

RESEARCH ARTICLE

The influence of complexity, uncertainty, and munificence on long-term organizational resilience to natural disasters

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Abstract

The turbulent conditions of the external environment have placed unprecedented pressure on firms, drawing management scholars' attention to organizational resilience. This research aims to study if complexity, uncertainty, and munificence influence organizational resilience in terms of long-term firm survival. We performed a binary logistic regression using a database of 1,849 Italian joint-stock firms between 2014 and 2020, of which 89 received public funds as compensation for damages caused by natural disasters. We found that munificence in the context where firms operate is likely to increase their survival in the long term compared to the peers together with turnover, however, context complexity and uncertainty have not been found significant. The results shed light on the role of the context as an antecedent of organizational resilience.

KEYWORDS

context munificence, contingent resource-based view, firm survival, natural disasters, organizational resilience

1 | INTRODUCTION

The magnitude and frequency of natural disasters, pandemics, wars, and terroristic attacks happening in recent times are changing how firms perceive external conditions. Indeed, from an organizational point of view, the materialization of such kind of threats might jeopardize business success or even question organizational survival. A recent study by the European Central Bank pointed out that if the low carbon transition will not be accomplished, firms particularly exposed to ecosystem disruptions related to global warming will face a probability of default five times higher than a median firm with an increase of 25% (Dunz et al., 2021). Therefore, in these times, the concept of resilience has become of paramount importance. Organizational resilience concerns an organization's aptitude to cope with and bounce back from adverse impacts, however, some scholars have focused their attention on the ability to recover and on the amount of disturbance an organization can deal with

without losing its functioning (Adger, 2000), while some others include the ability to preserve or even improving functioning (Kahn et al., 2018). Organizational resilience is considered as a set of capabilities that enable firms to persist over time and through shocks within complex and unstable contexts, therefore is often associated with survival (Ortiz-de-Mandojana & Bansal, 2016; Shepherd & Williams, 2023). However, only recently, management scholars have focused their attention on organizational resilience to natural disasters rather than on economic and technological jolts since the materialization of climate-related hazards calls for a reconsideration of the stability of the ecosystems on which the socio-economic systems depend. Scholars studying organizational resilience found that the resilience process has different kinds of antecedents both in terms of resources and in terms of capabilities (e.g. slack resources, relational capabilities, ecological embeddedness, flexibility, and integration with the supply chain). The role of the context remains unclear.

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The influence of context on the development of a proactive strategy for managing the relationship between the business and the natural environment has been widely recognized within the contingent resource-based view, which integrates the approaches of the contingency theory, the dynamic capabilities literature, and the natural resource-based view. In particular, the complexity, uncertainty, and munificence of the context have been identified as influential factors of business competitiveness and proactive environmental strategy. However, when considering the proactive strategies for managing this relationship, scholars usually refer to environmental strategies aimed at decreasing the firm's impact on the natural environment, neglecting the strategies to deal with the consequences of the ecosystem services' depletion, such as climate-related extremes. This study, therefore, aims to investigate the influence of complexity, uncertainty, and munificence on long-term organizational resilience to natural disasters through an analysis of a database collecting the data of 1,849 Italian joint-stock firms, of which: 89 firms received public funds as compensation for damages caused by river flooding and windstorm between 2013 and 2014; 880 firms operating in the same area but not reimbursed with public grants; and 880 firms located in other geographical areas that represent the reference group. A binary logistic regression analysis was carried out to determine the influence of complexity, uncertainty, and munificence (Aragón-Correa & Sharma, 2003) on organizational resilience in terms of survival probability of the three clusters in 7 years between 2014 and 2020, during which several external shocks occurred (i.e., river flooding, windstorms, and the COVID-19 pandemic). We found that context munificence is a significant predictor of organizational resilience with a positive relationship, together with turnover. However, context complexity and uncertainty have not been found significant.

Our study tries firstly to respond to the call of the natural resource-based view studies (Hart & Dowell, 2011) to shed light on the firms' responses to the depletion of natural resources and ecosystem services (Tencati & Pogutz, 2015; Winn & Pogutz, 2013), which pose serious risks to the business, such as in the case of climate change. Second, we extend the contingent resource-based view (Aragón-Correa & Sharma, 2003) by showing that it can also be applied to the development of organizational resilience capabilities necessary for firm survival when dealing with the natural turbulent conditions, beyond the environmental strategies just focused on the reduction of the corporate impacts. Third, we complement the literature on organizational resilience uncovering the role of exogenous factors, which was not very well addressed by previous research (Su & Junge, 2023).

The paper is structured as follows. In the next section, we propose a review of the literature about the antecedents of organizational resilience where our hypotheses are grounded. We then describe the methodology, focusing on the data collection, the measures, and the model. Thereafter we describe the results and discuss them. As we move to the conclusion, we suggest theoretical and policy implications.

2 | CONCEPTUAL BACKGROUND

2.1 | The antecedents of organizational resilience

The increasingly frequent and intense natural catastrophes related to climate change, and the outbreak of COVID-19 which resulted in an unprecedented global pandemic are raising the awareness of the need for the economic system to become more resilient to turbulent environments if it is to survive external shocks.

However, only recently, management scholars have focused their attention on organizational resilience to external shocks other than economic and technological jolts (Mithani et al., 2021). Scholars studying organizational resilience found that the resilience process has different kinds of antecedents: the nature of the external shock (Dutta, 2017); the individual characteristics (e.g. Santoro et al., 2020); the organization characteristics (e.g. Hamel & Välikangas, 2003); the contextual characteristics (e.g. Mertzanis, 2021). Size (Parker & Ameen, 2018), resources (Mithani et al., 2021), and organizational capabilities, such as relational resources (DesJardine et al., 2019; You & Williams, 2023); organizational learning (Evenseth et al., 2022); flexibility and integration (Iftikhar et al., 2021); proactive behavior (Parker & Ameen, 2018); ambidexterity and strategic consistency (Iborra et al., 2020), and digital capabilities (Browder et al., 2024), are important antecedents of organizational resilience. For example, good relationships with stakeholders, such as investors, communities, and governmental institutions, might provide additional financial resources or capabilities to implement adaptation measures or to recover from external shocks. DesJardine et al. (2019) showed that corporate social activities with a long-term perspective, abundant resources, and significant adjustments to a company's organizational structure can reduce losses and the amount of time needed to recover from environmental disturbances, thanks to the interdependencies among the stakeholders. Iftikhar et al. (2021) pointed out that organizational capability and supply chain capabilities, such as flexibility and integration, affect firm resilience. While Parker and Ameen (2018) found that a firm proactive behavior (e.g., investing in risk-averting infrastructure and adopting proactive risk management) enhances resilience, Iborra et al. (2020) showed that organizational ambidexterity (i.e., an organization's ability to be efficient in exploiting the present business, while exploring the future changes) and strategic consistency (i.e., perseverance in strategic choices) facilitate the resilience of small and medium-sized enterprises.

Regarding natural disasters, Whiteman and Cooper (2000) proposed that in case of intense and nonlinear changes in ecological ecosystems, the chance of survival increases with the ecological embeddedness, in terms of knowledge or experience, of the actor. In particular, previous studies suggested that experience with extreme weather events influences organizational resilience because it improves ecological knowledge of local ecosystems and the ability of firms to assess their vulnerability (Pinkse & Gasbarro, 2019). It seems that energy companies, located in areas rather exposed to frequent natural extreme events without stable natural conditions, on the one hand, develop deep knowledge of ecological ecosystems' functioning,

especially related to the event experienced, on the other, they understand better the operational and financial consequences related to the event materialization thanks to the lesson learned from the previous experiences, then they put in place advanced risk management structures which may give them the perception of being prepared and then quite resilient (Gasbarro & Pinkse, 2016; Pinkse & Gasbarro, 2019). Also, with a study on the dairy industry, Tisch and Galbreath (2018) showed that the experience over time with extreme weather events triggers a process of ecological sensemaking that enables resilience. Gasbarro et al. (2019) provided empirical evidence that some companies after dealing with specific weather extremes related to climate change have started to pay attention to other potential natural disruptions driven by climate change and identified and implemented adaptation measures to mitigate the related risks. Then, the experience with some disruptive events in the ecological ecosystem urged the company to improve its preparedness for other natural shocks. What remains unclear is if the overall firm resilience has been improving over the long term in a complex and uncertain natural environment, for example, a business environment where several different natural disruptive events occur over time.

The contextual antecedents of a firm's resilience seem to be important as well. Bouncing back tends to be less easy for firms that are sensitive to supply chain issues, as well as those dealing with disrupted markets or communities, especially if their business is locally oriented (Chang et al., 2022). Therefore, several scholars broadened the scope of research on resilience to supply chain, considering that firms operate in socio-ecological systems (Shashi et al., 2020; Wieland & Durach, 2021). Wiedmer et al. (2021) unveiled the influence of the supply network complexity on buyer resilience. The authors showed that this influence is multifaceted, that is, having several suppliers might either aggravate the disruptive impacts of a disaster or facilitate the recovery. The role of contextual antecedents, such as institutional governance, or that of industries, has received less attention in management studies (Su & Junge, 2023). Nonetheless, as concerns epidemiological risks, the role of infrastructure, demographics, economic activity, and institutional governance have been found to be significant predictors of corporate sales growth (Mertzanis, 2021). For instance, in the presence of an effective institutional capacity, the coordination and the management of a pandemic response are also facilitated as resource allocation becomes more effective. Consequently, the extent to which a state is equipped to identify and adequately respond to epidemic risks is a crucial factor in firms' performance (Mertzanis, 2021). Then, the role of public policies as antecedents to organizational resilience deserves further inquiry (Su & Junge, 2023). It was shown that public aid, especially grants, helps firms to recover after a specific shock (Chang et al., 2022); what remains unclear is if this aid improves the overall resilience of firms in the long term, for example to other external shocks, compared to those firms not receiving it.

If we narrow the focus on the literature regarding organizations and the natural environment where the limits of the planet and their influence on business strategies are recognized (e.g., Hart, 1995), the role of the context is included, but usually in terms of its influence on

a firm's environmental strategy aimed at reducing the business environmental impacts (e.g., Aragón-Correa & Sharma, 2003) rather than on the firms' responses to the depletion of natural resources, which pose serious challenges to the business, such as in the case of climate change (Hart & Dowell, 2011). For example, policymakers can promote the foundation and the growth of organizations (Russo, 2001), and industry growth has a positive moderating role on the relationship between environmental performance and firm profitability, in other terms, the higher the industry growth, the higher the positive influence of the environmental performance on firm profitability (Russo & Fouts, 1997). Some authors explained the decision to take part in climate change programs, with institutional pressures (Comyns, 2016; Delmas & Montes-Sancho, 2010; Galbreath, 2010). In addition, regarding climate-related risks, the risk responses of firms operating in highly regulated industries are different from those operating in non-regulated industries (Sakhel, 2017). The mediating role of the context complexity, uncertainty, and munificence in the development of dynamic capabilities for environmental business strategy has been highlighted within the contingent resource-based view (Aragón-Correa & Sharma, 2003; Rueda-Manzanares et al., 2008). We refer to this theoretical framework to study if complexity, uncertainty, and munificence influence organizational resilience.

2.2 | Contextual complexity and firm resilience

Complexity is one of the external factors influencing firms' strategy and competitiveness. According to the contingent resource-based view, a business environment is considered complex when there are several different factors firms have to deal with (Rueda-Manzanares et al., 2008). In such a case, usually, firms have difficulty in defining and implementing disruptive changes to their activities but rather adjust with incremental measures (Aragón-Correa & Sharma, 2003). Therefore, the complexity of the business environment has a negative influence on the implementation of a proactive strategy. With the materialization of climate change, the business environment is becoming more complex, because of the multiple risks firms are dealing with, i.e., regulatory, physical, reputation, and market risks (Gasbarro et al., 2017), and the different impacts related to the multiplicity of the weather and climate-related events, e.g., extreme weather, drought, floods, storms (Orlove, 2009). This increased complexity might have a negative influence not only on the firm competitive advantage and on the implementation of an environmental proactive strategy (Rueda-Manzanares et al., 2008), but also on the firm survival (or resilience) over the long term. If complexity in the general business environment limits the deployment of resources and capabilities, the complexity of the natural environment may limit the deployment of resources and capabilities, which are usually considered influential for the achievement of firm resilience. Therefore, we suggest the following hypothesis:

Hypothesis 1. Complexity in the natural environment where firms operate is likely to decrease their survival in the long term compared to their peers.

2.3 | Contextual uncertainty and firm resilience

Context uncertainty may refer either to managers' perception or to the objective dynamism of the business environment. Previous research maintains that firms operating in uncertain contexts are more likely to be proactive and innovative than firms operating in relatively stable conditions because they try to anticipate possible events (Aragón-Correa & Sharma, 2003). This may happen if firms are uncertain about the future direction of green technologies, demand, or legislation (Rueda-Manzanares et al., 2008), such as in the case of the automotive industry which needs to find alternative solutions for the sustainable mobility transition. It has been shown that firms operating in unstable and extreme natural conditions implement adaptation measures regularly thanks to their ability to assess and manage risk which improves their preparedness for ecosystem changes (Gasbarro & Pinkse, 2016). If context uncertainty has a positive influence on the implementation of an environmental proactive strategy and companies operating in extreme natural environments are more prone to implement adaptation strategies regularly, we hypothesize that it may have a positive influence on organizational resilience as well, then we posit:

Hypothesis 2. Uncertainty in the natural environment where firms operate is likely to increase their survival in the long term compared to their peers.

2.4 | Contextual munificence and firm resilience

Munificence is another external factor influencing firms' strategy and competitiveness, when a business environment can maintain sustained growth, which in turn allows firms to acquire slack resources (Dess & Beard, 1984). If the concept of munificence is often related to the presence of similar firms, suppliers, universities, and skilled labor in the geographical context where a firm is located, when considering the natural environment, munificence is extended to the availability of resources for environmentally friendly firms including loans and insurance at discounted rates, natural resources, and tax discounts and government subsidies (Aragón-Correa & Sharma, 2003). Therefore, the munificence in the context where firms operate has a positive influence on the implementation of proactive environmental strategy because these firms have the opportunity to acquire additional resources to implement changes in business management and develop additional capabilities compared to the competitors operating in hostile contexts. The context munificence may have a positive influence not only on the adoption of a proactive environmental strategy but also on organizational resilience. Chang et al. (2022) maintain that the factors influencing business impacts and recovery from shocks can be moderated by government aid such as financial support, which can pave the way for the recovery. While it has been shown that public aid, especially grants, helps firms to recover after a specific shock, what remains unclear is if this aid may improve the overall resilience of firms to external shocks compared to firms not receiving it. Further

insights come from empirical disaster literature, which compares the effectiveness of different funding programs, suggesting that grants are preferable to loans (Bartik et al., 2020), and highlighting the importance of distributing aid as early as possible (Resosudarmo et al., 2012). Hence, we suggest the following hypothesis:

Hypothesis 3. Munificence in the context where firms operate is likely to increase their survival in the long term compared to their peers.

3 | METHODOLOGY

3.1 | Context choice

To investigate the influence of complexity, uncertainty, and munificence on long-term organizational resilience to natural disasters we analyzed the survival rate of the firms located in the province of Modena (Emilia Romagna Region, Italy), that were impacted by river flooding and windstorms between 2013 and 2014 and reimbursed with public grants, that of firms not reimbursed with public grants and that of firms located in another geographical area. The choice of this case study is due, on the one hand, to the occurrence of multiple natural catastrophes in the same area; in fact, the Modena province has been affected by several external shocks: 1) in 2012 an earthquake struck the area causing insured damages of US\$ 1.3 billion, 17 deaths, 350 injured people, and affecting 14,350 people of which 1,400 homeless¹; 2) two windstorms affected some Municipalities in 2013 and 2014 respectively; 3) in 2014 the flooding of the River Secchia caused total damages amounting to some US\$ 120 million, 2 deaths, and affected 1,601 people,² and 4) in 2020 the COVID-19 pandemic wreaked havoc in this area, as well as in the rest of Italy. Then, these different factors firms had to deal with represent an indicator of complexity, while at the same time, these unstable natural conditions over time made the context also uncertain. In addition, the Emilia Romagna Region decided to allocate funds for the repair, restoration, and reconstruction of buildings for productive use and agricultural production plants and structures, for the repair and repurchase of instruments, and registered movable property, in conjunction with the replenishment of stocks and products, to the firms affected by natural catastrophes with Regional Decree n.209 of the 11 July 2014. This was considered as an indicator of the munificence of the context.

3.2 | Data collection and measures

In order to understand if context munificence may improve the resilience of firms that were the recipients of public aid compared to those firms that did not receive it, we examined the firm's survival rate.

¹EM-DAT, CRED/UC Louvain, Brussels, Belgium. Link: www.emdat.be, accessed on 2022-02-22.

²EM-DAT, CRED/UC Louvain, Brussels, Belgium. Link: www.emdat.be, accessed on 2022-02-22.

To that end, we downloaded the data of the firms' requests for loss funding through the Emilia Romagna regional web tool called Sfinge. A total number of 297 firms received reimbursement for their losses. Then, we relied on the Bureau Van Dijk ORBIS[®] database to extract the Inactive status and the Economic Activity (NACE codes v2, first level). The inactive status referred to the last available year (from 2014 to 2020) reported by the Bureau Van Dijk ORBIS[®] database at the time of the research (i.e., April 2022). Our initial sample included 297 firms, but we found only 89 firms in the Bureau Van Dijk ORBIS[®] database. To understand if context complexity and uncertainty may improve the resilience of firms, we extracted the Inactive status of all the firms operating in the province of Modena (but not with allocated grants) from the Bureau Van Dijk ORBIS[®] database at the time of the research for a total of 5,560 firms. Then, we selected only the 10 closest firms to each of the firms with allocated grants according to the turnover in the last available year operating in the same economic activity for a total of 880 firms (it was not possible to retrieve close firms for one company with allocated grants owing to the absence of financial data in the database). We then created the last cluster to compare our final sample of firms with those firms operating in different contexts. This cluster contained the closest national firms (about 10) to each of our firms with allocated grants according to the turnover in the last available year operating in the same economic activity for a total of 880 firms (it was not possible to retrieve close firms for one company with allocated grants owing to the absence of financial data in the database). The Bureau Van Dijk ORBIS[®]'s random selection process in this final cluster included companies whose most recent year of availability was 2013. Then we had three samples representing our three clusters: the Grant Recipient Cluster (89 firms); the Modena Cluster (880 firms); and the Italian Cluster (880 firms). The total number of firms in the final database amounted to 1,849 firms. All the clusters' variables are dummies (0,1). Active firms were then identified based on their inactive marker equal to 1 which indicates that they had not experienced bankruptcy or liquidation, 0 otherwise.

We also considered the influence of resources and that of economic activity as control variables. In fact, according to the literature, an important factor influencing organizational resilience is the availability of resources, especially slack and relational resources. Slack resources can be both physical, such as buffer stocks or unexploited capacities (Iftikhar et al., 2021), as well as financial, such as liquidity or credits (Mithani et al., 2021). Slack resources can enable the organization to absorb adverse impacts (Kahn et al., 2018; Mithani et al., 2021). In addition, according to Iborra et al. (2020), the industry (more specifically, the manufacture of food products, manufacture of paper and paper products, manufacture of chemicals and chemical products, and manufacture of furniture) has a high explanatory power as concerns survival and resilience. Iftikhar et al. (2021) provided evidence that industrial characteristics influence the adoption of supply chain resilience mechanisms, in particular organizational capability, supply chain flexibility, and integration.

We then included: Economic Activity, as a dummy variable (0,1) for each NACE code v2, first level; and the Turnover, as the natural

logarithm of the turnover in the last available year (lnTurn), as proxy of resource availability.

3.3 | Model

To test our hypotheses, we first carried out a cross-tabulation between the dependent variable and the independent variables, then, we implemented a binary logistic regression with a random intercept. The firms were nested at cluster and industry levels. In our models, the dependent variable is Active status. The independent variables are Clusters. The control variables are Economic Activity and Turnover.

3.4 | Data description

Table 1 shows the number of firms by cluster and their survival score. The Grant Recipient Cluster has the highest survival percentage equal to 93.3%, followed by the Modena Cluster with 80.3% of firms still active, and the Italian cluster with 78.6%.

Table 2 shows resilience, measured as a percentage of the firms that survived in our sample by economic activity. The percentage of the firms that survived varies widely by industry with the lowest for Other Service Activities and Information and Communication equal to 66.7% to 90.5% for Water supply; Sewerage, waste management and remediation activities, and Human Health and Social Work Activities.

4 | RESULTS

The results of cross-tabulations between clusters and survival, and economic activity and survival are presented in Tables 1 and 2, respectively. Only the Grant Recipient Cluster and Manufacturing industry show an association with the dependent variable ($p < .05$).

Then, regarding the economic activities we included in the models only the variables showing an association with the Active status. The results are displayed in Table 3. Two models are presented to compare the predictors' effect on firm survival (i.e., active status) as a measure of resilience. In models 1, and 2, we test the effect of Grant Recipient and Modena Clusters and that of Economic Activity, and Turnover. Model 1 includes the Clusters. The following model introduces the control variables: the Turnover and the Economic Activities. In both models, the Grant Recipient Cluster has high explanatory power.

Models 1 shows a chi-square ($df = 2$) equal to 13.450 ($p < .05$), predicts correctly 80.2% of the values on 1849 cases, and shows a positive fit, i.e., Cox and Snell R^2 equal to .007 and the Nagelkerke R^2 equal to .011. The Hosmer and Lemeshow test suggests no discrepancy in the distribution of the actual and predicted dependent values, $\chi^2 (df = 0) = 0.000$. Based on the Wald test, only the Grant Recipient Cluster is found to be a significant predictor of firms' survival ($p < .05$) with a positive coefficient, meaning that firms belonging to this cluster are more likely to survive. The Grant Recipient Cluster variable shows

TABLE 1 Survival by cluster - no. Firms (percentage) and cross-tabulation

Cluster	Survival			Pearson chi-square	Df	Asymt. Sig.
	Active no. (% by cluster)	Inactive no. (% by cluster)	Total			
Granted recipient cluster	83 (93.3%)	6 (6.7%)	89	10.097	1	0.001
Italian cluster	692 (78.6%)	188 (21.4%)	880	2.423	1	0.120
Modena cluster	707 (80.3%)	173 (19.7%)	880	0.038	1	0.846
	1,482 (80.2%)	367 (19.8%)	1849			

TABLE 2 Survival by industry - no. Firms (percentage) and cross-tabulation

Economic activity (NACE)	Survival			Pearson chi-square	Df	Asymt. Sig.
	Active no. (% by economic activity)	Inactive no. (% by economic activity)	Total no. (% by economic activity)			
A - agriculture, forestry and fishing	49 (76.6%)	15 (23.4%)	64 (3.5%)	0.537	1	0.464
C - manufacturing	524 (83.2%)	106 (16.8%)	630 (34.1%)	5.490	1	0.019
E - water supply; sewerage, waste management and remediation activities	19 (90.5%)	2 (9.5%)	21 (1.1%)	1.423	1	0.233
F - construction	228 (77.6%)	66 (22.4%)	294 (15.9%)	1.486	1	0.223
G - wholesale and retail trade; repair of motor vehicles and motorcycles	260 (77.4%)	76 (22.6%)	336 (18.2%)	1.981	1	0.159
H - transportation and storage	17 (81%)	4 (19%)	21 (1.1%)	0.009	1	0.926
J - information and communication	14 (66.7%)	7 (33.3%)	21 (1.1%)	2.428	1	0.119
K - financial and insurance activities	16 (76.2%)	5 (23.8%)	21 (1.1%)	0.209	1	0.647
L - real estate activities	203 (80.6%)	49 (19.4%)	252 (13.6%)	0.030	1	0.863
M - professional, scientific and technical activities	102 (81%)	24 (19%)	126 (6.8%)	0.055	1	0.815
N - administrative and support service activities	17 (81%)	4 (19%)	21 (1.1%)	0.009	1	0.926
Q - human health and social work activities	19 (90.5%)	2 (9.5%)	21 (1.1%)	1.423	1	0.233
S - other service activities	14 (66.7%)	7 (33.3%)	21 (1.1%)	2.428	1	0.119
Total	1,482 (80.2%)	367 (19.8%)	100.0%			

TABLE 3 Binary logistic regression of firm survival

Variable	Model 1						Model 2					
	B	S.E.	Wald	Df	Sig.	Exp(B)	B	S.E.	Wald	Df	Sig.	Exp(B)
Grant recipient cluster	1.324	0.431	9.450	1	0.002	3.758	1.364	0.454	9.022	1	0.003	3.910
Modena cluster	0.105	0.118	0.784	1	0.376	1.110	0.016	0.125	0.016	1	0.901	1.016
C - manufacturing							-0.067	0.137	0.241	1	0.624	0.935
LnTurnover							0.243	0.024	106.818	1	0.000	1.275
Constant	1.303	0.082	251.053	1	<.001	3.681	-1.766	0.306	33.331	1	0.000	0.171
Model chi-square	13.450			2	0.001		142.971			4	<.001	
Correctness	80.2% (100% active; 0% inactive)						81.4% (98.7% active; 9.1% inactive)					
Hosmer and Lemeshow	0.000			0	-		7.889			8	0.443	
Cox and Snell R ²	0.007						0.075					
Nagelkerke R ²	0.011						0.120					
No. cases	1849						1849					

a p-value lower than 0.01 and high ODDS, i.e., $\beta = 1.324$, Wald χ^2 ($df = 1$) = 9.450, $p = 0.002$, and $\text{Exp}(B) = 3.758$, indicating that the chances of survival of firms with allocated grants are 3.76 times higher than the chances of survival of those firms that did not get any grant.

Models 2 shows a chi-square ($df = 4$) equal to 142.971 ($p < .001$), predicts correctly 81.4% of the values on 1849 cases, and shows a positive fit, i.e., Cox and Snell R^2 equal to .075 and Nagelkerke R^2 equal to .120. The Hosmer and Lemeshow test shows non-significance, suggesting no discrepancy in the distribution of the actual and predicted dependent values, χ^2 ($df = 8$) = 7.889, $p > .05$. Based on the Wald test, few variables are found to be significant predictors of firms' survival ($p < .05$). These variables are the Grant Recipient Cluster and Turnover. The Grant Recipient Cluster and Turnover have a positive coefficient, meaning that the firms belonging to the cluster of Grant Recipients or having higher turnover are more likely to survive. The Grant Recipient Cluster variable has $\beta = 1.364$, Wald χ^2 ($df = 1$) = 9.022, $p < 0.05$, and $\text{Exp}(b) = 3.910$. The ODDS are approximatively equal to 4 indicating that the chances of survival of Grant Recipient firms are 4 times higher than the chances of survival of firms without allocated grants.

Both models show that the Grant Recipient Cluster is a significant predictor of firm survival, then this result supports hypothesis 3, which suggests that munificence in the context where firms operate is likely to increase their survival in the long term compared to their peers. None of the models show that the Modena Cluster is a significant predictor, therefore hypotheses 1 and 2 are not supported.

5 | DISCUSSION

We found that context munificence has a positive influence on organizational resilience in terms of a firm's long-term survival from natural disasters. Then, if we look at the number of inactive firms per year, in Table 4 we can see that between 2014 and 2016 the percentage of inactive firms in the Modena Cluster is higher than that of the Italian Cluster. In 2014 it amounted to 23% of the total inactive firms in the Modena Cluster, higher than that of the Italian cluster

amounting to 15%. This might mean that several firms have not survived two disruptive external shocks so close in time (an earthquake in 2012 and a flood in 2014). A similar dynamic happened for the Grant Recipient Cluster, where 4 over 6 inactive firms experienced bankruptcy or liquidation in 2016. The firms in the Grant Recipient Cluster are in the province of Modena as well but have a survival rate equal to 93.3%, much higher than that of the Modena Cluster equal to 80.3%, and that of the Italian Cluster equal to 78.6% of firms still active. Then, the long-term overall resilience rate of firms belonging to the Grant Recipient Cluster is higher. The firms belonging to this cluster received additional resources from public institutions as compensation for the losses and we may hypothesize that these were reinvested in adaptation measures (e.g., new and more resilient assets, insurance coverage, and risk management). Then, the companies belonging to the Grant Recipient Cluster probably improved their resilience, learning from the experience with natural disasters, but differently from the other companies located in the province of Modena, received additional resources. This may suggest that the experience with an external shock in the ecological system alone is not sufficient to improve the long-term resilience to external shocks occurring in the social, economic, and political systems and that should be coupled with the availability of further financial resources. As highlighted by Pinkse and Gasbarro (2009), past experience is just one of the several factors driving a firm's response to climate change.

However, if these public grants improved the resilience of the firms that received those funds, they did not influence the resilience of the overall economic context as shown by the results of the Modena Cluster. If Mertzanis (2021) showed that institutional governance is a significant predictor of corporate sales growth, our results show that institutional resource allocation after an external shock is a significant predictor of firm organizational resilience at the individual level, but this cannot be extended to the whole economic system. This may be due to the limited resource allocation, or to the fact that not all the firms applied, or the specific requirements for this fund allocation, which, in this case, were quite stringent. In addition, if Chang et al. (2022) maintain that government policies such as financial assistance facilitate the recovery from shocks, our analysis adds further

TABLE 4 Inactive firms by cluster and year

Last available year	Italian cluster Inactive no. (%)	Granted cluster Inactive no. (%)	Modena cluster Inactive no. (%)	Total Inactive no. (%)
2013	16 (9%)	0 (0%)	0 (0%)	16 (4%)
2014	28 (15%)	0 (0%)	40 (23%)	68 (19%)
2015	21 (11%)	0 (0%)	21 (12%)	42 (11%)
2016	23 (12%)	4 (67%)	26 (15%)	53 (14%)
2017	25 (13%)	0 (0%)	18 (10%)	43 (12%)
2018	21 (11%)	0 (0%)	29 (17%)	50 (14%)
2019	20 (11%)	1 (17%)	15 (9%)	36 (10%)
2020	34 (18%)	1 (17%)	24 (14%)	59 (16%)
	188 (100%)	6 (100%)	173 (100%)	367 (100%)

information showing that financial assistance improves the overall resilience of beneficiaries. This opens the way to a new interpretive lens of the antecedents of organizational resilience. Institutional context, such as institutional actors, can influence not only organizational behavior but also organizational resilience in terms of firm survival over time.

If context munificence has been found sometimes irrelevant to firms' environmental strategies (Rueda-Manzanares et al., 2008) and performance (Jancenelle, 2020), especially during a crisis (Fainshmidt et al., 2017), on the contrary, our analysis shows that it can have an important role in improving the organizational resilience over the long term, especially in terms of government subsidies. We also found that complexity and uncertainty in the natural environment where firms operate have no influence on organizational resilience in terms of survival over the long term. This result is different from previous research, where complexity (Rueda-Manzanares et al., 2008) and uncertainty are found to be influential (Jancenelle, 2020). These differences can be explained in that our study is aimed at investigating organizational resilience over the long term rather than focusing on environmental performance or firms' performance. The increased frequency and intensity of natural disasters are challenging the common knowledge on the relation between the business and the natural environment, which previous research addressed mainly considering the firms' environmental performance rather than the impact of the natural environment on the firms and the related responses. If uncertainty does not seem to be a predictor of organizational resilience, this could be explained by the fact that firms dealing with a specific kind of event, even if uncertain, may focus attention on and develop capabilities to deal with that specific event or related events, (Linnenluecke et al., 2012; Pinkse & Gasbarro, 2019), but not others, such as an earthquake or a pandemic. On the other hand, if the complexity of the natural environment does not result to be a predictor of firm survival can be explained by the fact that complexity of context may have a bidirectional influence on firm resilience, sometimes, it intensifies disruptive impacts, sometimes, it improves recovery (Wiedmer et al., 2021). This contrasting effect may decrease or hide the predicting role of this variable. Therefore, further research is needed to study the role of complexity and uncertainty in the natural environment on firm resilience more in-depth. In addition, organizational characteristics might be important predictors as well, as shown by the influence of turnover on the survival rate in our study. Our analysis suggests that firms with higher turnover are more likely to survive external shocks. This may be due to a higher availability of slack resources in larger firms since size and slack resources seem to be correlated (George, 2005).

These results extend the contingent resource-based view that highlighted the influence of the context on the development of a proactive strategy for managing the relationship between the business and the natural environment (Aragón-Correa & Sharma, 2003) by providing empirical evidence of the role of context munificence also on the organizational resilience, which includes the capabilities and strategies to respond to the consequences of the ecosystem services' depletion, such as climate-related extremes.

6 | CONCLUSIONS

The turbulent conditions of the external environment put unprecedented pressure on firms, drawing management scholars' attention to organizational resilience. The objective of this study was to investigate if the context complexity, uncertainty, and munificence influence the long-term organizational resilience to natural disasters, in terms of firm survival. To this aim, we carried out a binary logistic regression analysis on a database collecting the data of 1,849 Italian joint-stock firms over 7 years between 2014 and 2020.

Our analysis suggests that munificence in the context where firms operate is likely to increase organizational resilience compared to the peers, consequently, the chances of survival of firms that have been allocated grants to are higher than the chances of survival of firms that did not get any grant. We also found that complexity and uncertainty in the natural environment where firms operate have no influence on organizational resilience in terms of survival over the long term. Finally, our findings suggest that organizational resilience is related to turnover, i.e., larger firms are more likely to survive external shocks.

6.1 | Theoretical contribution

Our findings have several theoretical implications. Previous studies identified size, resources, proactive behavior, and supply chain capabilities as important antecedents of organizational resilience, overlooking the role of institutional factors (Su & Junge, 2023). By showing that context munificence, especially in terms of financial assistance, influences organizational resilience, our research sheds light on the role of context as an antecedent of organizational resilience at an individual level. This evidence represents also a contribution to the contingent resource-based view, which uncovered the moderating role of context complexity, uncertainty, and munificence on the development of dynamic capabilities for environmental business strategy. We provided empirical evidence that context might have an influence not only on environmental strategies but also on the development of organizational resilience capabilities necessary for firm survival when dealing with natural turbulent conditions.

As management scholars studying the relationship between organizations and the natural environment, we think that the times are mature to consider an outside-in perspective beyond the still prevailing inside-out perspective as the materialization of climate-related events is showing. We hope our research could contribute to, at least partially, fill this gap.

6.2 | Policy implications

Our study has several policy implications. We have shown the effectiveness of public grants as compensation for the losses caused by external shocks in improving the survival of beneficiaries in the long term, and then resulting in a higher overall resilience. However, we

also showed that, while these public grants do improve the resilience of the firms which have been allocated grants to, they did not influence the resilience of the overall economic context, questioning the effectiveness and sustainability of these policies. This may be due to the limited resource allocation, to the fact that not all the firms apply, or to the restrictive requirements for application. Consequently, rather than post-event reimbursement for the losses, other kinds of ex-ante policies may be more effective in improving the resilience of the whole economic system, such as risk assessment at the local level coupled with preventive information campaigns aimed at raising awareness of risks; introducing mandatory insurance for external shocks; economic incentives for the implementation of adaptation measures, and so on.

6.3 | Limitations and avenues for further research

This study is not without limitations. Firstly, the restricted number of firms that have been allocated grants to and the geographical area of the whole sample limit the generality of the results. A further study may be carried out using a larger sample beyond the Italian boundaries. Secondly, the long-term timeframe covers several external shocks during which further public policies have been implemented to help the firms to deal with; however, it was not possible to check if all the firms in the sample benefitted from them, and the study is focused only on a specific public grant. Further studies may address this point by relying on different indicators to understand the multiple factors influencing organizational resilience. In particular, if our study focuses on firm survival as a measure of resilience, additional indicators may be used, such as financial volatility and sales growth (Ortiz-de-Mandojana & Bansal, 2016). Moreover, as previously underlined, other research is needed to study the role of complexity and uncertainty in the natural environment on firm resilience more in-depth, for example by considering several forms and levels of complexity (Wiedmer et al., 2021), as well as, of uncertainty, such as the different levels of frequency and intensity and the multiplicity of natural disasters affecting a context. In addition, the contextual factors might be analyzed in conjunction with the firms' capabilities necessary for resilience.

ACKNOWLEDGMENTS

We would like to thank the two anonymous reviewers for their insightful comments on earlier drafts of this paper. Open access publishing facilitated by Università degli Studi di Brescia, as part of the Wiley - CRUI-CARE agreement.

CONFLICT OF INTEREST STATEMENT

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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How to cite this article: Gasbarro, F., & Tencati, A. (2024). The influence of complexity, uncertainty, and munificence on long-term organizational resilience to natural disasters. *Business Strategy and the Environment*, 1–10. <https://doi.org/10.1002/bse.4055>