Business groups' Liquidity resilience capabilities during the COVID-19 Shock in Indian Manufacturing and Service Industries

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Abstract

This study explores and evaluates cash holdings patterns, including cash-driven resilience capabilities for the manufacturing and service industries, and distinguishes between business group firms and stand-alone firms. Specifically, this study uses the ANOVA Kruskal-Wallis test to examine various cash-driven resilience capabilities and the weighted least-square (WLS) to test the stated research questions. The empirical outcomes uncover that non-resilient organizations predominate over resilient ones. Moreover, the study finds that various cash-driven resilience capabilities differ significantly from a statistical viewpoint. In the process, it contributes to the literature on the impacts of COVID-19 on both manufacturing and services industries. It also uses different empirical methodologies, including Driscoll-Kraay, pooled ordinary least squares, Rogers, White, and Newey-West Fixed effects between the group estimations and the generalised method of moments (GMM) estimator to check the robustness of the findings. Based on the findings, this study recommends that the management of manufacturing and service organizations focus on increasing organizational resilience potential. This study provides a platform for managers of the business group and the standalone firms to manage the liquidity so the companies should not face any liquidity crunch during adverse economic or epidemic conditions.

Keywords: Organizational Resilience, Dynamic Capabilities, Financial Slack, COVID-19, Business Group, Manufacturing Industry, Service Industry

JEL Classification: C3, G3, M2

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1. Introduction

The COVID-19 pandemic has had an unprecedented impact on the world economy. This pandemic has spread like wildfire, compelling countries to impose stringent nationwide lockdowns and bring domestic and international trade and travel to a grinding halt. The objective of nations has been to limit the spread of the virus and thereby save as many lives as possible. However, due to these stringent measures, the demand for products and services had fallen significantly because all industries across the globe were facing massive losses, which initially created large-scale unemployment. However, a few companies across the industries managed to withstand the global catastrophe due to their higher resilience power.

Companies have had to stop their production due to the fallen demand, leading to a significant drop in income during the lockdowns. At this point, all companies had faced significant financial and economic disruptions (Qiu, 2020). However, their respective 'resilience power' gave them the ability to absorb the catastrophic impact of unexpected events and bounce back to a state of some semblance of normalcy (Lengnick-Hall et al., 2011; Duchek, 2020). Moreover, this scenario also triggered a liquidity crunch, leading to fewer cash inflows from businesses. Literature shows that liquidity and cash holdings are major resources that help build organizational resilience, especially in adversarial conditions. Notably, the capabilities to quickly recover from an unexpected crisis have been termed Dynamic Capabilities (DCs). As discussed earlier, from an operational perspective, liquidity and financial resources are very significant for organizational resilience; thus, the current study refers to financial slack to distinguish between resilient and non-resilient companies. Financial slack, in other words, refers to a 'resource excess' from existing requirements for ongoing operations (e.g., excess cash provides more liquidity and freedom to expedite internal adjustments) (Cyert and March 1963; Natividad, 2013). It is a protective factor that 'cushions' organizations from the overwhelming effects of adversity (Williams et al., 2017). At its peak, the COVID-19 pandemic had virtually paralyzed the world economy. Based on a Price Waterhouse Coopers (PWC) report (2020), the manufacturing industry seemed to have faced one of its worst-ever challenges in the recent past since demand for the products had plummeted significantly, which, in turn, led to plant closures and unemployment on a stupendous scale.

In the process, the current study seeks to contribute to the existing literature by exploring the application of the role of the financial slack concept in the empirical evaluation of cash-driven resilience capabilities (RCs) of Indian organizations, while also investigating the resilience capacity between both business group and standalone firms (i.e., BG and SA firms, respectively). In the process, this paper seeks to contribute to the existing analytical approaches and develop an estimation of the capacity of the organizational cash holdings. Specifically, this study discusses the existing cash-holding patterns of several manufacturing and service organizations. Second, this research examines the dynamics of cash holdings from 2016 to 2021 as a determinant of preceding cash holding behaviour. Furthermore, this study uses three theories to discover the cash-holding mechanisms of an organization: organizational resilience, dynamic capabilities, and financial slack.

This paper mainly explores the resilience capabilities of manufacturing and service firms. Also, it investigates the capacity of resilience between the business group firms and the stand-alone firms during the COVID-19 period. This is relevant because India has been expected to be among the top ten fastest-growing economies in manufacturing and service activities during the 2016-2026 period since it has the significant benefit of offering low-cost resources, mainly the workforce. However, the growth in these industries was encouraging before 2020, but they faced several challenges and losses in revenues during the pandemic. Alleviation of these challenges was essential for these industries to realize their full potential. To some extent, most countries have faced similar challenges due to losses of demand in all industries (Hall, 2011). In this context, the manufacturing industry faced comparable abruptness concerning the fallen product demand. Considering the above circumstances, the main objective of this study is to explore the linkage between cash-resilient and non-resilient firms in manufacturing and service industries. Further, it aims to examine the relationship between cash-driven RCs and firm performance. It also wishes to explore the cash-driven RCs for BG and SA firms. To this end, the study examines a sample of 6709 firm-year observations during 2016–2021 to capture the cash-driven resilience capabilities (RCs). Based on the understanding culled from the literature, it attempts to explore the magnitude of cash holdings in adverse situations by examining the organizational cash-driven RCs.

The paper uses non-parametric methods to discover these RCs and panel regressions to examine the determinants of cash holdings in an organizational context. According to Ritchie and Jiang (2019), there is a research gap in studying and cognizing organizational resilience and its various levels, as well as the reasons that motivate the organizational resistance capacity. Lastly, this paper provides a perception of cash holdings or liquidity or cash management practices in manufacturing and service organizations. There is scant literature on empirical studies that investigated these practices in the corporates as a whole (Ritchie and Jiang, 2019; Rossell´o et al., 2020; Wieczorek-Kosmala, 2022). Therefore, the current study investigates empirically the organizational resilience power with the financial slack in Indian manufacturing and service organizations and also between various ownerships of companies.

More specifically, the study employs panel data and utilizes the ANOVA (Kruskal-Wallis) test and the weighted least-square (WLS) method to test the stated research questions. It also uses different empirical methodologies, including the Driscoll-Kraay, pooled ordinary least squares, Rogers, White, Newey-West Fixed effects between the group estimations and the generalised method of moments (GMM) estimator to resolve the endogeneity issues and the robustness of the findings.

The empirical evidence shows that both industries and both groups of Indian firms are not equal in many ways in terms of resilient capabilities. First, the study contributes to the literature by showing that organizations with a high return on equity (ROE) and a quick ratio (QR) manage high cash and maintain well their dynamic cash positions and financial slacks to stabilize their firms to absorb some of the unwanted financial and unproductive shocks. Second, it also contributes to the characteristics

of the manufacturing organizations by examining the resilient capacity of both industries. However, compared with the service organizations, the manufacturing organizations hold less cash but are far more resilient than the services industry. Third, this study also investigates the characteristics of the business group firms by examining how the management develops resilient capacity. However, compared with the SA firms, the BG firms have more resilience than the SA firms.

The rest of this paper is organized as follows. Section 2 presents the literature review. Section 3 addresses the research questions and provides the methodologies. Section 4 documents the data and descriptive statistics. Section 5 presents and analyzes the results. Finally, Section 6 presents the conclusion and policy implications.

2. Literature Review

The COVID-19 pandemic has severely impacted the manufacturing and service industries globally. Production and economic activities were also hampered due to social distancing measures, lockdowns, and work-from-home. These norms, in effect, were some of the major drivers for adopting operational activities of an organization through a new norm (work from home) (Golan et al., 2020; Deshmukh and Haleem, 2020; Belhadi et al., 2021; Aldrighetti et al., 2021). Indeed, this massive disruption significantly impacted revenue generation both in the manufacturing and services organizations and thereby created financial instability, which, in turn, compelled the organizations to be resilient while utilizing the available resources optimally (Ardolino et al., 2022; Aldrighetti et al., 2021; Belhadi et al., 2021).

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Another significant organizational challenge was in the form of managing the workforce, especially when governments across the world began to relax the lockdown norms (Badhotiya et al., 2022; Chowdhury et al., 2021; Taqi et al., 2020). Dynamic capabilities of organizations were tested, and the ones with robust DCs survived this vicious onslaught from the COVID-19 virus. Once the lockdown norms were relaxed, and countries began to open up their economies all over again, one of the major problems they faced was a reduction in liquidity and inadequacy of short-term financial positions; thus, this naturally affected organizational performance and growth (Belhadi et al. 2021).

Holling (1973) introduced the concept of resilience in ecological systems, and ever since, this concept has been investigated widely in various fields beyond ecology. Generally speaking, resilience is the ability to recover quickly from adverse situations in pre-existing conditions that may cause a disruption (Hosseini et al., 2016; Linkov and Trump, 2019). The existing literature states that resilient organizations should plan and execute effective strategies to enhance the probability of their own survival during adversarial environments (Hillmann and Guenther, 2021; Kursan, 2021). Organizational resilience, thereby, is believed to work under two aspects, including dealing with the effects of post-disruption and the adjustments made to adopt a dynamic process (Korber and McNaughton, 2017; Latifi et al., 2021). Further, it underlines that organizations with a high confidence and resilience capacity can absorb and rebound from turbulent situations and achieve their goals successfully after a disrupting period (Newman et al., 2014; Hartmann et al., 2020; Anglin et al., 2018). Additionally, confidence states the trust in management's ability to attain the goals, improve the firm's performance, tackle difficulties, and also shows a better association between all stakeholders (Judge and Bono, 2001; Huang and Farboudi, 2021; Newman et al., 2019).

While speaking about resilience as a dynamic process of adjustments, Bonß (2016) stated that resilience as a philosophy is as much a methodological practice that emphasizes the role of post-disruption recovery as the absorption of threats along with their consequences. Dynamic capabilities effectively indicate that organizations develop them on purpose while extending and/or modifying their resources to make the organizations more powerful to adapt or absorb the adverse and changing environment/s (Mishra et al., 2019; Seetharaman, 2020). Therefore, dynamic capabilities are established on the basis of a resource and also optimize the scarce resources (such as financial resources) to face sudden upcoming threats (Peteraf et al., 2013; Ferreira et al., 2020; Haarhaus et al., 2020). On the other hand, it is impractical and even impossible for any organization to identify and prepare for all kinds of possible disruptions (Burisch and Wohlgemuth, 2016). Hence, DC-enabled organizations generally prefer to create alternative ways to build capabilities and thereby sustain them through an unanticipated situation/disaster. According to Bogodisov and Wohlgemuth (2017), organizational resilience is integrally connected with its capability to transform available resources and adapt, as well as recover from crises.

In the operational context, it is very challenging to predict organizational resilience during any type of disastrous shocks from a macro perspective (Kursan, 2021). However, it could possibly be analyzed through the concepts of organizational slack. The literature documented some of the concepts of organizational slack, which is commonly known as the excess pool of resources as compared to the operational needs of an organization per se (Helfat and Peteraf, 2015; Mishra et al., 2019). In terms of resilience perspective, Bourgeois III, (1981) stated that organizational slack expresses "the cushion of actual or potential resources, which allows an organization to adapt successfully to internal pressures for adjustment or to external pressures for a change in policy." Therefore, the concepts of organizational slack relate to resources, which in turn lead to two functions (i.e., a buffer against disruptions and an opportunity execution). Organizational theories state that

slack provides positive strength and capabilities to counter any disastrous changes. Slack also enables the ability to absorb, adapt and recover - a fact that has been consistent with the perception of organizational resilience (Butt, 2021; Ferreira et al., 2020). Interestingly, the organizational slack has also been understood as a 'management inefficiency'. This is an expensive item, as resources are not being used at an optimal level. However, there are managerial incentives to waste these resources as proposed by the agency cost theory (Ding et al., 2021; Koçak et al., 2022). Hence, due to the high cost of managing slack and to avoid agency costs, some organizations do not prefer to hold on to organizational slack and instead look to maintain it at an optimal level (Dong et al., 2021; Busenbark et al., 2022; Stan et al., 2014; Wieczorek-Kosmala, 2021).

While speaking about the case of the buffering role of slack and the capability to quantify an organizational slack that provides a platform to 'bounce back easily', Bourgeois and Singh (1983) propounded the theory of organizational revival that has gained significant acceptance in the literature. Specifically, they classified the slack or buffer resources under three categories: (a) the available slack, (b) the recoverable slack and (c) the potential slack. These allow for measuring the 'slack', which is attainable with accounting-based information (Carnes et al., 2019). The available Slack is denoted by free resources, maintained in such a way that allows immediate access to use, 'Slack' in itself is also associated with liquid assets, such as cash buffers, cash equivalents, and marketable securities, among others that are essentially accumulated by an organization per se. Available slack could thereby be calculated with the size of cash and cash equivalents assets with total assets or, with the ratios of liquidity or the cash inflows-based ratios (Bradley et al., 2011; Stan et al., 2014; Wieczorek-Kosmala, 2022). Recoverable slack is understood in terms of the absorbed resources, which could be uncommitted; however, it needs time and significant changes in the organization's performance, which in turn, is measured with ratios of efficiencies and profitability (Wiersma, 2017). The potential slack provides information that shows how the resource could be managed from external resources which, in turn, is captured with the ratio of leverage capacity of the firm. in other words, by measuring the capital structure of a firm (Wiersma, 2017; Tamosiuniene et al., 2019).

The discussion above provides a linkage between the available slack and the determinants of organizational resilience capabilities and also establishes a relation with the organization's dynamic capabilities. The existing literature suggests that available slack is frequently considered as financial slack, which is associated with cash holdings and the organization's liquidity power (Subramaniam et al., 2011; Puro et al., 2021). Further, the other two slacks could be empirically tested as a financial power with a lag time, i.e., a recoverable slack and borrowing capacity in terms of potential slack (Wieczorek-Kosmala & Błach, 2022).

This study investigates the COVID-19 pandemic using the concepts of organizational resilience and the buffering function of financial slack, which are related to cash holdings from the perspective of the Indian manufacturing and service industries. Mostly, organizations develop themselves to

manage any adverse shocks that may appear in the future. During that situation, firms use dynamic capabilities through the financial slack holdings and the intensifying cash holding resources.

Figure A exhibits a conceptual map of the evaluation of cash-driven RCs that have been used in the current study. The conceptual map combines the size and the dynamic capabilities of cash holdings by "cash accumulation and consumption" and differentiates between four possible scenarios of cash-driven resilience capabilities. The first scenario shows that the organizations could be labelled as cash-resilient if they fall under the square A regime, which stipulates that these organizations have a high degree of cash and cash equivalent holdings. They show dynamic capabilities and resilience power in intensifying the cash balance from various resources. The second scenario discusses the negative dynamics of cash holdings, where organizations use buffer cash during adverse situations (shown by square B of Figure A). Hence, these categories of organizations are often labelled as uncertain RCs. Squares C and D of Figure A express that organizations hold low or insufficient cash to operate the organization effectively under these scenarios. The firms of square C of Figure A's region are called 'positive dynamic firms' and could be categorized as the perspectives for achieving resilience capabilities. However, the firms of the D square would be unable to increase their cash holdings; hence, can be considered non-resilient.

The existing literature documented the phenomenon of cash holdings by stating that cash holding strategies are applied as per the industry's sensitivity and determined that cash to be held is mainly for operational use and/or for the purpose of precautionary requirements, and/or for use in other endeavors (Amess et al., 2015). An organization that has experienced high cash flow volatility and high business risks manages excess cash holdings to face future uncertainties (Bates et al., 2009; Steijvers and Niskanen, 2013; Purkayastha et al., 2022; Isaac et al., 2022; Tripathi and Ahamed, 2021; Tripathi et al., 2024). The above arguments are shown in Figure A, which depicts four scenarios of cash-driven RCs. The differences between the organizations that show an accumulation and consumption of financial holdings are associated with positive or negative cash-holding dynamics. Therefore, it is required that organizations that do not maintain slack holdings have to maintain minimum cash holdings above the industry thresholds. The following researchers (George, 2005; Vanacker et al., 2013) stated that organizations develop a slack for basic operating expenses from various internal and external resources by maintaining thresholds of cash holdings above the average industry cash and cash equivalent. Further, this study empirically examines the behavior of the manufacturing and service industry during the COVID-19 pandemic period. Also, this study empirically tests whether business group firms are more resilient compared with stand-alone firms or not.

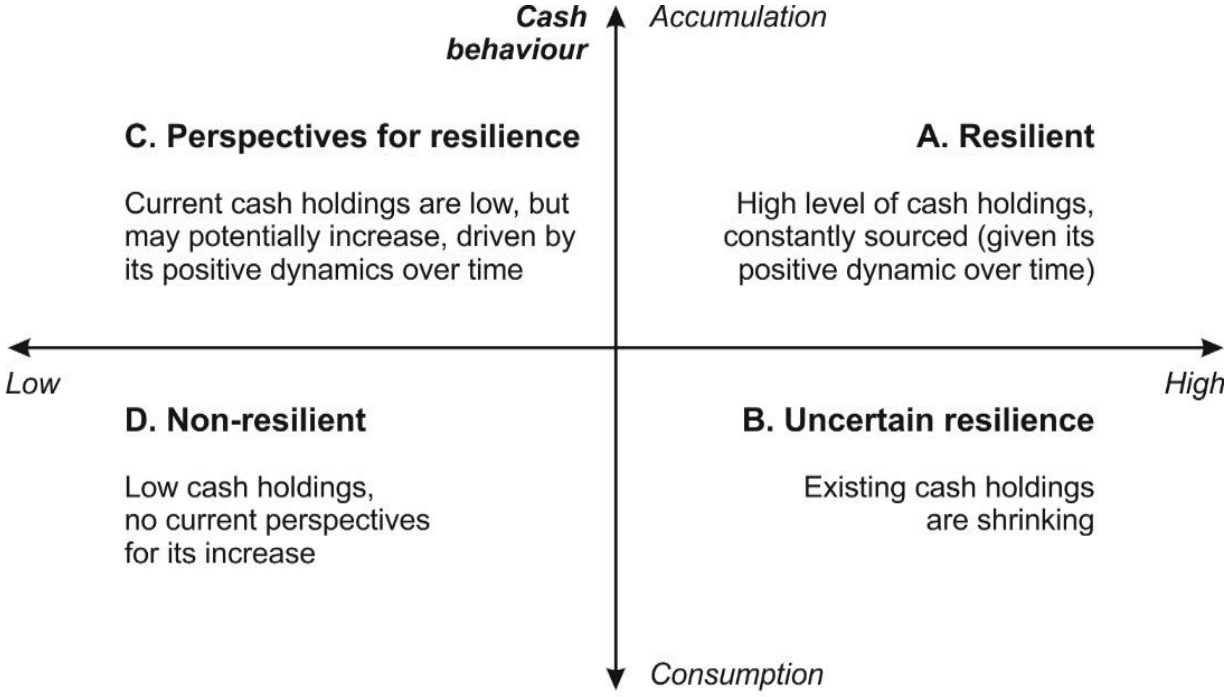

Figure A: This figure represents the conceptual framework to measure the cash-driven capabilities in manufacturing and service industries during the adverse economic and pandemic conditions.

Figure A. Conceptual map of the evaluation of cash-driven RCs

3. Research Questions and Methodologies

This study investigates cash-driven RCs between two major industries (i.e., manufacturing and service industries), as there seems to have been a significant decline in revenues and operating cash inflows from sales during the COVID-19 outbreak. These outcomes created liquidity issues and a bankruptcy threat in the corporate world globally. Hence, the COVID-19 pandemic provides a platform for examining cash-driven RCs for all industries that cater to several questions for researchers. Firstly, this study addresses the fact that organizations under both manufacturing and services industries are differentiated under four scenarios that include cash-driven RCs (**RC**), non-resilient (**NR**), uncertain resilience (**UR**), or perspectives for resilience (**PR**). Hence, the first research question is as follows:

RQ1*: Do cash-resilient organizations predominate non-resilient ones?*

Secondly, the study considered two major groups in the Indian industries, referred to herein, as business group firms vs. stand-alone firms. This paper examines the behaviour of the business group firms vis a vis the stand-alone firms in terms of cash-resilient potential under all four scenarios. Based on this prelude, the second research question is as follows:

RQ2*. Are business group firms more cash-resilient and profitable organizations, as opposed to stand-alone firms?*

Lastly, this study intends to examine the expected linkage between an organization's cash-driven RCs and firm performance between both industries (i.e., manufacturing and service industries), as well as between business group firms and stand-alone firms. Notably, it considered the two major aspects of firm performance (profitability and financial liquidity) during the COVID-19 pandemic. Regarding the first objective, the study discusses firm profitability, driven by sales revenues and operating costs. Notably, a firm's profitability is very sensitive to a decline in sales and an increase in operating costs. This characteristic is closely linked with the concept of recoverable slack; hence, an increase in profitability ratio does help with faster recoverable slack. In fact, this process allows the organization to accumulate funds from internal resources, which could potentially be a source of future cash holdings. As under the second objective, this study uses the concept of financial leverage and financial liquidity of a firm during the pandemic. This attribute of the firm does provide the concept of potential slack. Organizations with highly liquid assets and low levels of leverage can raise funds from external resources easily, which provides added support when firms lose their cash holdings. Consequently, this study formulates the following research questions:

RQ3*: Does the manufacturing industry have the same level of capital structure and resilience power as compared to the service industry?*

Table 1 discusses the construction of cash-driven resilient variables and financial variables. Panel A of Table 1 explains the variables of cash-driven RCs. Additionally, this study explores the cash holdings (CASBTA) and cash behaviour (CHCASBTA) for both manufacturing and service industries in India over the 2016-2021 period. This paper considers the cash holdings of an organization as being equivalent to the cash ratio (CASBTA) and the industry-adjusted cash holdings (C/A(B). Further, to differentiate between cash vs. non-cash holders, this paper considers CASBTA as the benchmark. Specifically, this paper uses the meaning of CASBTA from both manufacturing and service industries to set the benchmarks at 17.39% and 26.16%, respectively. Additionally, this paper considers the CASBTA benchmark for BG firms as 22.07%, and SA firms as 18.33% for all firms under each category (Daniel et al., 2004; Bradley et al., 2011; Stan et al., 2014; Wieczorek-Kosmala, 2022). A company holding CASBTA above the industry means is considered a cash holder; otherwise, it is treated as a non-cash holder firm. Furthermore, to define the cash behavior of a firm, this paper uses dynamic cash holding (CHCASBTA), whereby the positive value is considered as a cash accumulator, while the negative value is identified as a cash consumer organization. Panel B of Table 1 shows the information on financial and performance variables, which, in turn, are constituted as per the accounting-based (ROA, ROE, PA, and OPM) and the market-based (LNMCAP) financial measures.

This study uses non-parametric the ANOVA (Kruskal-Wallis) test to examine whether businesses of different industries and businesses of various groups of companies differ significantly in terms of the levels of RCs (i.e., ***RC, UR, PR and NR***). In the process, this paper carried out test-statistics (t-test) to investigate the mean differences between industries and groups of companies for

various financial variables. The cash holdings are an essential variable to capture the cash-driven RCs. Further, the weighted least-square (WLS) regression analysis is used to investigate the roles of ROE, ROA, LNMCAP, OM, PA, QR, CR, LEV, and Size in explaining cash-driven RCs in the manufacturing and service industries as well as between BG and SA firms (Kim et al., 2011; Ozkan and Ozkan, 2004). The WLS regression model is used to handle the issues of heteroskedasticity between the variables, which generally exist in cross-firm regression (Kleinbaum et al., 1988; Studenmund, 2006). This paper also uses the following regression models to address the RQs:

$$\mathrm{CASBTA}_{i,t} = a_0 + \beta_1 \mathrm{ROA}_{i,t}\ OR\ \beta_1 \mathrm{ROE}_{i,t}\ OR\ \beta_1 \mathrm{LNMACP}_{i,t} + \beta_2 \mathrm{OM}_{i,t} + \beta_3\, PA_{i,t} + \beta_4 QR_{i,t} + \beta_5 CR_{i,t} + \beta_6 LEV_{i,t} + \beta_7 SIZE_{i,t} + \varepsilon_{i,t} \ \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ Eq.(1)$$

$$\mathrm{CASBTA}_{i,t} = a_0 + \beta_1 \mathrm{ROA}_{i,t}\ OR\ \beta_1 \mathrm{ROE}_{i,t}\ OR\ \beta_1 \mathrm{LNMACP}_{i,t} + \beta_2 \mathrm{OM}_{i,t} + \beta_3\, PA_{i,t} + \beta_4 QR_{i,t} + \beta_5 CR_{i,t} + \beta_6 LEV_{i,t} + \beta_7 SIZE_{i,t} + \beta_8\, DMANU + \varepsilon_{i,t} \ \ldots\ldots\ldots\ldots\ldots\ Eq.(2)$$

$$\mathrm{CASBTA}_{i,t} = a_0 + \beta_1 \mathrm{ROA}_{i,t}\ OR\ \beta_1 \mathrm{ROE}_{i,t}\ OR\ \beta_1 \mathrm{LNMACP}_{i,t} + \beta_2 \mathrm{OM}_{i,t} + \beta_3\, PA_{i,t} + \beta_4 QR_{i,t} + \beta_5 CR_{i,t} + \beta_6 LEV_{i,t} + \beta_7 SIZE_{i,t} + \beta_8\, DGP + \varepsilon_{i,t} \ \ldots\ldots\ldots\ldots\ldots\ Eq.(3)$$

where ***CASBTA*** $_{i,t}$ refers to the cash ratio of firm *i* in year *t*, and is calculated as cash and cash equivalent divided by total assets. The variable *Return on equity (**ROE**)* is calculated as the profit after tax of firm *i* in year *t* divided by the shareholder's capital of firm *i* in year *t*; the variable *Return on assets (**ROA**)* is calculated as the profit after tax of firm *i* in year *t* divided by total assets of firm *i* in year *t;* the variable ***LNMACP*** is derived as the natural logarithm of the market capitalization of firm *i* in year *t.* Variable ***Size*** is formed as the natural logarithm of total assets of a firm *i* in year *t*; Leverage (***LEV***) is calculated as the long-term debt of a firm *i* in year *t divided by* total assets of a firm *i* in year *t*; current ratio (***CR***) is defined as current assets of a firm *i* in year *t* divided by current liabilities of a firm *i* in year *t*; quick ratio (***QR***) is measured as 'Current assets-inventories' of a firm *i* in year *t* divided from current liabilities of a firm *i* in year *t*; Productivity of assets (***PA***) is calculated as sales of a firm *i* in year *t* divided by total assets of a firm *i* in year *t*; Operating profit margin (***OM***) is defined as earnings before interest and taxes (EBIT) of a firm *i* in year *t* divided by total assets of firm *i* in year *t*. The variable ***DMANU*** uses a dummy variable '1' if a firm belongs to the manufacturing industry; otherwise, it takes '0.' The variable ***DGP*** uses the dummy variable '1' if a firm belongs to a business group; otherwise, it takes '0.'

Table 1. Construction of variables for cash-driven resilience capabilities in Panel A and financial variables in Panel B

Panel A: Cash-driven resilience capabilities	
Variable	**Definition**
CASBTA	Cash ratio, (cash + cash equivalents)/Total Assets
CHCASBTA	Dynamics of cash ratio ($cash_{t1} - cash_{t0}$)/ Total Assets
C/A(B)	Benchmark-adjusted cash ratio ($C/A - \overline{C/A}$) where $\overline{C/A}$ is for an average of the industry.
RCs	Resilience capabilities, in four scenarios (consistent with Figure B; a combination of Cash B and Cash_H): **RC** is for resilience (cash holders, cash accumulation). Refer to square A of Figure B. **UR** for uncertainty for resilience (i.e., cash holders and cash consumption). Refer to square B of Figure B. **PR** for perspectives for resilience (i.e., cash non-holders and cash accumulation). Refer to square C of Figure B. **NR** for non-resilient (i.e., cash non-holders and cash consumption). Refer to square **D** of Figure B.
Panel B: Variables definitions	
Sales	Sales
Debt	Long-term debt
TA	Total assets
MCAP	Market capitalization
Size	Natural logarithm of TA
LNMACP	Natural logarithm of Market capitalization
Leverage	Long-term debt/TA
CR	Current assets/current liabilities
QR	(Current assets-inventories)/current liabilities
PA	Productivity of assets (Sales/TA)
OM	Operating profit margin (EBIT/TA)
ROE	Return on equity, Profit after tax/shareholder's capital
ROA	Return on assets, Profit after tax/TA

4. Data and Descriptive Statistics

Financial data were obtained from the Prowess database (the Centre for Monitoring Indian Economy) during the period 2016 to 2021. This paper uses 6,709 firm-years, out of which 2,188 firm-years are for the service industry and 4,521 firm-years are for the manufacturing industry, while 3444 firm-years are for BG firms and 3265 firm-years are for SA firms.

Table 2 describes the descriptive statistics. The average sales were recorded as INR 43,755 million,[1] the total average debt was INR 17,893 million, and the total assets and market capitalization were INR 68,108 and INR 75,364 million, respectively. Average cash ratio (CASBTA) and change in cash ratio (CHCASBTA) were 20.2% and 1.4%, respectively. However, the minimum CHCASBTA had fallen to 293% during the study period. Further, the leverage (LEV), current ratio (CR) and quick ratio (QR) were 25.2%, 1.1705 times and 1.153 times, respectively, which shows that the organizations did maintain their liquidity position within a 'reasonable zone'. The productivity

[1] On November 30, 2022, this amount is equal to & USD 536.28 million.

of assets (PA) is less than one, which determines that, overall, all the organizations were unable to turn over their assets at least one time, whereas operating profit margin (OM), return on equity (ROE) and return on assets (ROA) was found as 0.7%, 8.6% and 3.5%, respectively, which shows that tax benefits on financial expenses lead to an increase in ROE and ROA.

Table 2. Descriptive statistics.

Variable	Mean	Std Dev	Min	Max	P1	P99
Sales	43754.93	231933.96	20.4	6157826	74.6	643259
Debt	17892.57	102297.23	0	3016310	0	324454.7
TA	68107.69	322664.6	304.9	9721190	425.6	1105919
MCAP	75363.87	364503.61	16.43	12849954.4	74.7	1220678.8
CASBTA	0.202	0.2	0	0.994	0.002	0.799
CHCASBTA	0.014	0.101	-2.93	0.709	-0.272	0.295
Leverage	0.252	0.343	0	11.392	0	1.314
CR	1.705	2.671	0.003	120.415	0.08	8.514
QR	1.153	1.773	0.003	45.532	0.036	6.906
PA	0.832	0.645	0.001	16.513	0.023	2.959
OM	0.007	1.995	-55.29	53.03	-2.666	1.022
ROE	0.086	0.146	-0.298	0.499	-0.258	0.404
ROA	0.035	0.092	-0.318	0.49	-0.318	0.275

Note: This table reports the descriptive statistics of the variables. The study uses 6,709 firm-years. Variables TA is total assets; MCAP is the market capitalization of the firm; CASBTA is defined as cash balance-to-total assets; CHCASBTA is calculated as changes in the cash balance from one period to another period and divided by TA; CR is current ratio; QR is quick ratio; PA is asset turnover-to- sales; OM is operating profit margin; ROE is the return on equity and ROA is the return on assets. The values of variables sales, debt, TA and MCAP are provided in terms of INR in millions. This study uses 6709 firm-year data.

5. Results and Discussion

5.1 Examining of cash-resilient capabilities (RQ1)

Panel A of Table 3 provides statistical information on the manufacturing and service industries. The t-test shows that there have been statistically significant differences in the mean of CASBTA between the industries (manufacturing and service industry) at a 1% level. This compelled us further to analyze the findings of both industries as a whole and at an individual level. The findings revealed that the industry level benchmark is at 17.39% and 26.16% for manufacturing and services industries, respectively. The findings also show that the service industry effectively accumulates more cash than the manufacturing industry. Moreover, for the manufacturing industry, the findings show that 27.07% (1001) firm-year is in cash-driven resilient capacity (RC), 34.94% (1292) firm-year in perspectives for resilience (PR), 10.44% (396) firm-year in uncertain resilience (UR) and 27.56% (1019) firm-year in non-resilient (NR) in resilient capacity. For the service industry, on the other hand, it is found that 28.79% (503) firm-year is in RC, 22.28% (494) firm-year in PR, 12.88% (225) firm-year in UR and 30% (525) firm-year in NR in resilient capacity. Overall, the findings show that the service industry firms seem to have less resilience potential, as compared to the manufacturing firms, as approximately 42.88% of firm-years are in a negative resilient potential, whereas 38% of firm-years are in the manufacturing industry.

Exploring the cash-resilient behavior of the BG and SA firms

Panel B of Table 3 depicts the test statistics (t-test) between the BG and SA firms for cash holding potential capacity of cash holdings (CASBTA). There was a statistically significant difference between BG and SA firms, while BG firms held approximately 3.74% more cash than SA firms. More importantly, this was also statistically significant at the 1% level. This paper investigated the data between two groups of firms and found that BG firms held 22.03% CASBTA, whereas SA firms held 18.33% CASBTA. These findings show that BG firms accumulated more cash than SA firms.

Additionally, for BG firms, the results showed that 35.54% (856) firm-year were in RC, 30.54% (866) firm-year in PR, 13.80% (371) firm-year UR and 27.56% (1019) firm-year in NR were located under the resilient potential capacity. For the service industry, the results uncovered that 24.45% (638) firm-year was in RC, 35.26% (920) firm-year in PR, 9.20% (240) firm-year in UR and 31.08% (811) firm-year in NR fell under the resilient potential capacity. The findings show that BG organizations have a more resilient capacity to bounce back from unexpected and unfavorable economic situations. They also show that 35.54% of firm-years are in the RC zone compared to 24.45% of firm-years in the RC zone for SA firms.

Table 3. Test statistics (t-test)

Panel A: t-test between the service industry and manufacturing industry.					
	Service (N= 2188)	**Manufacturing (N = 4521)**	**Difference**	**t-value**	**F-value**
Sales	33496	48719.9	-15224	-3.23[a]	5.55[a]
Debt	25143	14383.5	10759.9	3.48[a]	2.51[a]
TA	79661	62516.4	17144.4	2.06[b]	***1.05***
MCAP	77069	74538.6	2530.4	0.26	1.21[a]
CASBTA	0.2616	0.1739	0.0877	15.71[a]	1.71[a]
Leverage	0.2627	0.2468	0.0159	1.78[c]	3.82[a]
CR	2.0605	1.5325	0.5279	5.59[a]	13.53[a]
QR	1.6503	0.9121	0.7382	12.15[a]	10.14[a]
PA	0.6604	0.9154	-0.255	-13.85[a]	1.91[a]
OM	-0.1917	0.1035	-0.2952	-4.44[a]	5.77[a]
ROE	0.0685	0.0938	-0.0253	-6.32[a]	1.4[a]
ROA	0.0147	0.0449	-0.0303	-11.61[a]	1.71[a]
Panel B: t-test between standalone (SA) firms and business group (BG) firms.					
	SA (N = 3265)	**BG (N = 3444)**	**Difference**	**t-value**	**F-value**
Sales	43534	43964.4	-430.4	-0.07	3.21[a]
Debt	13608	21954.6	-8346.8	-3.35[a]	1.31[a]
TA	52417	82983	-30566	-3.91[a]	1.78[a]
MCAP	45842	103351	-57509	-6.6[a]	6.02[a]
CASBTA	0.1833	0.2207	-0.0374	-7.71[a]	***1.04***
Leverage	0.2599	0.2444	0.0155	1.85[b]	***1.02***
CR	1.9479	1.4742	0.4738	7.16[a]	5.24[a]
QR	1.3263	0.9885	0.3378	7.75[a]	2.34[a]
PA	0.8636	0.8025	0.0611	3.87[a]	1.16[a]
OM	-0.0277	0.0404	-0.0681	-1.41	1.78[a]
ROE	0.0879	0.0833	0.00463	1.3	1.02
ROA	0.0343	0.0357	-0.0014	-0.61	1.14[a]

Note: This table reports the test statistics between the service industry and manufacturing industry (Panel A), standalone firms, and business group firms (Panel B). Variables TA is total assets; MCAP is the market capitalization of the firm; CASBTA is defined as cash balance to total assets; CR is current ratio; QR is quick ratio; PA is assets turnover to sales; OM is operating profit margin; ROE is the return on equity, and ROA is the return on assets. Superscripts [a,b] and [c] show the significance level at the 1%, 5% and 10% levels, respectively.

Discovering the Movement of cash balance during the study period

Panels A and B of Table 4 show the behavior of Cash balance-to-total assets (CASBTA) and the change in cash balance-to-total assets (CHCASBTA) from 2016 to 2021. In terms of the cash ratio with TA, the organizations have maintained CASBTA linearly from 2016 to 2020. However, in 2021,

organizations increased the cash ratio with more assets; more importantly, the service industry seemed more potent than the manufacturing industry in cash accumulation activities (Refer to Appendix A for Figure V). Further, the mean values of dynamic cash holdings (CHCASBTA) did not change during 2019 and 2020, but more volatility was observed. However, the average dynamic of cash holdings increased by 3% in 2021, while volatility decreased for the manufacturing industry specifically. The finding shows that the average values of CHCASBTA had fallen in the negative zone in 2020, while the volatility had increased considerably. Conversely, the average CHCASBTA increased by 3% in 2021, while volatility decreased to 11% in the service industry.

Panels C and D of Table 4 provide the findings of CASBTA and CHCASBTA during the 2016 to 2021 period. In terms of CASBTA, BG firms held 22% of CASBTA from 2016 to 2020, but they increased CASBTA to 25% in 2021. The SA firms maintained their average CASBTA at 18% and increased it to 22% in 2021. The findings reveal that both categories of firms increased the 2% cash balance to face uncertain outcomes (refer to Appendix A for Figure VII). In the case of the dynamics of cash holdings (CHCASBTA), the change in cash balance was 3% in 2017, which declined to 1% in 2020. However, in 2021, the BG group firms rebounded, and the change in cash balance increased by 4%, but the SA firms had linearity that they maintained at 1% from 2017 to 2019, and this measure did not change in 2020; however, in 2022, it reached 3%. The findings show that both categories of firms did increase their dynamic cash holding capacity after the shock of the COVID-19 pandemic (refer to Appendix A for Figure VIII).

Table 4. Movement of cash balance during the study period.

Panel A: Cash balance-to-total assets (CASBTA)												
	Manufacturing industry						**Service industry**					
Year	2016	2017	2018	2019	2020	2021	2016	2017	2018	2019	2020	2021
N	696	709	734	772	809	801	348	353	368	372	385	362
Mean	***0.16***	***0.18***	***0.18***	***0.17***	***0.17***	***0.19***	***0.24***	***0.25***	***0.26***	***0.26***	***0.26***	***0.29***
Std Dev	0.17	0.18	0.18	0.17	0.17	0.18	0.22	0.22	0.23	0.23	0.24	0.25
Minimum	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum	0.94	0.97	0.92	0.81	0.81	0.91	0.97	0.93	0.94	0.93	0.99	0.99
Panel B: Change in cash balance-to-total assets												
N	n.a.	709	734	772	809	801	n.a.	353	368	372	385	362
Mean	n.a.	***0.02***	***0.02***	***0.00***	***0.00***	***0.03***	***n.a.***	***0.02***	***0.01***	***0.01***	***-0.01***	***0.03***
Std Dev	n.a.	0.09	0.07	0.08	0.13	0.08	n.a.	0.12	0.12	0.09	0.14	0.11
Minimum	n.a.	-0.81	-0.23	-1.07	-2.93	-1.14	n.a.	-0.56	-0.76	-0.44	-1.60	-1.08
Maximum	n.a.	0.58	0.68	0.65	0.32	0.47	n.a.	0.59	0.71	0.54	0.50	0.63
Panel C: Cash balance- to-total assets (CASBTA)												
	Business group firms						**Standalone firms**					
N	564	567	578	583	584	568	480	495	524	561	610	595
Mean	***0.20***	***0.22***	***0.22***	***0.22***	***0.22***	***0.25***	***0.18***	***0.18***	***0.18***	***0.18***	***0.18***	***0.20***
Std Dev	0.19	0.20	0.20	0.20	0.20	0.21	0.19	0.19	0.20	0.20	0.19	0.21
Minimum	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum	0.97	0.97	0.94	0.93	0.99	0.99	0.88	0.89	0.84	0.85	0.86	0.89
Panel D: Change in cash balance- t- total assets												
N	n.a.	567	578	583	584	568	n.a.	495	524	561	610	595
Mean	***n.a.***	***0.03***	***0.02***	***0.00***	***-0.01***	***0.04***	***n.a.***	***0.01***	***0.01***	***0.01***	***0.00***	***0.03***
Std Dev	n.a.	0.10	0.09	0.09	0.15	0.08	n.a.	0.10	0.09	0.08	0.11	0.10
Minimum	n.a.	-0.81	-0.74	-0.46	-2.93	-0.42	n.a.	-0.56	-0.76	-1.07	-1.60	-1.14
Maximum	n.a.	0.59	0.68	0.65	0.50	0.37	n.a.	0.49	0.71	0.45	0.32	0.63

Investigating mean differences between the manufacturing and service firms

This paper investigates the differences of means between manufacturing and service industry firms through test-statistics and the differences in resilience capabilities (i.e., RC, UR, PR and NR) through the Kruskal-Wallistest (K-W test). Panel A of Table 3 reports the t-test results. The magnitude of sales and the ratios of PA, OM, ROE, and ROA are more significant in the manufacturing industry than in the service industry; the differences are statistically significant at the 1% level. On the other hand, the degree of debt, TA amount, and ratios of leverage, CR, and QR are more important for the service industry than for the manufacturing industry. The findings show that the service industry is more concerned about liquidity than the manufacturing industry; on the other hand, the manufacturing industry is more focused on profitability and turnover. Further, this paper uses the non-parametric ANOVA (Kruskal-Wallis) test to confirm whether manufacturing and service organizations effectively differ regarding cash-driven RCs (i.e., RC, UR, PR and NR).

Table 5-Panel A provides the p-values of the Kruskal-Wallis test (K-W test) as a whole dataset. At the same time, Panels B & C display the K-W test results for the manufacturing and service industries. The outcomes of Panel A confirm that there are statistically significant differences at the RCs level in financial positions, liquidity ratios (such as CASBTA, Leverage, current ratio, quick

ratio) and performance ratios. However, when this paper further scrutinizes the differences with pair-wise RCs, it is found that the mean value of debt is not statistically significant for NR vs. PR and UR vs. RC. Additionally, the mean sales values are not statistically significant for NR vs. UR and PR vs RC; the mean of TA for UR and RC does not differ; the mean of CASBTA does not show a statistical difference for UR vs. RC; and the mean value of ROE does not vary for NR vs. UR. The outcome suggests that the mean value of CASBTA is equal for UR vs. RC, but the UR categories of firms seem unable to manage cash at the same pace as their consumption. This paper further analyzes the meaning value of CASBTA for both the manufacturing and service industries and finds that the mean value of CASBTA does not differ for the service industry. Hence, organizations under the UR categories maintain an equilibrium between accumulation and consumption of cash to use their resilience potential to bounce back to normalcy when facing any financial shocks, either within or beyond organizational controls.

Analyzing mean differences between the BG and the SA firms

This paper explores the differences in the means between BG and SA firms through the t-test. Also, it examines the differences in resilience capabilities (i.e., RC, UR, PR and NR) through the K-W test. Panel B of Table 3 illustrates the t-test results, showing no statistically significant difference between the means of sales, OM, ROE and ROA. However, the magnitude of debt, TA and MCAP, is more important for the BG firms than the SA firms; notably, the findings are statistically significant at the 1% level. On the other hand, means of leverage, CR, QR and PA are higher for the SA firms, with a statistical significance. The findings suggest that SA firms maintain the profitability ratio as per industry standards, and so do BG firms. Interestingly, the BG firms are valued higher than the SA firms, while the levels of profitability of both groups are equal. Further, through the K-W test, this paper explores whether BG and SA firms differ within RC, UR, PR and NR. In Table 5, both Panels D & E demonstrate the K-W test results for the BG and SA firms, respectively. The findings show statistically significant differences at the 1% level for all categories of variables. Regarding the pairwise study, the variable sales do not statistically differ for NR vs. PR and UR vs. RC, and the variable TA does not vary for NR vs. UR and NR vs. RC for the BG firms. The variable CASBTA is not statistically significant for the NR vs. UR pair for the BG firms. The results show that the BG firms under uncertain resilience (UR) and under non-resilient (NR), but within the resilient capacity, should look to accumulate cash holdings as determined by their dynamics and also increase their financial slacks to meet unforeseen circumstances, which in turn, would help in strengthening the reliance power of the management. The CABSTA variable does not differ for the PR vs. RC pair for the SA firms. This shows that the SA firms have the same cash and liquidity level as those that fall under the RC and PR categories, which are also likely to be in the potential resilient power. Hence, the SA group organizations have characterized in the opposite direction of the BG firms; thereby, the SA firms should primarily focus on the firms that belong to the UR and NR categories to improve liquidity and cash balance at an optimal level so that these firms can use their resilience to bounce back during adverse situations.

Table 5. The Kruskal-Wallis test (K-W test)

	Business financial position				**Ratios**				**Performance ratios**			
Panel A: The K-W test results for overall data.												
	Sales	**Debt**	**TA**	**MCAP**	**CASBTA**	**Leverage**	**CR**	**QR**	**PA**	**OM**	**ROE**	**ROA**
K-W test	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
NR vs. PR	<.0001	***0.2807***	<.0001	<.0001	<.0001	<.0001	0.0009	0.0032	0.001	<.0001	<.0001	<.0001
NR vs. UR	***0.235***	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	***0.2257***	<.0001
NR vs. RC	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
PR vs. UR	0.0005	<.0001	0.0047	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	0.0481	<.0001
PR vs. RC	***0.6908***	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
UR vs. RC	<.0001	***0.3531***	***0.236***	<.0001	***0.2375***	0.0004	0.0007	0.0044	<.0001	<.0001	<.0001	<.0001
Panel B: The K-W test results for manufacturing industry												
	Sales	**Debt**	**TA**	**MCAP**	**CASBTA**	**Leverage**	**CR**	**QR**	**PA**	**OM**	**ROE**	**ROA**
K-W test	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
NR vs. PR	0.0007	***0.7915***	***0.1547***	0.0027	0.0724	0.0144	0.0132	0.0091	0.0014	0.0479	<.0001	<.0001
NR vs. UR	0.0342	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	0.0191	<.0001
NR vs. RC	0.5186	<.0001	0.0025	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	***0.9977***	<.0001

Table 5. The Kruskal-Wallis test (K-W test)

	Business financial position				**Ratios**				**Performance ratios**			
PR vs. UR	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
PR vs. RC	0.0025	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
UR vs. RC	<.0001	***0.4201***	<.0001	<.0001	<.0001	0.0001	***0.1207***	***0.1007***	***0.7071***	<.0001	0.0011	<.0001

Panel C: The K-W test results for service industry.

	Sales	**Debt**	**TA**	**MCAP**	**CASBTA**	**Leverage**	**CR**	**QR**	**PA**	**OM**	**ROE**	**ROA**
K-W test	0.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
NR vs. PR	0.0002	0.991	0.0408	0.0002	<.0001	0.0421	0.021	0.0018	0.0284	<.0001	0.0045	<.0001
NR vs. UR	***0.9408***	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	0.9993	<.0001
NR vs. RC	0.0197	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	0.0431	<.0001	<.0001	<.0001
PR vs. UR	0.0237	<.0001	***0.3182***	<.0001	<.0001	<.0001	0.0004	<.0001	<.0001	<.0001	0.0062	***0.2822***
PR vs. RC	***0.641***	<.0001	***0.2503***	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	***0.1799***	<.0001
UR vs. RC	***0.2567***	***0.3503***	***1***	0.0804	***0.292***	0.0293	0.0721	***0.2486***	0.0656	<.0001	<.0001	<.0001

Panel D: The K-W test results for the business group firms.

	Sales	**Debt**	**TA**	**MCAP**	**CASBTA**	**Leverage**	**CR**	**QR**	**PA**	**OM**	**ROE**	**ROA**
K-W test	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
NR vs. PR	***0.9979***	<.0001	0.0002	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	***0.9066***	<.0001

Table 5. The Kruskal-Wallis test (K-W test)

	Business financial position				**Ratios**				**Performance ratios**			
NR vs. UR	0.0259	0.0762	***0.8431***	0.0219	***0.246***	0.0001	0.0017	0.0031	0.0102	<.0001	<.0001	<.0001
NR vs. RC	0.0009	<.0001	***0.3839***	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	0.018	0.0175
PR vs. UR	0.0024	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
PR vs. RC	<.0001	0.987	0.0152	<.0001	<.0001	0.0008	0.0167	0.0047	***0.1271***	<.0001	0.001	<.0001
UR vs. RC	***0.8697***	<.0001	0.0325	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	0.0216	<.0001

Panel E: K-W test results for standalone firms.

	Sales	**Debt**	**TA**	**MCAP**	**CASBTA**	**Leverage**	**CR**	**QR**	**PA**	**OM**	**ROE**	**ROA**
K-W test	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
NR vs. PR	***0.7899***	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	0.0879	<.0001
NR vs. UR	<.0001	***0.3893***	<.0001	<.0001	<.0001	0.0155	0.0409	***0.2454***	0.0102	<.0001	0.0018	<.0001
NR vs. RC	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
PR vs. UR	0.0054	<.0001	***0.3429***	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	***0.9609***	<.0001
PR vs. RC	0.0005	***0.9639***	0.0713	0.0022	***0.8809***	***0.6586***	***0.2385***	***0.5852***	0.0012	0.0589	<.0001	<.0001
UR vs. RC	***0.5645***	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001

Note: This table reports the results of the ***Kruskal-Walli*** test (K-W test) for the resilience states and financial constraints. It reports the p-values of the findings. The **bold and italic words** are not found statistically significant.

5.2 Investigating the impact of resilient organizations on firm performance (RQ2 & RQ3).

Table 6 provides the empirical findings of the WLS regressions, where this paper considers ROE as the measure of firm performance to investigate. All the models explain the variation in CASBTA from 21.00% to 25.00% (i.e., variation measure with adjusted R2 of each model). Notably, all the models are statically significant at the 1% level, as the F-values are recorded between 233-263, and there is no issue of multi-collinearity (VIFs are below 5). Model I shows the overall empirical findings. The coefficient of ROE (0.433) positively relates to CASBTA, which is statistically significant at the 1% level. The coefficients of PA and OM are negatively associated with CASBTA, and both are statistically significant at the 1% level. Further, in terms of liquidity variables, both QR and CR show opposite directional results, as the coefficient of QR is positive, while it's harmful to CR related to CASBTA. Notably, both are statistically significant at the 1% level. The findings of Model I suggest that organizations with high ROE and QR manage high cash and maintain their dynamic cash positions and financial slacks well to stabilize their firms and absorb unwanted financial and unproductive shocks.

Model II of Table 6 deals with the dummy variables between the manufacturing and service industries. The significant findings show that the DMANU coefficient (-0.073) is negatively correlated with CASBTA, which reveals that manufacturing firms generally hold less cash and cash equivalent amounts than the services industry. The service industry is more sensitive to cash accumulation and expenses. Additionally, the service industry should increase their financial slacks from the present level in the future.

Model III of Table 6 differentiates between the findings of the BG and SA firms, whereby it uses dummy variables. The coefficient of DGP (0.031) is positively correlated with CASBTA and is statistically significant at the 1% level. This reveals that the BG firms hold more cash than the SA firms. This finding supports the power of resilience of the BG firms. Further, the empirical findings suggest that BG firms have more resilience than SA firms. In this situation, both groups of firms should increase their respective resilient capacity to handle situations like COVID-19 in the future.

Model IV of Table 6 explores the impact of the manufacturing industry and the BG firms on CASBTA. The coefficients of DMANU (-0.074) and DGP (0.034) are negatively and positively correlated with CASBTA, respectively. Both coefficients are also statistically significant at the 1% level. These empirical outcomes support the findings of Model II and Model III, which prove that manufacturing firms have less financial slack. In contrast, the BG firms have excess cash to absorb unanticipated shocks.

Table 6. Weighted least squares (WLS) regressions.

	Model I		Model II		Model III		Model IV		
	Coefficient	**Coefficient**	**Coefficient**	**Coefficient**	**Coefficient**	**Coefficient**	**Coefficient**	**Coefficient**	**VIF**
Intercept	0.197[a] (14)	0.000	0.228[a] (16.32)	0.000	0.203[a] (14.48)	0.000	0.235[a] (16.9)	0.000	0.000
ROE	0.433[a] (15.05)	0.200	0.484[a] (17.02)	0.224	0.437[a] (15.27)	0.202	0.491[a] (17.31)	0.227	1.529
OM	-0.004[a] (-3.12)	-0.035	-0.003[a] (-2.67)	-0.030	-0.004[a] (-3.26)	-0.037	-0.003[a] (-2.82)	-0.031	1.086
PA	-0.083[a] (-22.89)	-0.267	-0.076[a] (-21.13)	-0.245	-0.082[a] (-22.84)	-0.266	-0.075[a] (-21.03)	-0.243	1.182
QR	0.032[a] (15.33)	0.280	0.025[a] (12.11)	0.222	0.032[a] (15.7)	0.286	0.026[a] (12.44)	0.227	2.963
CR	-0.012[a] (-8.54)	-0.154	-0.009[a] (-6.97)	-0.125	-0.012[a] (-8.54)	-0.154	-0.009[a] (-6.94)	-0.123	2.810
LEV	-0.114[a] (-15.97)	-0.196	-0.112[a] (-15.94)	-0.193	-0.112[a] (-15.69)	-0.192	-0.110[a] (-15.63)	-0.188	1.289
SIZE	0.008[a] (5.65)	0.063	0.009[a] (6.8)	0.075	0.005[a] (3.61)	0.042	0.006[a] (4.55)	0.052	1.148
DMANU			-0.073[a] (-15.18)	-0.171			-0.074[a] (-15.57)	-0.175	1.097
DGP					0.031[a] (6.87)	0.078	0.034[a] (7.65)	0.085	1.117
F Value	258.1[a]		262.39[a]		233.29[a]		241.75[a]		
Adj-R^2	0.2115		0.2377		0.2169		0.2442		

Note: This table represents the empirical findings of the WLS regressions where the dependent variable is cash and cash equivalent divided by total assets (CASBTA). Superscript [a] is statistically significant at the 1% level.

5.3 Robustness check

This paper uses two performance variables (i.e., ROA and LNMACP) to check the robustness of the findings of Table 6, and the analysis is provided for comparison purposes only. The empirical outcomes are not presented here. However, all models are statistically significant at the 1% level, and the adjusted R2 ranges from 19 to 28. In all the regressions, the coefficients of the manufacturing organizations are consistent (i.e., negative with CASBTA). Similarly, the coefficients of DGP are consistent (i.e., positive with CASBTA). This effectively proves why BG firms are more sensitive to maintaining liquidity. Furthermore, the empirical findings suggest that organizations with good firm performance and high market capitalization maintain a high cash ratio, good profitability, and liquidity at an optimal level.

5.3.1 Various Empirical Methodologies Estimations

We use unbalanced panel data and employ various empirical methodologies, namely, the Driscoll-Kraay, the pooled ordinary least squares (Pooled OLS), the White, Rogers, Newey-West and the generalised method of the moments (GMM) estimator, to test the robustness of our findings. The panel data structure permits one to consider the constant and unobservable heterogeneity, an explicit construct of each firm (i.e., the size of the firm [total assets], its revenue and its profit after tax). The OLS estimation produces estimators that can be biased and inconsistent when the unobserved effects correlate with the independent variables. These econometric challenges can be resolved using the fixed effects (within) or the WLS estimators. However, it would be more rational to consider that the firm activities can create endogeneity problems (Hermalin and Weisbach, 2003). Hence, it is necessary to use an econometric methodology that can deal with the endogeneity issues. To deal with exogeneity[2] and endogeneity, we use the GMM estimator proposed by Arellano and Bond (1991).

The empirical results are not displayed but discover that holding excess cash provides a cushion during adverse situations; the BG firms (DGP) accumulate or have more liquid cash as compared with the SA firms, whereas the manufacturing industry organisations (DAMU) do not keep more liquid cash, as compared with the service industry organisations. The results highlight that the business group organisation seems more resilient during adverse economic conditions. Further, the empirical findings suggest that a firm's excess liquidity positively impacts its performance and provides more resilient power to the organisation during adversity.

The CASBTA positively impacts the firm's performance (i.e., ROE, ROA, and LNMCAP). The findings determine that the liquidity of the organisations provides strength during adverse scenarios, which creates a more resilient capacity for the organisation when the firm holds more cash in association with the average cash consumption.

5.3.2 Panel quantile estimations

We have presented the quantile estimations (i.e., 0.05, 0.10, 0.20, 0.30, 0.40, 0.50, 0.60, 0.70, 0.80, 0.90 and 0.95) in Tables 7 and 8. These tables show the regression analysis results of the Canay (2011) fixed effects quantile panel data approach. Table 12 exhibits the results where the major variables are ROE, DGP, DMANU and CASBTA. Firstly, we find that the organisations of all quantiles from 0.05 to 0.95 positively relate to CASBTA, and the coefficients are statistically significant. Secondly, we find that the business group firms under the lower quartiles (i.e., 0.05, 0.10, 0.20 and 0.30) maintain less cash than the SA firms, which is statistically significant. On the other hand, the organisations under the higher quartiles (i.e., 0.40, 0.50, 0.60, 0.70, 0.80, 0.90 and 0.95) show a positive linkage with CASBTA, which

[2] When the strict exogeneity condition fails, then both the first differences and fixed effects (within) are unpredictable and have different probability limits. When the models do not satisfy strict exogeneity and endogeneity, the transformation is used to eliminate the unobserved effects and to introduce instruments to deal with the endogeneity (Wooldridge, 2002).

provides statistical support attesting that the organisations under higher quantiles of the BG manage excess liquidity, as compared with the lower quantiles of the BG firms and the SA firms. Thirdly, the organisations under the lower quantiles (i.e., 0.05, 0.10, 0.20, 0.30 and 0.40) of the manufacturing industry maintain more cash than the service industry, which shows that the organisations under these quantiles are more cautious regarding liquidity. This is possible because the products of the service firms are staples that survive recessions.

Further, the organisations in the higher quartiles are negatively related to CASBTA. The independent variables ROA and LNMCAP, of Tables 7 and 8, respectively, establish a positive relation between them and CASBTA, and all the coefficients are statistically significant at the 1% level. Overall, the findings determine that the CASBTA positively impacts firms' performance. Interestingly, the findings also reveal that the BG firms under different quantiles manage their liquidity position differently. The results show that the lower quantiles of the BG firms do not hold more liquidity than the SA firms. Similarly, we find that the lower quantiles of the manufacturing firms manage liquidity (as these firms hold more cash) differently than the SA firms. The findings discovered that higher quantile organisations of the BG firm are more resilient than the SA firms. Similarly, the higher quantile services firms are more resilient than the manufacturing firms.

Table 7. Canay (2011) Quantile results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Variables	**0.05**	**0.1**	**0.2**	**0.3**	**0.4**	**0.5**	**0.6**	**0.7**	**0.8**	**0.9**	**0.95**
ROE	0.015 [b]	0.009 [b]	0.008 [a]	0.014 [a]	0.018 [a]	0.021 [a]	0.025 [a]	0.034 [a]	0.039 [a]	0.041 [a]	0.036 [b]
	(0.017)	(0.011)	(0.005)	(0.004)	(0.003)	(0.002)	(0.003)	(0.004)	(0.007)	(0.012)	(0.019)
OM	0.002 [a]	0.001 [a]	0.001 [a]	0.001 [a]	0.001 [a]	0.001 [a]	0.001 [a]	0.001 [a]	0.001 [a]	0.000 [a]	0.000 [a]
	(0.003)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.002)
PA											-0.026
	-0.017 [a]	-0.015 [a]	-0.019 [a]	-0.020 [a]	-0.019 [a]	-0.019 [a]	-0.019 [a]	-0.020 [a]	-0.021 [a]	-0.024 [a]	[a]
	(0.005)	(0.003)	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.003)	(0.005)
QR											-0.009
	0.001 [a]	-0.001 [a]	-0.003 [a]	-0.003 [a]	-0.003 [a]	-0.004 [a]	-0.004 [a]	-0.005 [a]	-0.006 [a]	-0.008 [a]	[a]
	(0.007)	(0.003)	(0.002)	(0.000)	(0.001)	(0.000)	(0.001)	(0.002)	(0.000)	(0.001)	(0.005)
CR	-0.004 [a]	0.000 [a]	0.007 [a]	0.008 [a]	0.009 [a]	0.011 [a]	0.014 [a]	0.016 [a]	0.020 [a]	0.029 [a]	0.034 [a]
	(0.008)	(0.004)	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.004)	(0.006)
LEV											-0.025
	0.002 [a]	-0.000 [a]	-0.004 [a]	-0.010 [a]	-0.014 [a]	-0.018 [a]	-0.022 [a]	-0.026 [a]	-0.029 [a]	-0.027 [a]	[b]
	(0.009)	(0.006)	(0.002)	(0.002)	(0.001)	(0.001)	(0.002)	(0.002)	(0.003)	(0.006)	(0.012)
SIZE	0.029 [a]	0.027 [a]	0.026 [a]	0.026 [a]	0.026 [a]	0.026 [a]	0.027 [a]	0.027 [a]	0.027 [a]	0.028 [a]	0.029 [a]
	(0.002)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.002)
DGP	-0.016 [b]	-0.008 [a]	-0.005 [a]	-0.002 [a]	0.000 [a]	0.001 [a]	0.003 [a]	0.005 [a]	0.010 [a]	0.015 [a]	0.012 [a]
	(0.006)	(0.003)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.004)	(0.005)
											-0.019
DMANU	0.031 [a]	0.016 [a]	0.006 [a]	0.003 [a]	0.000 [a]	-0.001 [a]	-0.001 [a]	-0.004 [a]	-0.005 [a]	-0.007 [a]	[a]
	(0.007)	(0.004)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.004)	(0.006)
Intercept	-0.161 [b]	-0.100 [b]	-0.065 [a]	-0.046 [a]	-0.038 [a]	-0.036 [a]	-0.033 [a]	-0.026 [a]	-0.012 [a]	0.009 [b]	0.040 [b]
	(0.018)	(0.012)	(0.006)	(0.004)	(0.003)	(0.003)	(0.003)	(0.005)	(0.006)	(0.013)	(0.018)
Observations	6,709	6,709	6,709	6,709	6,709	6,709	6,709	6,709	6,709	6,709	6,709

Robust standard errors in parentheses: $p<0.01$, $p<0.05$, $p<0.1$. Superscripts [a, and b] represent statistical significance at the 1% and 5% levels, respectively.

Table 8. Canay (2011) Quantile results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Variables	**0.05**	**0.1**	**0.2**	**0.3**	**0.4**	**0.5**	**0.6**	**0.7**	**0.8**	**0.9**	**0.95**
ROA	0.095 [b]	0.088 [b]	0.081 [a]	0.094 [a]	0.102 [a]	0.107 [a]	0.118 [a]	0.137 [a]	0.145 [b]	0.154 [b]	0.138 [b]
	(0.039)	(0.023)	(0.010)	(0.006)	(0.005)	(0.004)	(0.004)	(0.009)	(0.014)	(0.025)	(0.031)
OM	0.001 [a]	0.000 [a]	0.001 [a]	0.000 [a]	0.000 [a]	0.000 [a]	0.000 [a]	0.000 [a]	0.000 [a]	-0.000 [a]	0.000 [a]
	(0.001)	(0.003)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)
PA	-0.019 [a]	-0.018 [a]	-0.022 [a]	-0.023 [a]	-0.023 [a]	-0.023 [a]	-0.023 [a]	-0.024 [a]	-0.025 [a]	-0.029 [a]	-0.031 [a]
	(0.005)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.003)	(0.005)
QR	0.000 [a]	-0.001 [a]	-0.003 [a]	-0.003 [a]	-0.003 [a]	-0.004 [a]	-0.004 [a]	-0.005 [a]	-0.006 [a]	-0.007 [a]	-0.009 [a]
	(0.007)	(0.003)	(0.002)	(0.000)	(0.000)	(0.001)	(0.000)	(0.002)	(0.001)	(0.001)	(0.001)
CR	-0.002 [a]	0.000 [a]	0.007 [a]	0.007 [a]	0.009 [a]	0.011 [a]	0.013 [a]	0.015 [a]	0.020 [a]	0.027 [a]	0.033 [a]
	(0.008)	(0.004)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.004)	(0.003)
LEV	0.006 [a]	0.002 [a]	-0.002 [a]	-0.007 [a]	-0.011 [a]	-0.013 [a]	-0.014 [a]	-0.016 [a]	-0.016 [a]	-0.014 [a]	-0.012 [a]
	(0.010)	(0.005)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.004)	(0.008)	(0.011)
SIZE	0.027 [a]	0.025 [a]	0.024 [a]	0.024 [a]	0.024 [a]	0.025 [a]	0.025 [a]	0.025 [a]	0.025 [a]	0.026 [a]	0.027 [a]
	(0.002)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.002)
DGP	-0.016 [a]	-0.008 [a]	-0.005 [a]	-0.002 [a]	-0.000 [a]	0.001 [a]	0.003 [a]	0.005 [a]	0.010 [a]	0.013 [a]	0.012 [a]
	(0.006)	(0.003)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.004)	(0.005)
DMANU	0.029 [a]	0.016 [a]	0.006 [a]	0.004 [a]	0.000 [a]	-0.000 [a]	-0.001 [a]	-0.004 [a]	-0.006 [a]	-0.008 [a]	-0.020 [a]
	(0.008)	(0.004)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.004)	(0.005)
Intercept	-0.144 [b]	-0.085 [b]	-0.047 [a]	-0.030 [a]	-0.021 [a]	-0.017 [a]	-0.015 [a]	-0.009 [a]	0.005 [a]	0.029 [a]	0.060 [a]
	(0.020)	(0.011)	(0.006)	(0.003)	(0.003)	(0.003)	(0.003)	(0.005)	(0.007)	(0.012)	(0.016)
Observations	6,709	6,709	6,709	6,709	6,709	6,709	6,709	6,709	6,709	6,709	6,709

Robust standard errors in parentheses: p<0.01, p<0.05, p<0.1. Superscripts [a, and b] represent statistical significance at the 1% and 5% levels, respectively.

6. Conclusion

This paper explores the resilience potentials of the Indian manufacturing and service industries during the COVID-19 pandemic. It also considers the BG firms and the SA firms to test the resilience capacity of those firms. The findings reveal that 37.96% of firm-years for the manufacturing organizations and 42.88% of firm-year for the service industry were in the NR (non-resilience) and UR (uncertain for resilience) categories, which shows that the service industry is more oriented to cash consumption, as compared with cash accumulation. Its products are recurring staples. This indicates that the manufacturing industry has a more resilient capacity than the service industry, whereas CASBTA is more for the service industry than for the manufacturing industry. The manufacturing industry's products are more cyclical and need cash accumulation during stressful times. The findings also indicate that the service industry should create a more resilient capacity to help it rebound from an unexpected financial or operational crisis. Regarding the dynamic capability to make financial slacks, the service industry has bounced back with 4% of CASBTA in post-2020. In contrast, the manufacturing industry returned with 3% of CASBTA in the same period. In post-2020, both industries have increased their financial slacks to face such a turbulent future.

This study also documents the behaviour of the BG organizations and the SA organizations regarding their resilient potential. About 25.85% of the firm-year of the BG firms falls under the NR category, whereas 31.08% of the firm-year of the SA firms fall under the NR classification. The CASBTA of the BG firms is more significant than its counterpart of the SA firms. The BG firms use more dynamic techniques to scale up their financial slacks post-2022. This finding reveals that the BG firms are more sensitive to using their resources during adverse conditions than the SA firms.

The empirical investigation reveals that the results of the cash-driven RCs of the manufacturing and service industries are not at a justifiable level. The empirical results for the BG and SA firms also suggest that resilient firms have more resilience capacity than non-resilient firms. Both categories of firms hold the same ratio of cash. Still, during the COVID-19 period, the cash holdings were insufficient to bounce back to normalcy, as the dynamic capabilities of the firms could not manage the financial slack during 2020 as they had fallen from 2% to -1%.

The findings provide directions to the management of firms, underscoring that the organizations should create more financial slacks and maintain the cash and cash equivalent at the average of the industry level. These findings are also applicable to BG firms as well as SA firms. Companies fall under the NR zone. Those companies could be prone to the bankruptcy code. Hence, their management should focus more on those companies that fall under the NR zone and in the UR categories. Firms with a liquidity crunch should improve their liquidity to fair well at the industry level. Further research can be carried out to examine the liquidity and resilience capacity of the organization, as well as the bankruptcy scores and other financial and adverse economic conditions.

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