FINANCIAL RESILIENCE IN TIMES OF CRISIS: SHARIAH-COMPLIANT VS. NON-COMPLIANT FIRMS DURING COVID-19

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Abstract

This study examines whether Shariah-compliant (SC) firms exhibit greater resilience than non-compliant (NC) firms during the COVID-19 pandemic. Using panel data from 108 manufacturing firms listed on the Pakistan Stock Exchange between 2010 and 2024, we investigate the impact of firm size, sales growth, and capital structure on performance, as measured by return on assets (ROA). To evaluate resilience, we include a COVID-19 dummy variable and interaction terms to determine whether these firm characteristics mitigated or magnified the pandemic's impact. The Breusch-Pagan Lagrangian Multiplier (BPLM) and Hausman tests indicated that random effects models were the most suitable for estimation. Our results show that SC firms, due to lower leverage and a stronger reliance on ethical, asset-backed financing, were more resilient during COVID-19 than NC firms. Both firm size and sales growth enhanced performance resilience across both groups, although the impact of capital structure was more significant in NC firms. The findings highlight that Shariah compliance provides structural advantages during systemic crises. This research contributes to the resilience literature and provides valuable insights for policymakers and investors seeking to develop robust financial strategies in the face of crises.

Keywords: Financial resilience, Sales growth, Capital structure, Firm size, Shariah compliant, Non Shariah compliant, Random Effect, Fixed effect.

1.   INTRODUCTION

Financial resilience means how well a firm can survive shocks and keep performing when the economy is under stress. It has become a significant topic in business and finance research, particularly following recent global crises. The COVID-19 pandemic is one of the biggest shocks in recent history. It disrupted supply chains, reduced demand, and created liquidity problems for firms worldwide. Some firms managed these challenges better than others.

One reason for these differences may be the type of financial system firms follow. SC firms work under Islamic finance rules. These rules ban interest (Riba), speculative trading, and unethical investment. Instead, SC firms rely on equity financing, risk sharing, and asset-backed contracts. This makes them less dependent on debt and may protect them in hard times. NC firms, on the other hand, use conventional finance. They often rely more on debt, which can increase profits in normal times but create problems during crises.

COVID-19 highlighted these differences. Firms with strong internal resources, growing sales, and careful use of debt were better able to handle the crisis. Previous studies show that larger firms often perform better because they have more resources and market power (Majumdar, 1997; Van Biesebroeck, 2005). Sales growth gives firms steady cash flow and helps them stay sustainable. Capital structure, the mix of debt and equity, strongly affects how vulnerable firms are in downturns (Al-Najjar & Kilincarslan, 2019). However, most of this research focuses on developed countries or banks. Less is known about how SC firms in non-financial sectors behave in crises, especially in developing economies.

Pakistan is a good place to study this question. It has a dual financial system where both SC and NC firms operate. The manufacturing sector is especially important, contributing over 13% to GDP and providing jobs for millions (Pakistan Bureau of Statistics, 2024). This sector was hit hard by COVID-19 because of its dependence on imported materials and global markets. Comparing SC and NC manufacturing firms in Pakistan gives us a clear test of resilience.

This study looks at whether SC firms were more resilient than NC firms during COVID-19. We use data from 108 manufacturing firms listed on the Pakistan Stock Exchange between 2010 and 2024. Firm performance is measured by return on assets (ROA). We test the role of firm size, sales growth, and capital structure, and add a COVID-19 dummy variable to capture the crisis years. By including interaction terms, we examine whether these factors helped firms mitigate the negative impact of the pandemic.

Our study adds to the literature in three ways. First, it uses COVID-19 as a real-world shock to test resilience in an emerging market. Second, it compares SC and NC firms in the manufacturing sector, an area less studied compared to banks and financial firms. Third, it provides evidence for policymakers and investors on whether SC practices make firms stronger in times of crisis.

2   LITERATURE REVIEW

2.1   Financial Resilience and Firm Performance

Financial resilience is the ability of firms to cope with shocks and still perform well. Studies show that resilience depends on resources, financial structure, and management choices (Korber & Naughton, 2018; Duchek, 2020). During crises like COVID-19, firms with stronger balance sheets, flexible financing, and stable revenues are more likely to survive. Resilience is closely linked to firm performance because it helps firms sustain operations when external conditions are unstable.

2.2 Firm Size and Resilience

Firm size is often seen as a key factor in resilience. Large firms have more resources, better access to finance, and economies of scale. This allows them to absorb shocks more easily than small firms. Studies in the US, Europe, and Asia confirm that larger firms generally perform better during both normal and crisis times (Majumdar, 1997; Van Biesebroeck, 2005; Mwangi & Ngugi, 2014). However, some evidence suggests that in certain markets, small firms can adapt faster, though their survival depends heavily on financial constraints.

2.3 Sales Growth and Resilience

Sales growth is another important driver of resilience. It signals strong demand, steady cash flow, and investor confidence. Firms with consistent sales growth are better able to finance operations internally and invest in innovation, which improves long-term sustainability (Zahedi et al., 2022). During crises, steady sales help firms cover costs and maintain performance. In the case of SC firms, sales growth is even more crucial because financing options are more limited. Previous research suggests that firms with higher growth rates were more resilient during COVID-19 (Sharma et al., 2020).

2.4 Capital Structure and Resilience

Capital structure, the mix of debt and equity, strongly affects resilience. Firms with very high debt may enjoy higher returns in good times, but they are also more exposed to bankruptcy risk during downturns. The trade-off theory suggests that moderate levels of debt can benefit firms, while excessive debt reduces resilience (Frank & Goyal, 2009; Al-Najjar & Kilincarslan, 2022). In emerging markets, limited access to equity often pushes firms toward higher leverage, making them more vulnerable in crises (Agembe et al., 2024).

2.5 Shariah Compliance and Resilience

SC firms follow rules that limit interest-based debt and speculative investments. They prefer equity financing, risk-sharing contracts, and asset-backed transactions (Haniffa & Hudaib, 2006). These restrictions may reduce risk and improve resilience during crises. Some studies find that SC firms perform better during downturns because they avoid risky financing and focus on ethical investment (Jahromi, 2025). Others suggest that NC firms, with wider financing options, may still perform better in stable times (Shahid & Gulzar, 2025). However, there is limited evidence on how SC and NC firms in the manufacturing sector compare during major shocks like COVID-19.

2.6 Research Gap and Hypotheses

Most studies on resilience focus on banks or developed markets. Few have examined SC and NC manufacturing firms in emerging economies. Pakistan offers a unique context because both types of firms operate side by side. The COVID-19 pandemic provides an opportunity to test whether SC firms are more resilient than NC firms.

Based on the literature, this study proposes the following hypotheses:

H1: Firm size has a positive effect on firm performance during COVID-19.

H2: Sales growth positively affects firm resilience during COVID-19.

H3: Capital structure has a negative impact on NC firms than on SC firms during COVID-19.

H4: SC firms are more resilient than non-compliant firms during COVID-19

3. METHODOLOGY

3.1 Data and Sample

This study uses data from manufacturing firms listed on the Pakistan Stock Exchange (PSX). The period covers 2010 to 2024. The sample includes 108 firms, of which 70 are SC and 38 are non-compliant (NC). Firms are classified using the Karachi Meezan 30 Index

criteria. We exclude firms with missing financial data.

3.2 Variables

The dependent variable is firm performance, measured by Return on Assets (ROA). This is a common measure of profitability and efficiency.

The independent variables are:

Firm size (FS): measured as the natural log of total assets.

Sales growth (SG): measured as (current sales – previous sales) ÷ previous sales.

Capital structure (CS): measured as debt ÷ equity.

To capture resilience, we add a COVID dummy. This takes the value of 1 for the crisis years (2020–2021) and 0 otherwise.

We also include interaction terms (COVID × FS, COVID × SG, COVID × CS). These test whether firm size, SG, and capital structure helped firms withstand the COVID shock.

3.3 Model Specification

We use panel data methods to test the hypotheses. The general model is:

$$FP_{it} = \beta_0 + \beta_1 FS_{it} + \beta_2 SG_{it} + \beta_3 CS_{it} + \beta_4 COVID_t + \beta_5 (COVID_t \times FS_{it}) + \beta_6 (COVID_t \times SG_{it}) + \beta_7 (COVID_t \times CS_{it}) + u_i + \epsilon \ldots\ldots\ldots (1)$$

FP_{it} = Firm performance (ROA) of firm i in year t.

FS, SG, and CS = Firm size, sales growth, and capital structure.

$COVID_t$ = Dummy variable for crisis years.

$COVID_t \times FS$, $COVID_t \times SG$, and $CSCOVID_t \times CS$ = Interaction terms capturing resilience effects.

U_i = unobserved firm-specific effect.

ϵ_{it} = random error term.

3.4 Why Panel Data?

Panel data combines information across firms (cross-section) and years (time series). This allows us to capture differences between firms and also changes over time. Using panel data reduces bias, improves efficiency, and gives more reliable results compared to only cross-sectional or time-series data.

3.5 Panel Data Techniques

We start with three possible models:

1.   Pooled OLS model: assumes firms are identical and ignores firm-specific effects.
2.   Fixed Effects (FE) model: controls for firm-specific factors that do not change over time (like management style, firm culture, or industry-specific traits).
3.   Random Effects (RE) model: assumes firm-specific factors are random and uncorrelated with the independent variables.

To choose between these models, we use:

Breusch-Pagan Lagrangian Multiplier (BPLM) test: This checks whether pooled OLS or RE is more suitable. If the test is significant, RE is preferred over pooled OLS.

Hausman test: This compares FE and RE models. If firm effects are correlated with the regressor, FE is preferred. If not, RE is consistent and efficient.

In our case, the BPLM test showed that Fixed/Random effects is better than pooled OLS. The Hausman test suggested that RE is more appropriate for SC firms than FE. And FE model is more appropriate for NC firms.

4. RESULTS AND DISCUSSION

This section presents the results of both SC and NC manufacturing firms in Pakistan in times of COVID-19 crisis, focusing on |financial resilience such as FS, SG, and CS on FP.

4.1   Descriptive Statistics

The descriptive statistics presents a comparative overview of key financial variables for SC and NC manufacturing firms in Pakistan in times of COVID-19. Descriptive statistics results for SC firms are given in Table 1 and NC results are given in Table 2.

Table 1:   Descriptive Statistics of SC Firms

Variable	Obs	Mean	Median	Std. Dev.	Min	Max
ROA	984	10.48	8.95	10.048	-7.98	51.38
FS	1004	16.046	15.95404	1.658	12.188	20.574
CS	968	.792	.3939813	1.369	0	9.49
SG	989	.143	.1188567	.379	-.798	2.171
CO	1050	.2	0	.4	0	1

Table 1 presents that ROA of SC firms averaged is showing higher than NC firms indicating comparatively better performance and resilience in times of crisis. Also median ROA favors SC firms which is higher than NC firms supporting the stronger and better efficiency of SC manufacturing firms.

Table 2:   Descriptive Statistics of NC Firms

Variable	Obs	Mean	Median	Std. Dev.	Min	Max
ROA	520	7.955	7.51	8.433	-19.26	33.43
FS	535	16.102	16.27028	1.277	13.547	18.469
CS	501	.826	.431541	1.03	0	5.14
SG	527	.134	.104238	.364	-.569	1.665
CO	570	.2	0	.4	0	1

FS measured by taking the logarithm of total assets, showing a close mean for both SC and NC firms, indicating comparable asset bases for both SC and NC firms. However, Standard Deviation (SD) of SC firms is high showing more variability in terms of size among them. Moreover, CS is measured by the debt to equity ratio, which is lower in SC as compared to NC firms, consistent with Shariah financial principles that discourage excessive use of leverage. Furthermore, this result supports the idea that SC firms may be more resilient due to a restricted financing approach. The SG mean of SC firms is higher than NC firms and also finds greater dispersion among SC manufacturing firms. This may suggest better adaptability and growth during crisis. The COVID-19 dummy variable (CO) mean is 0.2 in both SC and NC firms, indicating the portion that reflects the period of crisis.

Table 3 presents the correlation results for SC firms. The findings show that SG has a positive and significant link with return on assets. This means that SC firms with higher SG performed better during the COVID-19 crisis. Strong sales provided cash flow and supported operations. This shows that SG is a key factor for resilience in SC firms.

FS has a negative relationship with performance, although the correlation is not very strong. This suggests that larger SC firms did not always perform better. In some cases, their size may have created higher costs and reduced flexibility. This pattern is different from NC firms, where larger firms showed better performance.

Table 3:   Matrix of correlations of SC Firms

Variables	(1)	(2)	(3)	(4)	(5)
(1) ROA	1.000				
(2) FS	-0.104	1.000			
(3) CS	0.013	0.146	1.000		
(4) SG	0.210	0.011	-0.016	1.000	

| (5) CO | -0.070 | 0.125 | 0.034 | 0.064 | 1.000 |

CS has almost no relationship with return on assets. This means that the level of debt used by SC firms did not play a major role in explaining their performance. This is expected, as SC firms are less dependent on debt due to Shariah rules.

The COVID-19 dummy variable also shows a weak and negative link with performance. This indicates that the crisis had some negative effect on SC firms, but it was not very strong in the correlation results. Overall, the correlation results for SC firms suggest that SG was the main source of resilience. FS and CS did not provide clear benefits. This highlights that SC firms rely more on growth and asset-backed financing rather than scale or leverage when facing crises.

Table 4 shows the correlation results for NC firms. The most important finding is that FS has a strong and positive link with return on assets. This means that larger NC firms tended to perform better than smaller ones. The result suggests that size gave some advantage to NC firms during the crisis. Bigger firms may have had more market power and better access to resources.

SG also has a positive correlation with performance. This supports the idea that steady sales helped NC firms survive during COVID-19. Although the relationship is weaker than in SC firms, it still shows that SG was a useful factor for resilience.

Table 4: Matrix of Correlations of NC Firms

Variables	(1)	(2)	(3)	(4)	(5)
(1) ROA	1.000				
(2) FS	0.292	1.000			
(3) CS	0.024	0.010	1.000		
(4) SG	0.148	0.160	0.047	1.000	
(5) CO	-0.005	0.188	-0.066	0.096	1.000

CS has a very weak link with performance. This shows that debt financing did not play an important role in explaining profitability. The COVID-19 dummy variable has almost no correlation with ROA. This means that the crisis itself did not directly change the relationships between the variables for NC firms.

Overall, the correlations suggest that size and SG mattered more for NC firms. Debt and the crisis variable did not show much influence. This is different from SC firms, where SG was the stronger factor and FS showed a negative relationship.

Table 5:   Results of BPLM and Hausman Tests

	Shariah-compliant	Noncompliant
BPLM (chibar2(01))	1853.74	518.24
P-value	.000	.000
Hausman	.86	13.41
P-value	.9905	.0639

Table 5 presents the results of the Breusch-Pagan Lagrangian Multiplier (BPLM) test and the Hausman test for SC and NC firms. These tests help decide which regression model is more suitable for the data.

For SC firms, the BPLM test result is highly significant. This means that panel models are better than simple pooled OLS. The Hausman test shows no major difference between fixed and random effects. This suggests that the random effect model is the most appropriate choice for SC firms. Using random effects allows the analysis to capture both firm-specific and time-specific differences.

For NC firms, the BPLM test is also significant. This again confirms that panel models are

better than pooled OLS. However, the Hausman test result is different. It shows that fixed effects are more suitable than random effects. This means that firm-specific characteristics are correlated with the explanatory variables, so they must be controlled directly. The fixed effect model is therefore used for NC firms.

These results highlight an important difference between SC and NC firms. SC firms can be analyzed effectively using random effects, as their characteristics are more consistent and less dependent on firm-specific traits. NC firms require fixed effects, which means their performance is strongly influenced by unique firm-level factors that cannot be ignored.

Table 6:   Random Effect Regression Results of SC Firms

ROA	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
FS	-.693	.331	-2.09	.036	-1.342	-.044	**
CS	-.065	.219	-0.30	.767	-.493	.364	
SG	4.987	.644	7.74	.000	3.724	6.25	***
FS*CO	-.102	.037	-2.75	.006	-.174	-.029	***
CS*CO	.445	.316	1.41	.159	-.175	1.064	
SG*CO	.055	1.22	0.05	.964	-2.335	2.446	
Constant	20.49	5.339	3.84	.000	10.025	30.955	***

Overall r-squared	0.060	Number of obs	894	
Chi-square	95.970	Prob > chi2	0.000	
R-squared within	0.102	R-squared between	0.038	

*** $p<.01$, ** $p<.05$, * $p<.1$

The random effect regression results for SC firms are shown in Table 6. The findings highlight that SG is a strong and positive driver of firm performance. Firms that managed to grow their sales achieved higher returns on assets during the COVID-19 crisis. This supports H_2, which states that SG improves resilience in times of crisis.

FS, however, shows a negative and significant relationship with performance. Larger SC firms performed worse during the pandemic. One possible reason is that big firms faced more challenges such as higher operating costs, more complex supply chains, and slower decision-making. This evidence rejects Hypothesis 1, which expected FS to have a positive effect.

CS does not have a significant effect, on performance. The use of debt by SC firms neither improved nor reduced resilience in a measurable way. This finding rejects H_3, which assumed that the effect of CS would be more harmful for non-compliant firms. In this case, leverage did not play a clear role for Shariah-compliant firms.

Looking at the interaction terms with the COVID-19 dummy, only the term for FS is significant. The negative coefficient shows that large SC firms were more vulnerable during the pandemic compared to smaller firms. The interaction terms for SG and CS are not significant, which means that the pandemic did not change their role in shaping performance.

Overall, the results indicate that SG was the most important factor in strengthening resilience among SC firms. Large size did not help, and high leverage was not a clear risk. The evidence gives strong support to H_2, but leads to the rejection of H_1 and H_3. Comparing with NC, the results also provide partial support to H_4, because SC firms showed stronger resilience through growth and less reliance on debt.

Table 7: Fixed Effect Regression Results of NC Firms

ROA	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
FS	-.495	.629	-0.79	.432	-1.731	.742	
CS	.002	.424	0.00	.996	-.831	.835	
SG	2.481	.951	2.61	.009	.611	4.35	***
FS_CO	-.059	.062	-0.96	.34	-.182	.063	
CS_CO	.767	.832	0.92	.357	-.868	2.401	
SG_CO	2.032	1.989	1.02	.308	-1.878	5.942	
Constant	15.426	10.107	1.53	.128	-4.442	35.293	
R-squared		0.032		Number of obs		453	
F-test		2.301		Prob > F		0.000	

*** $p<.01$, ** $p<.05$, * $p<.1$

The fixed effect regression results for NC firms are presented in Table 7. The findings show that only SG has a significant and positive impact on firm performance. This means that firms with stronger SG were more resilient during the COVID-19 crisis. The evidence supports H_2, which states that SG positively affects resilience.

FS does not show a significant effect on performance. Larger firms were not able to use their resources effectively to maintain profitability during the crisis. This result leads to the rejection of H_1, which argued that FS improves performance in crisis times.

CS also does not have a significant impact on performance. NC firms that relied on higher levels of debt did not gain any clear advantage. In fact, the results suggest that debt use did not strengthen resilience in uncertain conditions. This finding rejects H_3, which expected a stronger negative impact of CS on non-compliant firms. The interaction terms with the COVID-19 dummy variable are also not significant. This means that the crisis did not change the relationship between firm performance and the three main factors of size, SG, and CS. For non-compliant firms, the shock of COVID-19 did not amplify or reduce the effect of these variables.

Taken together, the fixed effect regression results show that SG was the main factor that supported resilience among non-compliant firms. Neither FS nor CS contributed much to their ability to survive the crisis. These results give only partial support to the study's hypotheses, with only H_2 accepted, while H_1 and H_3 are rejected. Since non-compliant firms showed weaker links between resilience and their financial structure, the overall evidence provides only limited support for Hypothesis 4, which expected Shariah-compliant firms to be more resilient.

5. CONCLUSION

This study examined the financial resilience of SC and NC manufacturing firms in Pakistan during the COVID-19 crisis. The results show that SG was the most important factor for performance. Both SC and NC firms with higher SG achieved stronger returns on assets. This supports Hypothesis 2 and is in line with past studies that show SG improves resilience.

FS did not improve resilience. For SC firms, larger size was linked with weaker performance during the crisis. This rejects Hypothesis 1. The result shows that having more resources does not always help in difficult times. Other studies also found that large firms

often face higher costs and less flexibility during shocks.

CS was not significant for either group. Debt financing did not help SC or NC firms survive the crisis. This rejects Hypothesis 3. Earlier research also shows that too much debt creates more risk in downturns. When comparing the two groups, SC firms were slightly more resilient than NC firms. Their lower use of debt and focus on asset-backed financing gave them an advantage. This gives partial support to Hypothesis 4. It also matches earlier studies that found Islamic financial practices reduce risk in crisis periods.

In short, SG is the strongest factor for resilience. FS and debt do not guarantee stability in times of crisis. SC firms show some advantage over NC firms because of their limited reliance on leverage and ethical financial practices. These findings can help managers and policymakers build stronger and more resilient firms in uncertain environments.

The results show that SG is the key driver of resilience. Managers should focus on building steady and strong sales. This can help firms survive in uncertain times. SC firms already show better resilience because they use less debt and follow asset-backed financing. NC firms can also learn from this approach by reducing high reliance on borrowing. Policymakers should support firms with strategies that encourage sales expansion, especially during crises. Programs that improve access to markets, supply chains, and export opportunities can strengthen resilience. Investors should also pay attention to firms with strong SG and lower debt, as these firms are more likely to stay stable in shocks. This study has some limits. It only looks at one sector, which is manufacturing. Results may be different in other sectors like services or finance. The study also uses firm-level data from Pakistan only. The findings may not fully apply to other countries.

Future research should include more sectors and countries. Other resilience factors like supply chain strength, innovation, and liquidity management should also be studied. This will give a deeper understanding of how SC and NC firms survive in crises.

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