, reported by some of the researchers (Agarwal et al., 2002). Some other researchers reported a negative relation between firm performance and the age of the firm. Loderer and Waelchli (2009) used the variable age as an independent variable and reported that older firms perform worse due to organizational rigidities, seniority rules, and inertia problem.

Thus, the hypothesis is developed to test the phenomenon regarding the impact of firm size on the firm's performance in the presence of FFR.

*H<sub>2</sub>: The performance of younger firms is better than the performance of older firms, and is negatively affected by the presence of financial fragility.*

Mixed results have been found in the literature regarding the impacts of size on performance. Some reported positive impacts of size on the performances of firms and proved that the larger firms perform better as compared to smaller firms (Wu, 2006). The results of other authors agree with Fama, and French (2005) who reported the negative impact of size on the firm.

Thus, the third hypothesis is developed as

*H<sub>3</sub>: Performance of the large size firms is better than the performance of the small size firms, in the presence of financial fragility.*

### 3. METHOD

The study aims to investigate the impact of financial fragility on the firm's performance. Data for analysis is collected from the balance sheet statements analysis published by the State Bank of Pakistan. The sample contains 250 PSX listed firms across the different non-financial sectors for the period 2010 to 2019. For the data analysis purpose, different techniques are used in

this study including descriptive statistics, correlation analysis, and regression analysis i.e. Pooled Ordinary least square (POLLS), Fixed Effect Method (FEM), and Random Effect Method (REM). Table 1 describes the detail of the variables used in this study.

**Table 1: Variables Measurements.**

Name of Variable	Measurement	Literature Support
Firm Performance (PR)	Return on Assets (ROA) = $\frac{\text{Net Profit}}{\text{Total Assets}}$ Tobin's Q (TQ) = $\frac{(\text{MVE}+\text{BVD})}{\text{BVA}}$	Kalkan et al. (2011) Loderer & Waelchli (2009) Chathoth & Olsen (2007) Mao & Gu (2008)
Financial Fragility (FFR)	$\text{FFR} = \frac{\text{Equity}}{\text{Assets}}$	Agliari et al. (2006) Vitali et al. (2016) Chan et al. (2012) Fazzari et al. (1988)
Age (AG)	Ln of date of listing	Agarwal et al. (2002) Loderer & Waelchli (2009) Shumway (2001)
Size (SZ)	Ln of the BVA	Mao & Gu (2008) Wu (2006) Kalkan et al. (2011)
Growth (GR)	$\text{GR} = \frac{\text{Sales}_t}{\text{Sales}_{t-1}} - 1$	Majumdar (1997) Mao & Gu (2008)
Activity (AC)	$\text{AC} = \frac{\text{Sales}}{\text{Assets}}$	Moyer et al. (2001) Kiyamaz (2006)
Cash Flow (CF)	Net Profit after taxes plus depreciation	Fazzari et al. (1988) Chen et al. (2007) Hong et al. (2012)

Note: MVE = market value of equity, BVD = book value of debt, BVA = book value of the total assets.

### 3.1 Empirical Specifications

The magnitude of the relationship between the dependent variables (DV) and explanatory variables is tested by applying the inferential statistical analysis. The basic regression model is developed as

$$PR_{it} = \alpha_i + \beta_1 FFR_{it} + \beta_2 AG_{it} + \beta_3 SZ_{it} + \beta_4 GR_{it} + \beta_5 AC_{it} + \beta_6 CF_{it} + \epsilon_{it} \quad (1).$$

The subscript *i* is used for each cross-section unit or firm in the sample data set. Subscript *t* denotes the period for the variables.  $\alpha_i$  is the regression constant,  $\beta_1, \beta_2, \text{ and } \beta_3$  are the regression coefficients of fragility (FFR), age (AG), and size (SZ) of the firm, respectively. Similarly,  $\beta_4, \beta_5, \text{ and } \beta_6$  are the regression coefficients of growth (GR), activity (AC), and cash flow (CF).  $\epsilon_{it}$  indicates the unexplained portion of the regression model.

To meet the objectives of the study, the sample data set is split based on the first three independent variables; fragility, age, and size of the firms using the median value. If the value of the firm is less than the median value that is classified as a fragile firm, otherwise non-fragile firms (Arslan-Ayaydin et al., 2006). If the Firm's age is greater than the median value of the age, then the firm is grouped as the older firm, otherwise as to the younger firm (George et al., 2011). Similarly, firms having larger value than the median, are classified as larger firms otherwise are grouped in small-sized firms. Each group consists of 125 cross-section units.

## 4. RESULT AND DISCUSSION

Table 2 describes the study results including the descriptive statistics, The mean and median values of the ROA are 4.2%, and 2.7%, which depicts the low performance of the firms. The minimum value is in the negative, which is due to the loss of the firm, the highest value is 87.52%. The average TQ shows that the market value of the firm is more than the book value of the firm, and there are many such firms, whose market value is less than the book value of the firm.

**Table 2: Descriptive Statistics.**

Variable	Mean	Median	SD	Minimum	Maximum	Jarque-Bera Test	
						Value	Sig.
ROA	0.042	0.027	0.151	-1.961	0.875	3.502	0.174
TQ	1.364	1.025	1.709	0.059	43.622	1.733	0.42
FFR	0.287	0.352	0.530	-8.118	1	1.945	0.378
GR	0.152	0.065	0.352	-0.854	3.490	1.661	0.436
SZ	5754.5	1035.7	17977.4	1.1	208070		
SZ(LN)	7.096	6.943	1.687	0.095	12.246	6.294	0.043
AG	23.312	18.911	12.489	2	61.792	0.391	0.822
AC	1.184	0.975	1.341	0.002	24.849	1.262	0.532
CF	554.245	56.473	3263.34	-31972.6	57600.3	0.851	0.654

The fragility of firms is determined based on median value, that the firms less than the median value are considered as the fragile firms. The value of mean 0.29 is less than the value of median 0.35, which means that the fragile firms are more in numbers than the non-fragile firms in the sample data. Data of fragility deviate from its mean by 0.529. The minimum value of the variable is very critical that is -8.12. It means that there are such firms in the sample data set which have been suffering losses continuously. These losses bring the equity of the firm negative gradually and lead to the insolvency of the firms. The maximum value of the firm is 1 which indicates that the assets of the firms are approximately 100% backed by the shareholder's equity. The growth of the majority of firms is not only low but also negative growth. Minimum and maximum values of size show that in the sample data set there are varieties of firms.

**Table 3: Results of REM of Fragile & Non-Fragile Firms.**

Variables	DV: ROA Model 1	DV: TQ Model 2	DV: ROA Model 3	DV: TQ Model 4
	Fragile Firms		Non-Fragile Firms	
Constant (C)	0.994*** (0.032)	0.971*** (0.032)	-0.013 (0.015)	-0.165** (0.080)
FFR	-1.005*** (0.030)	-1.009*** (0.030)		
NFR			0.100*** (0.023)	0.237* (0.131)
GR	0.021* (0.011)	0.022** (0.011)	0.0332*** (0.010)	0.046 (0.054)
AC	0.288*** (0.024)	0.310*** (0.024)	0.023*** (0.002)	0.044*** (0.013)
CF	0.003*** (<0.001)	0.003*** (0.001)	0.001*** (<0.001)	<0.001** (<0.001)
F-Statistic	1.213***	1.217***	1.2724**	4.554***
H-Test	6.75	6.548	2.098	1.290

\*\*\*, \*\*, \* show the significance of results at 1%, 5%, and 10% level of significance respectively.  
NFR = Financial Fragility for Non-Fragile Firms.

The values of F-Test and H-Test reported in Table 3 confirm the validity of REM for analysis. The beta coefficient of fragility describes that there is the negative impact of a firm's fragility on its

performance. Rests of the variables are all significant except the growth variable, whose significance level is low. The coefficient of Cash flow seems very low apparently. The reason for the low beta coefficient is that it is in million rupees. In Model 2, the beta coefficient of fragility is also narrated that there is a negative impact of firm's fragility on their market performance as well. The results imply that the firm should reduce the leverage, and retained earnings should be utilized for further financing as described in the pecking order theory (Myers, 1984). If there are no retained earnings to be utilized for financing even then the firm should be careful to use the debt as external financing. In Model 3 beta coefficient of healthy firms is 0.1, which captures the change in performance. The beta coefficient of the growth variable is highly significant and has more explanatory power than the beta coefficient of fragile firms. The coefficient of Cash flow confirms the less dependence of performance on internal cash flows in the case of financially sound firms. In model 4, the variable of NFR is negative, and the reason for the negative intercept is that if there is no impact of good equity ratio on performance it leads to negative performance. This justification may be confirmed from the independent variable NFR, as it has a significant positive impact on the performance. Therefore, the hypothesis **H1** is accepted as indicated by the results in Table 3.

**Table 4: Results of FEM of Older & Younger Firms**

Variables	DV: ROA Model 5	DV: TQ Model 6	DV: ROA Model 7	DV: TQ Model 8
	<i>Older Firms</i>		<i>Younger Firms</i>	
<b>AG</b>	-0.004* (0.002)	-0.004** (0.002)	0.013** (0.006)	0.013*** (0.002)
<b>GR</b>	0.028*** (0.009)	0.0103 (0.009)	0.002** ( $<0.001$ )	0.003*** (0.002)
<b>AC</b>	0.047*** (0.016)	0.0003*** (0.000)	0.029** (0.009)	0.050*** (0.003)
<b>CF</b>	$<0.001$ *** (0.000)	0.00001*** (0.000)	$<0.001$ *** (0.000)	0.000 *** (0.000)
<b>AG*FFR</b>	-0.001*** ( $<0.001$ )	-0.001*** ( $<0.001$ )	-0.003*** ( $<0.001$ )	-0.003*** ( $<0.001$ )
<b>Adj. R<sup>2</sup></b>	0.462	0.438	0.275	0.432
<b>F- Statistic</b>	4.978***	4.772***	1.435***	1.680***
<b>H-Test</b>	29.832***	36.132	24.290	20.692

\*\*\*, \*\*, \* the significance of results at 1%, 5%, and 10% level of significance, respectively.

In Table 4, age shows the negative impact on the performance of firms describing that the performance of older firms is not better as compared to the younger firms due to organizational rigidities, seniority rules, and inertia problems as described by Loderer, and Waelchli (2009). The interaction dummy variable of age and fragility shows that the incorporation of fragility in old age firms increases the negative impact on performance. The model 6 results show the larger negative impact on the market performance of the firm as compared to the impact on accounting performance. The interaction dummy variable of age and fragility in this case also describes the negative impact on the performance of the firm and is highly significant than the age variable. It shows that the incorporation of fragility in old age firms increases the negative impact on performance. The interaction dummy variable of age and fragility, in this case, describes the negative impact on the performance of the firm. It shows that the incorporation of fragility in



younger firms not only decreases but it leads to a negative impact on the performance of the firm. Therefore, the hypothesis **H2** is accepted as indicated from the results shown in Table 4.

We further find a positive impact of age on the performances of firms. The interaction dummy variable of age and fragility, in this case, describes the negative impact on the performances of firms, which shows the destruction of performance due to fragility. Fragility converts the positive impact of younger age firms on performance into a negative impact. Further, this model describes that fragility not only volatile the accounting performance but it leads to the decline in the market performance of the firm as well.

Results of Table 5 show that the significance of the beta coefficient of larger size firms captures the change in performance measure variable, and rejects the null hypothesis, and ensures the acceptance of alternative one (**H3**) that there is a positive relationship between the larger firms, and the performance. Unlike the case of younger firms, fragility does not destroy the performance of larger firms. The interaction dummy variable of large size and fragility shows the negative beta coefficient but is insignificant. It means that there is no effect of fragility on the performance of larger firms.

**Table 5: Results of POLS of Larger and Smaller Firms**

Variables	DV: ROA Model 9	DV: TQ Model 10	DV:ROA Model 11	DV: TQ Model 12
	<i>Larger Firms</i>		<i>Smaller Firms</i>	
<b>C</b>	0.47642*** (0.128)	0.473*** (0.132)	1.640*** (0.136)	1.653*** (0.136)
<b>SZ</b>	0.037*** (0.014)	0.0382*** (0.014)	<-0.001*** (<0.001)	<-0.001*** (<0.001)
<b>GR</b>	0.007* (0.004)	0.008* (0.004)	-0.006 (0.004)	-0.011** (0.005)
<b>AC</b>	0.338*** (0.0418)	0.358*** (0.043)	0.152*** (0.048)	0.155*** (0.048)
<b>CF</b>	<0.001*** (0.000)	<-0.001*** (0.00000)	0.001* (0.001)	0.002** (<0.001)
<b>SZ*FFR</b>	-0.003 (0.005)	-0.006 (0.005)	-0.555*** (0.119)	-0.556*** (0.120)
<b>Adj. R<sup>2</sup></b>	0.194	0.211	0.144	0.147
<b>F-Statistic</b>	1.094	1.089	0.952	0.924

\*\*\*, \*\*, \* the significance of results at 1%, 5%, and 10% level of significance, respectively.

Estimation results of the model10 show that the size of the larger firms has also a positive impact on the market performance of the firms. The interaction dummy variable of large size and fragility is insignificant which means that the market performance of larger firms is not affected by the fragility. Results in Model 11 describe that with the decrease in the size of firms, the performance also decreases. The interaction dummy variable of small size and fragility shows the significant negative beta coefficient. It means that the market performance of the smaller firms will decline drastically in the presence of fragility.

## 5. CONCLUSION

Financial Fragility means the unavailability of finance, which leads to less investment, and low productivity as well as low profitability. The present study investigates phenomena regarding

the destruction of firm performance resulting in financial fragility. The analysis of the study shows that fragility has a negative impact on firms' performance. Financial fragility shows the negative impact on the performance of the firms during 2010-2019, describing that cost of using debt is higher than the benefits. Hence, firms should reduce debt financing to improve their performance. These results follow the optimal capital structure theory that debt will destroy the value of the firm when it crosses the optimal level (Moyer et al., 2001). In contrast, the pecking order theory states that retained earning financing is better than debt financing, and debt financing is better than equity financing from the issuance of new shares (Myers, 1984).

We further find that non-fragile firms have easy access to external finance, which creates investment opportunities. Older firms are low performers than the younger firms, and the destruction of the financial fragility is found in the case of both types of firms, younger, and older. The presence of financial fragility converts the positive impact of younger firms on the performance into the negative impact, and increase the negativity of older firms with respect to accounting as well as market performance. This study results show the positive impact of size on the performance of firms in the case of large-size firms, and the negative impact of the size is reported on the firm performance for the small-size firms. Unlike the results of the interaction dummy variable of age and financial fragility, the presence of fragility n't does not destroy the performance of the firms in the case of large-size firms. But the small size firms are found more affected by the presence of financial fragility. But if the financial fragility persists continuously, then the performance of large size firm will also decline.

It is the more desirable policy for a firm to use retained earnings for financing instead of debt financing. This policy follows both, optimal capital structure, and pecking order, theories. The firm's manager should be careful to utilize the option of debt financing, although pecking order theory suggests using debt financing if retained earnings are not enough. The results of the study describe that the firms are highly leveraged, and the managers of fragile firms should reduce the debt of the firm to improve the performance.

## 6. Availability of Data, and Material

Data can be made available by contacting the corresponding author.

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