


Management control mechanisms, environmental unpredictability and organizational resilience


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Received on 03.11.2022 – Desk acceptance on 03.30.2022 – 4th version approved on 10.03.2022

Editor-in-Chief: Fábio Frezatti

Associate Editor: Cláudio de Araújo Wanderley

ABSTRACT

This article analyzes the (formal and informal) role of control mechanisms in fostering (proactive and reactive) organizational resilience of financial technology startups (fintechs), considering the moderating effect of environmental unpredictability. First, there is little evidence on formal and informal control mechanisms in the context of organizational resilience. Second, studies on management controls focus on some resilience approaches, however, they do not address resilience from a proactive and reactive perspective. Third, the literature on the effects of environmental unpredictability on contemporary organizations, like the fintechs, is still scarce. On the one hand, new evidence is added to the literature on management control and organizational resilience, the understanding of antecedents of resilience in startups is expanded, and insights are provided on the effects of environmental unpredictability on the alignment of management controls and objects of control. On the other hand, insights are provided on control mechanisms that fintechs can benefit from to building organizational resilience, both to anticipate and prepare and to act and formulate responses in the face of business disruptions and uncertain times. The findings benefit the building and strengthening of resilience in fintechs, which becomes key for these startups to survive and consolidate themselves in the financial market. Data have been collected by survey and analyzed through structural equation modeling. Additional investigation has been conducted via fuzzy-set qualitative comparative analysis. The main results reveal that: (i) formal and informal control mechanisms foster proactive and reactive organizational resilience; (ii) in scenarios of high environmental unpredictability, greater attention given to informal controls results in higher proactive resilience levels; and (iii) there are four (five) organizational configurations that lead fintechs to high proactive (reactive) resilience.

Keywords: management control, formal controls, informal controls, environmental unpredictability, organizational resilience.

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This is a bilingual text. This article was originally written in Portuguese, published under the DOI <https://doi.org/10.1590/1808-057x20221677.pt>



1. INTRODUCTION

Globalization and contemporary markets evoke scenarios of dynamism and turbulence, which continually affect the insertion and maintenance of new companies in the market (Fisher et al., 2020; Townsend et al., 2018). This is particularly true for startups, which are organizations that, even in the face of these uncertainties, seek to offer new products and services (Ries, 2011). Among the various startup segments, one that has received considerable attention is financial technology startups (fintechs), as they are agile companies that can innovate quickly (Brandl & Hornuf, 2020). Fintechs take advantage of the digitalization era and new technologies to offer disruptive financial services, which become a differential feature for these organizations (Hornuf et al., 2021).

Despite their innovative potential, a considerable portion of these startups cannot survive for a long time, mainly due to difficulties in operating business (March-Chorda, 2004; Noelia & Rosalia, 2020). It is estimated that more than half of these startups do not survive five years or more (Nobel, 2011). Within the scope of Brazilian fintechs, there are several barriers that lead to failure, such as lack of regulation of their own, need for investment, and difficulty in raising funds, conflicts with established players in the market (e.g. competition with large banks and brokerage firms), difficulties in finding networks of strategic partners, in addition to user behavior and acceptance (Braido et al., 2021). Thus, resilience is a key element to increase startups' chances of success and survival (Frare & Beuren, 2021b). Organizational resilience may be considered from both a proactive and a reactive perspective: while the first focuses on creating internal awareness for readiness in the face of possible business disruptions, the second seeks to formulate responses and succeed in tackling the emergence of these disruptions (Jia et al., 2020).

Managing and fostering organizational resilience is a tough task for startups (Haase & Eberl, 2019). In this sense, the present study postulates that formal control mechanisms (action and results controls) and informal ones (personnel and cultural controls) can collaborate for fintechs to manage and foster the building of organizational resilience, both proactively and reactively. Within the scope of formal controls, action controls guide employees in accomplishing tasks, while results controls monitor performance targets to be achieved. From the perspective of informal controls, personnel controls deal with employee hiring, training, and commitment, while cultural control refers to the vision, mission, and values

among members (Goebel & Weißenberger, 2016, 2017a, 2017b; Kleine & Weißenberger, 2014).

First, evidence already suggests that enabling management control systems (MCS) foster the creation of cognitive, behavioral, and contextual resilience (Beuren & Santos, 2019) and organizational resilience in a broad sense (Beuren et al., 2020). Control systems focused on planning, monitoring, flexible budgeting, and performance management also help in building organizational resilience capabilities (Bracci & Tallaki, 2021). However, for the discussion of formal and informal control mechanisms, the findings are less conclusive. Formal and informal control mechanisms instigate behaviors such as organizational commitment and trust (Goebel & Weißenberger, 2017a, 2017b; Kleine & Weißenberger, 2014), which is essential for the organization to be attentive and seek to anticipate possible business disruptions, in addition to facilitating the delivery of quick responses when changes are needed (Jia et al., 2020). In this vein, it is understood that formal and informal controls can promote the congruence of organizational and individual goals (Merchant & Van der Stede, 2007) aimed at encouraging (proactive and reactive) organizational resilience.

Second, management control studies have focused on cognitive, behavioral, and contextual resilience (Beuren & Santos, 2019) and organizational resilience in a broad sense (Beuren et al., 2020; Bracci & Tallaki, 2021), ignoring proactive and reactive aspects (Jia et al., 2020). Thus, highlighting control mechanisms that foster proactive and reactive organizational resilience is relevant, as the first aims to anticipate and expect possible atypical events (Sull, 2005), while the second seeks to deliver quick responses to unexpected events that occur (Dubrovski, 2004). In this way, startups can increase their probability of survival (Watanabe et al., 2004) and increase competitiveness (Teixeira & Werther, 2013) by managing uncertainty (Gunasekaran et al., 2011). Inherent to all this, the incipient studies that address resilience enablers in startups is a motivating factor to explore this phenomenon and its antecedents (Frare & Beuren, 2021b; Haase & Eberl, 2019).

Third, contemporary organizations are increasingly subject to environmental unpredictability, i.e. inability to anticipate environmental changes and, in view of this, assess possible managerial and organizational impacts (Bedford & Malmi, 2015). Basically, the increase (decrease) in environmental unpredictability results in a greater (lesser) need to align management controls to achieving

a certain outcome or behavior (Gerdin et al., 2019; Henri & Wouters, 2020). It is speculated that this is consistent with the reality of fintechs, as higher environmental unpredictability levels are expected to require greater intensity of (formal and informal) control mechanisms to ensure the maintenance of (proactive and reactive) organizational resilience needed to anticipate and handle organizational changes (Jia et al., 2020).

Given the incompleteness, inconclusive results, and gaps in the literature, this study sought to analyze the role of (formal and informal) control mechanisms in favor of (proactive and reactive) organizational resilience of fintechs, considering the moderating effect of environmental unpredictability. To do this, the hypotheses were tested in 78 Brazilian fintechs, based on structural equation modeling through partial least squares (PLS-SEM). Complementarily, fuzzy-set qualitative comparative analysis (fsQCA) was applied, which provides a comprehensive view of the results (Crespo et al., 2019; Cruz et al., 2022; Frare et al., 2022).

The findings indicate that formal and informal control mechanisms foster organizational resilience, both proactive and reactive. They also suggest that environmental

unpredictability positively moderates the relationship between informal controls and proactive resilience. Also, there are several combinations of conditions (formal controls, informal controls, environmental unpredictability, size, age, and ecosystem support) that result in high (proactive and reactive) organizational resilience. This is all consistent with the idea that management controls are relevant for startups to succeed (Davila & Foster, 2005, 2007). These findings contribute in two main ways. On the one hand, the study contributes to the literature on management control and organizational resilience (Beuren & Santos, 2019; Beuren et al., 2020; Bracci & Tallaki, 2021), antecedents of resilience in startups (Frare & Beuren, 2021b; Haase & Eberl, 2019), impacts of environmental unpredictability on the alignment of management control and object of control (Gerdin et al., 2019; Henri & Wouters, 2020), in addition to adding new insights into fintechs (Brandl & Hornuf, 2020; Hornuf et al., 2021). On the other hand, it contributes to fintech management finding ways to encourage the building of (reactive and proactive) organizational resilience, aiming to anticipate and act quickly when adverse situations occur (Jia et al., 2020).

2. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

2.1 Management Control and Organizational Resilience

By inducing employee behaviors, MCSs enable managers to promote and achieve organizational goals (Merchant & Van der Stede, 2007). This occurs through management control mechanisms, which permeate formal (action and results controls) and informal (personnel and cultural controls) ways (Goebel & Weißenberger, 2016, 2017a, 2017b; Kleine & Weißenberger, 2014). On the one hand, action controls are aimed at how employees accomplish their tasks, while results controls focus on performance goals to be achieved. On the other hand, personnel controls are concerned with employee hiring, training, and commitment, while cultural control aims to disseminate the vision, mission, and values among the organization's members (Goebel & Weißenberger, 2017a).

Formal and informal control mechanisms tend to be beneficial to organizations in several ways. The use of both controls is positively influenced by the managers' leadership style, in addition to the fact that in this case informal controls serve as facilitators of organizational commitment (Kleine & Weißenberger, 2014) and contribute to making

MCS efficient, while in formal controls only action controls have a positive association with MCS efficiency, all of which is reflected in organizational performance (Goebel & Weißenberger, 2017a). Informal controls are useful for promoting an ethical work climate, which results in greater trust and improved organizational performance (Goebel & Weißenberger, 2017b); they also foster organizational identification and employees' affective commitment (Monteiro & Lunkes, 2021), which are key to ensuring the congruence of individual and organizational goals (Merchant & Van der Stede, 2007).

Although informal controls alone contribute more than formal controls to employee job satisfaction, when combined they can lead to high job satisfaction (Cruz et al., 2022). An identical perspective takes place in the contribution of formal and informal controls to managers' performance in family businesses; in isolation, informal controls stand out, but when combined, they result in more than one path leading to high managerial performance (Monteiro et al., 2021). Formal and informal controls, together, also encourage trust and organizational commitment (Boff et al., 2021). In general terms, the evidence suggests that the extent to which formal and

informal control mechanisms are used can orchestrate various organizational priorities and the present study postulates the case of organizational resilience.

Organizational resilience has aroused interest in understanding phenomena such as recovery, adaptation, and anticipation of events characteristic of turbulent environments (Annarelli & Nonino, 2016; Buliga et al., 2016). This is because such phenomena provide survival (Watanabe et al., 2004) and increased competitiveness (Teixeira & Werther, 2013) through uncertainty management (Gunasekaran et al., 2011). Considering this dynamics, resilience represents a source of survival, especially for organizations that work with new technologies and see themselves in a scenario of high unpredictability and competition (Watanabe et al., 2004).

Organizational resilience may be considered from two perspectives: proactive and reactive (Jia et al., 2020). Proactive organizational resilience consists in the act of anticipating and waiting for possible atypical events (Sull, 2005), aiming to promptly expedite organizational changes if something happens (Giustiniano et al., 2018). It boils down to the creation of internal awareness, analysis and assessment of probabilities, preparation of contingency plans, and any other aspects for prevention and readiness in the face of possible occurrence of business disruptions (Jia et al., 2020). Reactive organizational resilience focuses on providing prompt responses to unexpected events that occur (Dubrovski, 2004), mobilizing efforts to minimize the impacts of adverse events caused by new circumstances (Bode & Macdonald, 2017), permeating the quick recognition, identification, and assessment of threatening situations, in order to deliver responses and succeed in dealing with these moments (Jia et al., 2020).

This discussion of (proactive and reactive) organizational resilience is particularly relevant for startups, which are constantly threatened and, since their birth, they are susceptible to major business disruptions, due to lack of resources, fierce competition, acceptance barriers by users (Braido et al., 2021), as well as adverse events such as the pandemic caused by the coronavirus disease 2019 (COVID-19) (Frare & Beuren, 2021b).

Evidence for management controls and organizational resilience is limited, but it does suggest that the former fosters the latter. Evidence points out that an enabling MCS encourages the creation of cognitive, behavioral, and contextual resilience, while the coercive MCS is less useful in this situation, but nevertheless fosters contextual resilience (Beuren & Santos, 2019). Also, there are findings indicating that the enabling perception of the MCS fosters organizational resilience (Beuren et al., 2020) and that

the MCS is relevant to promoting adaptive behaviors and organizational change, providing quick responses to face adverse situations, i.e. organizational resilience capabilities (Bracci & Tallaki, 2021).

As they operate on a wide scope covering action, results, personnel, and cultural, formal and informal control mechanisms are useful to promote the congruence of organizational and individual goals (Goebel & Weißenberger, 2016, 2017a, 2017b; Kleine & Weißenberger, 2014). The extent to which these mechanisms are used ensures the MCS efficiency (Goebel & Weißenberger, 2017a), potentially leading the organization to build proactive and reactive organizational resilience capabilities; organizational commitment is encouraged (Boff et al., 2021; Goebel & Weißenberger, 2017a; Kleine & Weißenberger, 2014), which is key for the organization to be attentive and seek to anticipate possible business disruptions, in addition to facilitating the delivery of quick responses when changes are needed (Jia et al., 2020).

In summary, it is noticed that control mechanisms aimed at results and action (formal controls) and at personnel and cultural (informal controls) can create an organizational environment of commitment, care, and readiness (Boff et al., 2021; Cruz et al., 2022; Goebel & Weißenberger, 2017a; Kleine & Weißenberger, 2014), which is crucial to stimulate internal awareness of possible business disruptions (proactive resilience) and to promptly act when these disruptions occur (reactive resilience). Burnard et al. (2018) point out that the process of responding to events that start suddenly, which is the case with many actions and needs of startups, is iterative, and even though the responses depend on the event that one seeks to respond to in itself, and even the ability to collect, analyze, interpret, and use information effectively, suggesting that formal and informal control mechanisms play a distinctive role in fostering organizational resilience.

Thus, evidence suggests that the extent to which management control mechanisms are used can lead to the building of higher organizational resilience levels. More specifically, each (formal and informal) control mechanism is expected to play a relevant role in promoting proactive and reactive resilience, as described below:

H_{1a}: Higher levels of formal controls lead to increased proactive resilience.

H_{1b}: Higher levels of formal controls lead to increased reactive resilience.

H_{1c}: Higher levels of informal controls lead to increased proactive resilience.

H_{1d}: Higher levels of informal controls lead to increased reactive resilience.

2.2 Moderating Effect of Environmental Unpredictability

Finding ways to manage and foster organizational resilience in times of unpredictability is a constant challenge (Sawalha, 2015). Environmental unpredictability permeates the organization's inability to anticipate possible environmental changes and therefore assess the possible impacts on management and organizational structure (Bedford & Malmi, 2015). As environmental unpredictability increases (decreases), greater (lesser) is the need to align controls to achieving a certain outcome/behavior (Gerdin et al., 2019; Henri & Wouters, 2020), in this case, (proactive and reactive) resilience.

Environmental unpredictability stems mainly from the actions of stakeholders, such as suppliers, customers, and competitors (Bedford & Malmi, 2015). Management control configurations in conditions of high or low environmental unpredictability may vary, according to characteristics such as life-cycle stage, strategy, and type of service provided (Auzair, 2015). In this sense, studies have explored management control configurations and certain outcomes, considering the moderating role of environmental unpredictability.

Gerdin et al. (2019) investigated the complementarity between value-based controls and results controls, in relation to profitability at the firm level, considering the moderation of environmental unpredictability. Similarly, Henri and Wouters (2020) analyzed the interdependence between the functionality of cost information and the

diversity of non-financial performance indicators, as well as the moderating effect of environmental unpredictability. Both studies reinforce that in the face of low unpredictability, the greater the probability that controls act strongly and in line with the target goal, i.e. on the planned route. On the other hand, when unpredictability is high, the range of use of controls increases. Also, evidence suggests that an environment of cooperation, trust, and beliefs, in addition to stricter norms and goals, may be relevant to maintaining resilience in contexts of increased environmental unpredictability (Andersson et al., 2019).

These findings reinforce the idea that informal (which favor cooperation, trust, and dissemination of beliefs) and formal (stricter goals and norms) control mechanisms are relevant to fostering resilience. Thus, since resilience is closely related to the ability to proactively respond to what is unexpected, i.e. unpredictability (Ortiz-de-Mandojana & Bansal, 2016), and that recent evidence indicates that managers relinquish controls to react to what the environment is imposing (Sarkar & Clegg, 2021), it is expected that:

H_{2a}: Environmental unpredictability positively moderates the relationship between formal controls and proactive resilience.

H_{2b}: Environmental unpredictability positively moderates the relationship between formal controls and reactive resilience.

H_{2c}: Environmental unpredictability positively moderates the relationship between informal controls and proactive resilience.

H_{2d}: Environmental unpredictability positively moderates the relationship between informal controls and reactive resilience.

3. METHOD

3.1 Sample and Data Collection

Fintechs are an emerging phenomenon, both in the market and in academia. These are organizations that exploit the digitization wave and new technologies to offer disruptive financial services (Hornuf et al., 2021), agile and able to innovate quickly, either incrementally or radically (Brandl & Hornuf, 2020). Furthermore, despite the barriers to the entry of fintechs, the Brazilian context is prolific and full of opportunities (Braidó et al., 2021).

The research population consists of 566 fintechs listed on the *StartupBase*, which is run by the Brazilian Association of Startups (Associação Brasileira de Startups [Abstartups]). Data were collected by survey, applied

to fintech managers via *LinkedIn*, between December 2020 and April 2021. The sample brings together 78 different fintechs (13.78% of the population) and the representativeness and size are satisfactory when compared with research papers in the field (Crespo et al., 2019; Frare & Beuren, 2021a, 2021b). As for size, 42 fintechs (53.85%) have 20 or fewer employees. Regarding age (years of operation in the market), 27 fintechs have been operating for up to 2 years; 28 from 3 to 4 years; 11 from 5 to 6 years; and 12 for more than 6 years, with 43 (55.13%) having been in the market for at least 3 years and 34 confirming some business ecosystem support (e.g. incubator, park, or accelerator).

3.2 Measurements

The study of **formal and informal control mechanisms** in startups is timely and pertinent (Akroyd & Kober, 2020; Santos et al., in press). This construct captured managers' perceptions of the extent of use of formal (action and results, 5 items each) and informal (personnel, 5 items, and cultural, 6 items) controls, adopted from Goebel and Weißenberger (2017a). A 7-point Likert-type scale was applied (1 = Strongly disagree to 7 = Strongly agree).

The external environment of startups is so relevant to the point of shaping business strategies and impacting on the management and outcome of these companies (Von Gelderen et al., 2000). For the construct **environmental unpredictability**, managers have pointed out how predictable or unpredictable their organization's external factors are, based on 3 items (suppliers' actions; customer needs, wishes, and preferences; competitors' market activities) (Henri & Wouters, 2020). Higher mean scores represent a higher environmental unpredictability level (1 = Highly predictable to 7 = Highly unpredictable). It is worth highlighting that the external environment can permeate several perspectives, such as uncertainty, turbulence, complexity, and hostility - for further theoretical and operational details, see Bedford and Malmi (2015) and Chenhall (2003). However, according to the research objectives and in line with the study by Henri and Houters (2020), environmental unpredictability is exclusively considered, which is occasionally defined as "inability to anticipate variations among elements of environment and assess the effect of material changes on the organization" (Bedford & Malmi, 2015, p. 9) and represents key dimensions of the external environment of organizations, namely suppliers, customers, and competitors (Henri & Houters, 2020).

The study of **organizational resilience** in startups is relevant to providing answers in the face of business disruption, crises, and environmental uncertainties as a whole (Frare & Beuren, 2021b; Haase & Eberl, 2019). To measure this construct, managers declared their

agreement with aspects of proactive (4 items) and reactive (5 items) resilience in the organization, adopted from Jia et al. (2020). A 7-point Likert-type scale was applied (1 = Strongly disagree and 7 = Strongly agree).

Additionally, the study resorts to 3 **control variables**. The first is organization size, measured by the number of employees, based on a dummy variable (0 = Up to 20 and 1 = More than 20). The second consists of organization age, based on the time since creation, using another dummy variable (0 = Up to 3 years and 1 = More than 3 years). Firm size and age are commonly controlled in related studies (Bedford, 2015). Finally, business ecosystem support was measured by considering whether the startup had a link with some institution (e.g. accelerator, incubator, or park), using a dummy variable (0 = No and 1 = Yes). Previous studies demonstrate many organizational configurations for startups depending on business ecosystem support (Frare & Beuren, 2021a, 2021b).

Finally, it is emphasized that all constructs and items explored in the research have the relevant literature as a basis and can be found in detail in the Appendix.

3.3 Data Analysis Technique

Data analysis follows a mixed methods approach. For the hypothesis test, PLS-SEM is used, which allows symmetrical analyses of the proposed relationships, it does not require data normality, in addition to allowing complex modeling (Hair et al., 2019). In a complementary way, the use of fsQCA is adopted, which allows asymmetric analyses, to show needed and sufficient conditions for the occurrence of a given outcome (Ragin, 2008). Several studies that explore management controls in startups employ the mixed methods approach (Crespo et al., 2019; Cruz et al., 2022; Frare & Beuren, 2021a, 2021b; Frare et al., 2022). Particularly, the fsQCA allows analyzing possible combinations of management controls and other organizational elements that generate equally effective configurations for certain outputs (Bedford & Sandelin, 2015; Frare et al., in press).

4. DATA ANALYSIS

4.1 PLS-SEM Analysis

4.1.1 Measurement model

The first stage of applying the PLS-SEM is assessing the measurement model, according to the assumptions

shown in Table 1. Consistent with the relevant literature (Goebel & Weißenberger, 2016; Kleine & Weißenberger, 2014), formal (action and results) and informal (personnel and cultural) controls are modeled as a second-order structure, based on the indicator repetition approach.

Table 1

Structural model

Variables	Average	SD	α	CR	AVE	1	2	3	4	5	6	7	8
1. FC	4.97	1.79	0.918	0.924	0.859	0.927	0.782	0.200	0.594	0.616	0.126	0.060	0.168
2. IC	5.55	1.68	0.905	0.898	0.815	0.711	0.903	0.188	0.526	0.574	0.152	0.146	0.163
3. EU	4.27	1.59	0.746	0.851	0.656	0.022	0.022	0.810	0.181	0.266	0.024	0.025	0.371
4. PR	4.75	1.71	0.860	0.905	0.704	0.542	0.484	-0.013	0.839	0.494	0.102	0.183	0.141
5.RR	5.52	1.23	0.798	0.858	0.602	0.545	0.503	-0.138	0.422	0.776	0.119	0.088	0.128
6. Size	-	-	-	-	-	-0.109	-0.102	0.015	-0.056	-0.038	-	0.370	0.140
7. Age	-	-	-	-	-	-0.044	0.075	-0.010	-0.143	-0.041	0.370	-	0.053
8. Support	-	-	-	-	-	0.113	0.113	-0.322	0.126	0.099	-0.140	-0.053	-

Notes: The square root values of the AVE are shown on the diagonal, below the values of the Fornell-Larcker correlations, above the values of the heterotrait-monotrait (HTMT) correlation ratio.

SD = Standard deviation; CR = composite reliability; AVE = average variance extracted; FC = formal controls; IC = informal controls; EU = environmental unpredictability; PR = proactive resilience; RR = reactive resilience.

Source: Prepared by the authors.

For model fit, 3 items were excluded (see Appendix for more information), 1 from reactive resilience, 1 from action controls, and 1 from cultural controls. The items' factor loadings proved to be adequate (> 0.60), 0.699 being the lowest load found (Hair et al., 2017). As for descriptive statistics, it is noticed that informal controls were used to a greater extent than formal controls, in addition to greater agreement with the presence of reactive resilience than proactive resilience. Cronbach's alpha (α) and composite reliability values meet expectations (between 0.70 and 0.95), this is attested by the reliability of internal consistency (Hair et al., 2019). The average variance extracted resulted in satisfactory values (> 0.50), this confirms the convergent validity (Hair et al., 2019). Finally, the Fornell-Larcker criterion (square root of the average variance extracted greater than the other correlations) and the heterotrait-monotrait correlation ratio criterion (with values lower than 0.90) exhibit discriminant validity (Hair et al., 2017, 2019). Thus, the measurement model is adequate.

The possible presence of non-response bias was tested by comparing the average values between the first and last respondents, since the latter are analogous to non-respondents (Armstrong & Overton, 1977). Thus, a simple comparison test of average values between the constructs for the 10 first and 10 last respondents (Frare et al., 2022) reveals that there is no significant difference between these groups (p values between 0.134 and 0.806), which explains that there is no problem with this bias. The possible presence of the Common Method Bias (CMB) was also investigated, which by using the Harman test resulted in 6 factors with eigenvalues above 1, cumulative variance of 72.83%, and the first factor comprises 33.49% of the total variance. Thus, because it is below the threshold (50%), the CMB is not a problem (Podsakoff et al., 2012).

4.1.2 Structural model

The assessment of the structural model is shown in Table 2. Panel A reveals the results of path analysis, while Panel B refers to the quality criteria.

Table 2
Structural model

Panel A – Path analysis				
Relationship		Beta (β)	P value	f ²
Direct effects				
H _{1a}	Formal controls → Proactive resilience	0.481	0.004***	0.174
H _{1b}	Formal controls → Reactive resilience	0.398	0.013**	0.108
H _{1c}	Informal controls → Proactive resilience	0.221	0.088*	0.039
H _{1d}	Informal controls → Reactive resilience	0.255	0.068*	0.048
-	Environmental unpredictability → Proactive resilience	-0.091	0.266	0.011
-	Environmental unpredictability → Reactive resilience	-0.164	0.149	0.033
Moderating effects				
H _{2a}	Formal controls * Environmental unpredictability → Proactive resilience	-0.028	0.444	0.001
H _{2b}	Formal controls * Environmental unpredictability → Reactive resilience	0.046	0.420	0.001
H _{2c}	Informal controls * Environmental unpredictability → Proactive resilience	0.332	0.061*	0.062
H _{2d}	Informal controls * Environmental unpredictability → Reactive resilience	0.010	0.482	0.001
Control variables				
-	Size → Proactive resilience	0.083	0.444	0.010
-	Size → Reactive resilience	0.059	0.597	0.004
-	Age → Proactive resilience	-0.153	0.173	0.033
-	Age → Reactive resilience	-0.069	0.556	0.006
-	Support → Proactive resilience	0.042	0.690	0.003
-	Support → Reactive resilience	-0.021	0.833	0.001
Panel B – R² and Q²				
		R ²	Q ²	
Proactive resilience		0.348	0.241	
Reactive resilience		0.280	0.164	

Notes: Bootstrapping with 5,000 resamplings, one-tailed test when the sign of the relationship is predicted, and two-tailed otherwise.

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.

For direct effects, f^2 pervades small (0.02), mid- (0.15), and large (0.35) effect sizes. For interaction effects, f^2 pervade small (0.005), mid- (0.01), and large (0.025) effect sizes (Hair et al., 2021).

Source: Prepared by the authors.

Hypothesis testing reveals that there is statistical support for H_{1a}, H_{1b}, H_{1c}, H_{1d}, and H_{2c}. Furthermore, no control variable is statistically significant. The coefficient of determination (R²) of both dependent variables (proactive and reactive resilience) shows a large (R² = 26%) explained variance (Cohen, 1988). Also, the Stoner-Geisser indicator (Q²) has predictive accuracy (Q² > 0) of dependent variables (Hair et al., 2019). Based on the variance inflation factor, the possible presence of multicollinearity between independent variables was investigated. Variance inflation factor values are less than 3 (highest variance inflation factor = 2.901), and this attests the absence of this problem (Hair et al., 2019).

Additionally, an analysis of combination of controls (formal × informal mechanisms) was performed through interaction (Frare et al., 2022; Müller-Stewens et al., 2020). (Non-tabulated) results indicated that combination of controls does not show a significant relationship with

proactive ($\beta = -0.049$; $p = 0.638$) and reactive ($\beta = 0.001$; $p = 0.994$) resilience, while the other relationships remained constant in view of what is displayed in Table 2.

4.2 fsQCA Analysis

4.2.1 Calibration

Calibration is the first step of the fsQCA. At this stage, data are converted to a *fuzzy score* (0 to 1), considering the *full set membership*, *crossover point*, and *full set non-membership* (Ragin, 2008). For variables on a 7-point Likert-type scale, after defining the average value of the construct items (Crespo et al., 2021), theoretical anchors 7, 4, and 1 are used, respectively (Cruz et al., 2022; Leischnig et al., 2016). For the others (demographic variables), the scores have a *crisp-set* nature (Ragin, 2008).

4.2.2 Necessary conditions

Analysis of necessary conditions is the second step. A certain condition may be necessary or almost always necessary for the occurrence of a certain outcome. The literature suggests that when consistency is greater than 0.90 it is necessary, and above 0.80 it is almost always necessary (Ragin, 2000). On the one hand, it was identified that formal controls are necessary for the occurrence of high proactive resilience (0.914) and almost always necessary for high reactive resilience (0.858). On the other hand, it was noticed that informal controls are necessary for the occurrence of high proactive resilience (0.938) and high reactive resilience

(0.904). The groups of demographic variables do not show any need.

4.2.3 Sufficient conditions

The third step of the fsQCA is the preparation of a truth table, with 2^6 rows, for each model under analysis (Ragin, 2008). To refine the truth table, a 0.80 consistency threshold and a 2 frequency threshold are applied (Ragin, 2008). The intermediate solutions resulting from these procedures are shown in Table 3. While Panel A displays the conditions that lead to high proactive resilience, Panel B highlights the conditions that result in high reactive resilience.

Table 3

Sufficient configurations for high organizational resiliency

Panel A – Model A: PR = f(FC, IC, EU, Size, Age, Ecosystem support)					
Conditions	SA1	SA2	SA3	SA4	
Formal controls	●	●	●	●	
Informal controls	●	●	●	●	
Environmental unpredictability					
Size	○		○	●	
Age	○	○		●	
Ecosystem support		●	●	○	
Raw coverage	0.401	0.308	0.309	0.249	
Unique coverage	0.023	0.026	0.075	0.044	
Consistency	0.876	0.887	0.837	0.853	
Overall coverage of the solution	0.789				
Overall consistency of the solution	0.825				
Panel B – Model B: RR = f(FC, IC, EU, Size, Age, Ecosystem support)					
Conditions	SB1	SB2	SB3	SB4	SB5
Formal controls	●	●	●		●
Informal controls	●	●	●	●	●
Environmental unpredictability				●	
Size	○		○	○	●
Age	○	○		○	●
Ecosystem support		●	●	○	○
Raw coverage	0.366	0.278	0.287	0.207	0.230
Unique coverage	0.028	0.030	0.081	0.012	0.046
Consistency	0.980	0.984	0.956	0.987	0.970
Overall coverage of the solution	0.747				
Overall consistency of the solution	0.959				

Notes: black circle (●) = presence of the condition; white circle (○) = absence of the condition; and ballots without circles = such condition is indifferent to the solution.

PR = proactive resilience; RR = reactive resilience; FC = formal controls; IC = informal controls; EU = environmental unpredictability.

Source: Prepared by the authors.

Consistencies are greater than 0.80 and overall coverage ranges from 0.25 to 0.90, and this reveals suitability (Ragin,

2008). Model A (Model B) reveals 4 (5) causal solutions that lead to high proactive (reactive) resilience.

4.3 Discussion

(Formal and informal) control mechanisms are positively associated with (proactive and reactive) organizational resilience, and this supports H_{1a} , H_{1b} , H_{1c} , and H_{1d} . Overall, this finding confirms previous evidence that management control may be relevant to fostering resilience (Beuren & Santos, 2019; Beuren et al., 2020; Bracci & Tallaki, 2021), but fuels additional discoveries in terms of extending the discussion into formal and informal control mechanisms.

For the literature on formal and informal controls, this reveals that in addition to organizational commitment (Boff et al., 2021; Keine & Weißenberger, 2014; Monteiro & Lunkes, 2021), MCS efficiency (Goebel & Weißenberger, 2017a), organizational performance (Goebel & Weißenberger, 2017a, 2017b), ethical work climate (Goebel & Weißenberger, 2017b), trust (Boff et al., 2021; Goebel & Weißenberger, 2017b; Monteiro & Lunkes, 2021), organizational identification (Monteiro et al., 2021), management performance (Monteiro et al., 2021), and job satisfaction (Cruz et al., 2022), these mechanisms contribute to fostering organizational resilience, both proactive and reactive.

Although additional results regarding the combination of controls in favor of resilience are not statistically significant in PLS-SEM analysis, fsQCA analysis points out that high proactive or reactive resilience is usually achieved through combinations of formal and informal control mechanisms along with other conditions (environmental unpredictability, age, size, and/or ecosystem support). Particularly, this combination of formal and informal control mechanisms is effective in all 4 solutions for high proactive resilience (Table 3 – Panel A) and 4 out of the 5 solutions for high reactive resilience (Table 3 – Panel B). This corroborates the idea that combinations of formal and informal controls are relevant to promoting high job satisfaction (Cruz et al., 2022), high management performance (Monteiro et al., 2021), and high (proactive and reactive) organizational resilience. This finding is in line with the idea that, due to resource constraints in early stages, startups initially have informal controls focused on culture and personnel hiring and training, and over time, with increasing organizational complexity and also the occurrence of relevant events (e.g. incubation and fund raising), feel the need to rely on rather formal control mechanisms for operating business, such as target and results controls (Akroyd & Kober, 2020). Thus, various combinations of rather formal and informal control mechanisms can be effective in achieving the desired congruence of goals (Frare et al., in press).

Additionally, this study shows that regardless of environmental unpredictability, size, age, and ecosystem support, high organizational resilience crucially depends on the presence of a combination of formal and informal control mechanisms. This finding is relevant because the relationship between formal and informal control mechanisms and organizational resilience is a differential feature in startups. In these organizations, quickness of response to anticipating and predicting atypical events (proactive resilience) and quickness of providing prompt responses to unexpected events (reactive resilience) is very high when compared to conventional companies. Besides, the size of these organizations and their strategy execution dynamics require constant adaptation, especially those related to the product/service and the market.

It was proven that the controls aimed at managing activities (action controls), focused on performance goals (results controls), hiring, training, and commitment (personnel controls), and dissemination of the vision, mission, and values among the organization's members (cultural controls) (Goebel & Weißenberger, 2017a; Kleine & Weißenberger, 2014) build organizational resilience, both proactively and reactively. This is relevant, as it indicates the types of control mechanisms that fintechs can use to encourage anticipation and prediction of possible atypical events (Sull, 2005), quickly stimulating possible organizational changes (Giustiniano et al., 2018), in addition to providing immediate responses to unexpected events (Dubrovski, 2004), thus mobilizing efforts to minimize the impacts arising from new circumstances (Bode & Macdonald, 2017).

This finding of combining controls and other elements via fsQCA brings up several interesting perspectives. Thus, it is clear that the combination of formal and informal controls leads to high (reactive and proactive) resilience in scenarios where: ecosystem support is indifferent and companies are younger and smaller (SA1 and SB1); ecosystem support is present and the company is younger (SA2; SB2) or smaller in size (SA3; SB3); and there is no support from the ecosystem, but the companies are already bigger and more mature in the market (SA4; SB5). In addition to these related solutions for proactive and reactive resilience, an alternative solution (SB4) has been observed, where companies lack ecosystem support, are smaller and younger, achieve high reactive resilience from informal controls, regardless of the extent to which formal controls are used. Particularly, this last finding reveals the crucial role of informal control mechanisms to engage, empower, and inspire employees to achieving the congruence of organizational goals in an agile and reactive way (Cruz et al., 2022). In general, the solutions

found in fsQCA reveal that startups that do not have ecosystem support necessarily need to mature in age and grow in size, so that, along with dosage of a combination of controls, they can reach high resilience levels. On the other hand, in the case of existence (or even indifference) of ecosystem support, smaller and/or younger companies are already able to combine controls in favor of high organizational resilience levels. This finding highlights the role of accelerators, incubators, and parks in helping younger and smaller startups, mainly in managerial alignment to establish controls and search for certain outcomes (Frare & Beuren, 2021a; Frare et al., in press).

Regarding the hypotheses that propose the moderating effect of environmental unpredictability on the association of control mechanisms and organizational resilience, only H_{2c} is supported, proving that environmental unpredictability positively moderates the association of informal controls with proactive resilience. H_{2a} , H_{2b} , and H_{2d} were rejected, statistically proving that the impact of environmental unpredictability on how formal control mechanisms are associated with resilience (both proactive and reactive) is not significant. The same goes for the impact of unpredictability between informal controls and reactive resilience, signaling that, for certain organizations, the impact of external agents is not aligned with the extension of control mechanisms and the search for resilience or, in other words, environmental unpredictability does not interfere in the extent to which formal controls are used

in favor of organizational resilience, as well as the use of informal controls in fostering reactive resilience.

Considering the companies under analysis, the unsupported hypotheses H_{2a} , H_{2b} , and H_{2d} may also indicate that due to the characteristics inherent to startups, they already have a rather adaptive behavior that does not require movements in favor of resilience. Also, the time of existence of these companies and their rather flexible management models may also indicate that managers do not notice the relationship between controls and proactive resilience.

The only supported hypothesis (H_{2c}) from this perspective suggests that increased environmental unpredictability requires a greater need to align controls to achieving a certain outcome (Gerdin et al., 2019; Henri & Wouters, 2020), in this case, the organizational capacity to generate internal awareness, analyze and evaluate probabilities, prepare and follow contingency plans, and ensure means for prevention and readiness in the event of business disruptions (Jia et al., 2020). Thus, in view of the actions of stakeholders (Bedford & Malmi, 2015), (personal and cultural) informal controls are relevant for fintechs to be able to build proactive resilience. This is particularly relevant, as it allows these organizations to anticipate and be better prepared to face turbulent and competitive environments (Annarelli & Nonino, 2016; Buliga et al., 2016). Figure 1 details this moderating effect found in H_{2c} .

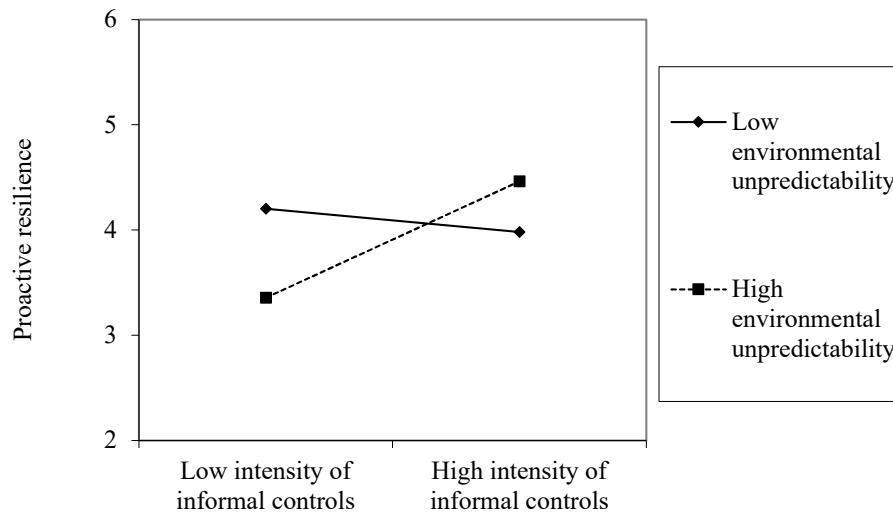


Figure 1 Moderating effect

Source: Prepared by the authors.

Under low environmental unpredictability, regardless of the low or high presence of informal controls, the effects on proactive resilience vary little. Interestingly, they even decrease to a small extent when the intensity of informal

controls increases. However, under high environmental unpredictability, greater effort directed towards informal control mechanisms becomes crucial, since as they receive greater attention, higher proactive resilience levels are

obtained. This evidence is supported in the literature, suggesting that when there is low unpredictability, there is a greater propensity for management controls to act strongly and in line with the target object of control, while when unpredictability is high, it becomes key to assign greater priority to using a given management control (Gerdin et al., 2019; Henri & Wouters, 2020; Sarkar & Clegg, 2021).

Specifically for the fintech scenario, this finding is important to encourage these organizations to overcome

their obstacles in order to gain space and prosper in the market (Braido et al., 2021). Particularly, the findings indicate that the extent to which controls disseminating the organizational culture are used for employee hiring, training, and retaining are relevant to encouraging fintechs to remain attentive and cautious of possible threats to business, especially when there are high unpredictability of central external agents: customers, suppliers, and competitors.

5. CONCLUSIONS, IMPLICATIONS, AND RECOMMENDATIONS

This study has concluded that formal and informal controls are relevant in promoting proactive and reactive resilience. For scenarios of high environmental unpredictability, greater intensity of informal controls results in greater proactive resilience. Many combinations of formal and informal controls, environmental unpredictability, size, age, and ecosystem support become configurations for fintechs to achieve high proactive and reactive resilience levels. Essentially, the adoption and implementation of formal and informal control mechanisms is useful for fintechs to promote the congruence of individual and organizational goals, enabling means to encourage proactive and reactive resilience.

The present study adds new evidence to the literature on management controls and organizational resilience (Beuren & Santos, 2019; Beuren et al., 2020; Bracci & Tallaki, 2021).

First, it explores formal and informal control mechanisms (Goebel & Weißenberger, 2016, 2017a, 2017b; Kleine & Weißenberger, 2014) and resilience from proactive and reactive perspectives (Jia et al., 2020). This is relevant, as it signals more or less implicit managerial mechanisms that, in fintechs, contribute to building organizational resilience, whether in the sense of anticipating or promptly acting in the face of unpredictable events.

Second, it contributes to improving the understanding of resilience antecedents in startups, something that has been emerging in the literature (Frare & Beuren, 2021b; Haase & Eberl, 2019). Particularly, this finding contributes to exploring how management can concentrate its efforts, through managerial mechanisms, when the priority is being resilient.

Third, it shows new insights into the effects of environmental unpredictability on the alignment of management controls and certain outcomes/behaviors (Gerdin et al., 2019; Henri & Wouters, 2020), particularly on the alignment of control mechanisms and

organizational resilience. This perspective highlights the dynamism arising from relationships with customers, suppliers, and competitors, which interfere in the implementation of business strategies in favor of the search for resilience.

Finally, new discussions are held about fintechs, a recent type of organization whose discussion and evidence are still incipient in academia and in the market (Braido et al., 2021; Brandl & Hornuf, 2020; Hornuf et al., 2021). Particularly, this study denotes the perspective of a startup segment (financial technology) that has a unique context, encompassed in a highly competitive market with established players, incipient regulation, and barriers to acceptance by users.

The research findings contribute in various ways to managing fintechs.

First, evidence is presented that both controls aimed at action and outcome (formal controls) and at people and culture (informal controls) are relevant for the organization to be able to issue signs of anticipation and preparation, in addition to providing quick responses to interruptions (business disruptions), arising from uncertain or adverse events. This finding reveals how managers can guide themselves to achieve their priorities in fintechs, especially in terms of the resilient 'spirit'.

Second, discussions arise on how external factors (suppliers' actions, needs, customer wishes and preferences, and competitors' market activities) make the organization place greater emphasis on informal controls, so that it can promote higher proactive resilience levels, i.e. aiming to anticipate and prepare in the best possible way for possible unique circumstances. This idea reinforces the perspective of implementing more organic controls, based mainly on culture and people.

Third, the study reveals that there is not just one path for fintechs to reach high organizational resilience levels (both proactive and reactive), but that various combinations of conditions lead to the same outcome. All of this depends on the fintech profile itself, i.e. the

perceived environmental unpredictability, number of employees (size), time in the market (age), and support from incubators, parks, or accelerators (ecosystem support). However, in order to achieve high proactive or reactive resilience, regardless of the conditions of the startup profile itself, the presence of a combination of formal and informal control mechanisms becomes key; elements that can contribute to overcoming difficulties and delay in raising funds, difficulties with major competitors, and time delay in establishing an adequate network of partners, for instance.

This study is not free from limitations. A sample of fintechs is exclusively taken, so, other organizations, even startups from other segments, may exhibit various behaviors. A natural path would be to extend the research to these new segments. This study uses a cross-sectional survey. In view of this, the use of alternative collecting methods (e.g. interviews or archival data) would be valid to

deepen knowledge about the phenomenon. This research is based on the context of organizational resilience in the face of business disruptions, but does not exclusively delimit and segregate possible internal or external disruptions, on small or large scales, therefore, further research studies can focus on delimiting and understanding the impact of each type of business disruption in the startups' management and organizational resilience. The conceptual model considers the moderation of environmental unpredictability. However, it is relevant to including other external factors (e.g. market turbulence and complexity), which can potentially impact the relationship between control mechanisms and their respective alignment with organizational resilience. Finally, this study considers the approach of formal and informal control mechanisms; exploring other approaches could enrich the body of knowledge about management control and organizational resilience.

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FINANCING

The authors would like to thank the Coordination for the Improvement of Higher Education Personnel (Coordenação de Aperfeiçoamento de Pessoal de Nível Superior [CAPES]) for financial support in carrying out this research.

APPENDIX

Research instrument

Formal controls: Results controls (1 = Strongly disagree to 7 = Strongly agree)

1. Specific performance goals are established for employees.
2. Employees' achievement of performance goals is controlled by their respective superiors.
3. Potential deviations from performance goals have to be explained by the responsible employees.
4. Employees receive feedback from their superiors concerning the extent to which they achieved their performance goals.
5. Variable remuneration components are linked to assigned performance goals.

Formal controls: Action controls (1 = Strongly disagree to 7 = Strongly agree)

6. Superiors monitor necessary steps regarding their employees' achievement of performance goals.
7. Superiors evaluate the way in which employees accomplish an assigned task.
8. Superiors define the most important work steps for routine tasks.
9. Superiors provide employees with information on the most important steps regarding the achievement of performance goals.
10. Policies and procedures manuals define the fundamental course of processes. *

Informal controls: Personal controls (1 = Strongly disagree to 7 = Strongly agree)

11. Our employees are carefully selected whether they fit the values and norms of our startup.
12. Much effort has been put into establishing the best-suitable recruiting process for our startup.
13. Emphasis is placed on hiring the best-suited applicants for a particular job position.
14. Training and development activities for employees are regarded as being very important.
15. Our employees receive numerous opportunities to broaden their range of skills.

Informal controls: Cultural controls (1 = Strongly disagree to 7 = Strongly agree)

16. Traditions, values, and norms play a major role in our startup. *
17. In our startup, high emphasis is placed on sharing informal codes of conduct with employees.
18. Our mission statement conveys the startup's core values to our employees.
19. Top managers communicate the startup's core values to employees.
20. Our employees are aware of the startup's core values.
21. Our employees perceive the values codified in our mission statement to be motivating.

Environmental unpredictability (1 = Highly predictable to 7 = Highly unpredictable)

22. Suppliers' actions.
23. Customer demands, tastes, and preferences.
24. Market activities of competitors.

Proactive resilience (1 = Strongly disagree to 7 = Strongly agree)

25. We created internal awareness for disruptions (business stoppages) and made attempts to drive this awareness to our employees.
26. We analysed and assessed both probability and impact of potential disruptions.
27. We improved our disruption prevention capabilities.
28. We engaged in contingency planning to prepare for potential disruptions.

Reactive resilience (1 = Strongly disagree to 7 = Strongly agree)

29. We are able to quickly recognize that there is a threatening situation. *
30. We are able to gather and interpret information of cues to gauge the magnitude, location, and causes of the disruption.
31. We are able to quickly identify, formulate, and evaluate a set of possible responses to disruption.
32. We can quickly organize a formal response team of key personnel, both on-site and at corporate level.
33. We are very successful at dealing with crises, including addressing public relations issues.

* Items excluded in scale purification.