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How do entrepreneurs build a resilient and persistent identity? Re-examining the financial crisis impact

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Abstract

This study examines re-entry entrepreneurs' response to exogenous shakeouts (economic crises). Concretely, we analyse how prior business failure experience contributes to the creation of an entrepreneurial resilience identity, through entrepreneurial persistence, during/after the Global Financial Crisis (GFC). Using data from 24 European countries from 2007 to 2014, our analysis shows that, while experiencing business failure can be challenging both personally and professionally, it also provides a tailored form of learning applicable in these challenging times. If entrepreneurs are confident and persistent, they may take advantage of failure experience, thus leading to entrepreneurial resilience, especially if they are re-entering via high-tech sectors. Our results contribute to the entrepreneurship literature by exposing the factors that increase entrepreneurial resilience and support entrepreneurial persistence. These insights may lead to the development of a resilient economy capable of overcoming the pandemic's recessionary impact. Several implications for policymakers and entrepreneurs emerged from this study.

Keywords Business Failure · Entrepreneurial Re-entry · Entrepreneurial Confidence · Entrepreneurial Persistence · Entrepreneurial Resilience · Economic crisis · High-tech sectors

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Introduction

The current economic context is one in which rising interest rates, inflationary concerns including wage-price spirals, and unprecedented consumer and national debt levels coupled with the threat of national debt default, is resulting in recessionary fears and a generally uncertain economic environment. According to the World Bank (2020), a recession, depression, or stagflation are potential market ramifications emerging in the aftermath of the global pandemic. The uncertain economic environment, combined with social and health restrictions, effectively closed businesses operating in non-essential sectors. Typically, during a financial crisis or uncertainty period, business failure rates rise, and the impact ripples outwards, displacing employees (Eklund et al., 2020). Consequently, this effect potentially disrupts supply chains and adversely affects investors and customers.

A contemporary example is the 2008 financial crisis, whereby this study explores the learning and resilience of entrepreneurs in the European Union during the crisis, the recovery, and subsequent stages of the economic cycle (European Commission, 2018). While business failure is not wholly negative – it is a sign of economic vibrancy –, when it occurs in an economic crisis, it can result in damaging, large-scale economic ramifications and increase informal rates. Thus, increased business failure rates are a hallmark of an economic crisis (Klapper & Love, 2011). Consequently, entrepreneurship is considered an essential vehicle to revitalise economies and assist them out of crisis towards renewed prosperity and stability. Entrepreneurship is wrought with adversity. From an economic perspective, entrepreneurial action occurs under uncertainty (Gonzaléz-Pernía et al., 2018). Therefore, individuals with prior business failure experience may be most likely to be persistent (explore and exploit opportunities) and resilient (re-enter into entrepreneurship) during periods of turbulence as their previous failure experience strengthens their ability to manage an internal crisis (Caliendo et al., 2020; Williams et al., 2017).

Inspired by this academic discussion, our study examines the regenerative entrepreneurs' responses to exogenous shakeouts (economic crises) during and after the 2008 Global Financial Crisis (GFC). In particular, we analyse how prior business failure experiences helped build entrepreneurial resilience in high-tech sectors through entrepreneurial persistence in the financial crisis (2007–2010) and the subsequent years of the financial recession (2011–2014) throughout the span of the GFC. Using information from 24 European countries that participated in the Global Entrepreneurship Monitor (GEM), we proposed and tested a conceptual model about the role of prior business failure to build entrepreneurial resilience through entrepreneurial persistence in challenging times. Our results provide insights into how, during the economic crisis period, individuals' prior failure experiences, combined with confidence were crucial for building entrepreneurial resilience (re-entry into entrepreneurship) through entrepreneurial persistence (the exploration and exploitation of new business opportunities). This study contributes to the entrepreneurship literature by exposing the factors that increase entrepreneurial persistence and, in turn (Williams et al., 2017), ways to support entrepreneurial resilience in high-tech sectors (Caliendo et al., 2020) capable of overcoming the economic crisis triggered

in the aftermath of the COVID-19 pandemic. Initiating entrepreneurial action following failure requires entrepreneurial confidence and entrepreneurial persistence – if these traits can be conferred on those that recently experienced failure due to the current crisis, then the entrepreneurial community can build resilience and to be enrolled in high-tech sectors in the face of adversity.

Following the introduction, this paper is structured as follows. "Theory and hypotheses development" section shows the theory development and the proposed conceptual framework to understand the links between prior business failures, confidence, persistence, and resilience. "Methodology" section describes the methodological design to test our hypotheses. "Results" section shows our results and plausible explanations. Later, "Discussion" section discusses the contributions and implications of this study in the current economic environment (recessionary fears post-COVID). Finally, "Conclusions" section describes our conclusions, limitations, and future research agenda.

Theory and hypotheses development

Impact of business failure on entrepreneurial persistence, resilience, and re-entry

The experience of business failure has been described as an "entrance fee for entrepreneurship" (Ucbasaran et al., 2006, p. 24). Going through failure enables an entrepreneur to understand their risk appetite, learn the practical and operational aspects of business venturing, and ultimately failure frees up non-productive resources so they can be redeployed elsewhere in the market. By some, failure is seen as a necessary component of entrepreneurship since opportunity can emerge through trial and error (Yamakawa & Cardon, 2015). However, the experience of failure is often challenging; it impacts the individual beyond their professional life affecting their sense of self (e.g., confidence, fear of failure, risk appetite, engagement with ones' network). Yet, despite the obstacles wrought by failure the majority of entrepreneurs prefer to leave entrepreneurship through a revolving door instead of a one-way exit (Stokes & Blackburn, 2002). According Korber and McNaughton (2017), entrepreneurial resilience connotes persistence in the face of absent success or the ability to venture again after failure. While persistence and resilience are generally positive terms associated with entrepreneurs that continue through adversity (Davidsson & Gordon, 2016); conducting a large-scale examination in a period of sustained macroeconomic crisis provides an opportunity to explore how entrepreneurs with prior business failure experience respond in such an environment and sheds light on the mechanisms they employ to overcome environmental turbulence, maintain persistence, and build resilience.

Entrepreneurial persistence when navigating challenging times

Recent research cites the need for research that examines the impact of the situational context on entrepreneurial persistence, including examining the impact of retrospective and prospective factors on persistence decisions (Lin et al., 2022); whereby retrospective factors consider existing issues faced by the entrepreneur (e.g., period and degree of firm underperformance) and prospective factors consider potentiality (e.g., potential for firm growth). Navigating a financial crisis (2007–2010) that evolves into a financial recession (2011–2014) are two existential situational contexts that can deeply impact an entrepreneur's decision to persist as it influences both their retrospective and prospective worldview and economic expectations for their enterprise. We assume that an individual's ability to identify opportunities, and their existence within a supportive network, enables them to exploit presenting opportunities during/after challenging times and indicate entrepreneurial persistence (Caliendo et al., 2020). The first component of entrepreneurial persistence is the identification of opportunities. The identification of opportunities is central to an individuals' capacity for developing entrepreneurial action (Baron, 2000). Studies have found that entrepreneurs' emotions shape their cognitive evaluation of the opportunity (Welpe et al., 2012). Research suggests that entrepreneurs put substantial effort into their risky project of choice as a way of reducing potential future regret (Sjöström et al., 2018) or continue in the system derived of external economic shakeouts (González-Pernía et al., 2018). The second component of entrepreneurial persistence is associated with the exploration/exploitation of opportunities. Entrepreneurs with networks may be buffered from the ill effects of a challenging event due to their social capital (Wiesenfeld et al., 2008). According to Klyver et al. (2018), entrepreneurial action involves both risk-taking and stress. Therefore, in challenging situations, supportive networks can be beneficial for building entrepreneurial persistence. A negative manifestation of persistence, whereby it leads to an over-escalation of commitment to a failing course of action (Holland & Shepherd, 2013) is disrupted through having a strong support network. A support network insulates an entrepreneur from negative persistence through the provision of emotional and social support (Klyver et al., 2018); in turn allowing the entrepreneur to waterproof ideas and perform feasibility checks to better evaluate opportunities (Meurer et al., 2022). Therefore, entrepreneurial persistence is considered present when an entrepreneur is actively seeking opportunities for entrepreneurial re-entry, in an environment with an ongoing macroeconomic crisis, while maintaining a social network of active entrepreneurs.

Prior failure leads to persistence through adversity

Failure is often a gruelling experience with difficult financial (Jenkins et al., 2014), emotional (Cope, 2011; Shepherd et al., 2009), and professional (Simmons et al., 2014) implications that long outlast the lifespan of the venture. Extant studies found that experiencing the failure of a business can be a catalyst for new business development (McGrath, 1999), a fundamental part of achieving subsequent success (Singh et al., 2007), and may even act as market validation information gathering (Stevenson et al., 2022). Business failure offers a tailored learning experience that cannot be

taught merely attained through experience; however, it is useful for this learning. The entrepreneur needs to put it into practice through the act of entrepreneurial re-entry (Walsh & Cunningham, 2017). When an entrepreneur overcomes failure and learns, it can be a springboard for identifying new entrepreneurial opportunities (Funken et al., 2020), accessing diverse networks (Caliendo et al., 2020), and assuming risks to enter the entrepreneurial process (Guerrero & Espinoza-Benavides, 2021a). Based on these assumptions, we believe that prior experience of business failure is positively related to entrepreneurial persistence. Thus, the following hypothesis is proposed:

H1a: Prior experience of business failure is positively related to entrepreneurial persistence

Any entrepreneurial initiative requires cognitive biases to act under uncertainty. In this vein, entrepreneurial confidence is one of the most prevalent cognitive biases faced by entrepreneurs in uncertain times (Chen et al., 2018; Szerb & Vörös, 2021). Overconfidence is understood as an overestimation of one's own ability to make accurate forecasts or as an overestimation of one's own ability relative to others (Koellinger et al., 2007, p. 505). Entrepreneurial confidence captures individuals' perceptions about specific skills they have relevant to business venturing (Koellinger, 2008) and individuals' fear of failure (Cacciotti & Hayton, 2015; Bosma et al., 2008). According to Koellinger (2008), a high degree of self-confidence is related to entrepreneurial innovativeness and survival; it is also related to gauge one's capabilities when considering exploiting an opportunity (Al Issa, 2022). However, when an individual has experienced a prior business failure, embarrassment/grief can erode self-esteem and confidence (Jenkins et al., 2014; Shepherd et al., 2009). Fear of failure impacts the identification of opportunities because individuals with greater fear of failure are less able to distinguish between the benefits of alternative opportunities in the environment (Mitchell & Shepherd, 2011). Yet, in some instances, a prior failure experience can even become an asset during an entrepreneurial re-entry process (Amankwah-Amoah et al., 2022); allowing the entrepreneur to feel better prepared to re-enter (Shepherd et al., 2020). If an entrepreneur can maintain their (over)confidence following a business failure experience, this can engender entrepreneurial persistence and reduce failure's emotional costs (Hayward et al., 2010; Ucbasaran et al., 2013). As a result, overconfidence can be positive as it prompts market entry in complex and unfamiliar situations (Walsh & Elorriaga-Rubio, 2019). Based on these assumptions, we believe that entrepreneurial confidence could reinforce, positively (through skills) or negatively (through fear of failure), the influence of a business's prior experience on entrepreneurial persistence. Then, we propose the following hypothesis.

H1b: The positive relationship between the prior experience of business failure and entrepreneurial persistence is moderated by entrepreneurial confidence (fear of failure and skills)

Rising debt and increased unemployment levels, in conjunction with stagnant or shrinking GDP, are all hallmarks of an economic crisis (González-Pernía et al., 2018). An economic crisis is identified as a period with increased debt, increased unemployment, more significant insolvency, and contracting GDP. During periods

of economic crisis, it is expected that the risk of business failure due to exogenous factors (economic crises) could be more pronounced. To recover, entrepreneurs who experienced prior failure are part of a limited cohort with invaluable experience at initiating, building, growing, and managing a business – such skills are essential to set the economy on the path to recovery (Guerrero & Peña-Legazkue, 2019). Re-engaging this cohort is an essential part of restarting and re-imaging the economy as a means of moving past the crisis. Based on these antecedents, economic shakeouts could intensify business failure experiences through building entrepreneurial persistence. Therefore, the following hypothesis is proposed:

H1c: The positive relationship between the prior experience of business failure and entrepreneurial persistence moderated by entrepreneurial confidence is intensified during an economic crisis

Entrepreneurial resilience for handling challenging times

Resilience captures an individuals' ability to maintain reliable function despite adversity; it also relates to one's ability to mitigate adversity before it arises (Williams & Shepherd, 2016; Williams et al., 2017). In entrepreneurship, resilience is essential given the high failure rates, the prevalence of risk, and the various obstacles to be overcome. Resilience is not necessarily inherent but a trait that can be built over time and through exposure to adversity. When considering crisis and crisis management, a process definition of resilience emerges whereby it includes "adversity capabilities, in-crisis organizing and adjusting, and post-crisis resilience" (Williams et al., 2017, p.742). This illustrates that resilience can be built over time whereby one copes with unanticipated dangers (such as the impact of a global pandemic) and learns to bounce back (Gittel et al., 2006). As such, entrepreneurial resilience may constitute a good adaption by entrepreneurs for dealing with risk under a significant adverse context (Liu, 2020). In this study, entrepreneurial resilience includes entrepreneurs that are actively engaging in entrepreneurial activities in the twelve months following a failure experience.

Economic crisis breeds entrepreneurial resilience in high-tech sectors

Persisting through adversity to build resolve and strengthen the experience leads to the cultivation of resilience. Flexibility, improvisation, and endurance are all qualities associated with resilience (Boin et al., 2010); thus, while persistence is the continued pursuit of an objective despite adversity, resilience is the ability to adapt, recover, and learn from an adverse experience. According to Williams et al. (2017), "resilience assists actors in persisting in activities despite hardship" (p. 757). While Shepherd et al. (2020) posit that persistence through adversity leads to resilience. These perspectives indicate a potentially symbiotic relationship between persistence and resilience, whereby the presence of one may result in the emergence of the other. To overcome an exogenous shake out (economic crises) that results in the closure of one's business, persistent individuals will seek to re-enter

the entrepreneurial sphere in similar/different sectors than the previous one. To persist in the entrepreneurial field, re-entry entrepreneurs will need to identify an opportunity in the high-tech markets to exploit for profit. Persistence can be further strengthened through an individual's network, as according to Arenius and De Clercq (2005), networks provide access to new knowledge, and as such, one's network may be a source of support necessary to facilitate opportunity recognition and exploitation. If one has a supportive network and can perceive opportunities, they persist through adversity and exhibit entrepreneurial resilience. Based on these antecedents, we posit that entrepreneurial persistence is positively related to entrepreneurial resilience. Then, we propose the following hypothesis:

H2a: Entrepreneurial persistence is positively related to entrepreneurial resilience in high-tech sectors

Persistence may result in resilience, yet entrepreneurs' confidence levels play a role in this relationship. Persistence can be fear-driven in that an individual's strong fear of failure leads to the aggressive pursuit of impulsive reaction rather than reasoned action (Walsh & Cunningham, 2017). This is the 'fight' reaction in the fight-flight-freeze response to a perceived threat (Mitchell & Shepherd, 2011). While it is a form of persistence, it is maladaptive and unlikely to result in adaptive behaviour. It is more likely to lead to an inability to distinguish between the benefits of alternative opportunities in the environment (Mitchell & Shepherd, 2011) and, thus, negatively affect entrepreneurial resilience. Another component contributing to entrepreneurial confidence is skills. When the re-entry entrepreneur decides to re-engage in high-tech business and perceives themselves to have the requisite skills to successfully execute an opportunity, they persist, using these skills to adapt to the new high-tech market conditions. Based on these assumptions, we believe that entrepreneurial confidence reinforces, positively (through skills) or negatively (through fear of failure), the influence of entrepreneurial persistence on entrepreneurial resilience in high-tech sectors. As such, the following hypothesis is proposed:

H2b: The positive relationship between entrepreneurial persistence and entrepreneurial resilience in high-tech sectors is moderated by entrepreneurial confidence (fear of failure and skills)

Traditionally fear of failure was seen as a negative aspect of one's character, but more recently, it is viewed as an impairment to be overcome (Walsh & Cunningham, 2017). Findings on the impact of fear of failure on entrepreneurial action tend to be oxymoronic – those that face higher risks are more likely to have a greater fear of failure (Mitchell & Shepherd, 2011), those that succeed in high-tech entrepreneurship are more likely to have a greater fear of failure as success leads to higher aspirations (Morgan & Sisak, 2016) and greater expectations from self. Given that entrepreneurs considering re-entry have already experienced business failure, the presence and impact of fear of failure are somewhat unclear – on the one hand, they are re-entering during or directly following a crisis and thus face increased risks indicating greater fear of failure. On the other hand, they

are not tied by past success expectations, indicating reduced fear of failure. Fear of failure is rational and a form of self-protection. It is even more expected during periods of economic crisis when failure is more omnipresent, and the availability of alternative employment opportunities are fewer. During times of economic crisis, failure is riskier as there tend to be fewer alternative opportunities to pursue than exist in more prosperous times. A further consequence of the looming spectre of crisis and failure is the impact such exogenous shakeouts (economic crises) can have on entrepreneurs' confidence, namely skills. Entrepreneurs who retain belief in their skills (despite the crisis) and perceive their strengths are likely to have a stronger sense of self. Thus, they can deploy them in adaptive, entrepreneurial pursuits than individuals whose ability to perceive their skills were eroded by the economic crisis. Based on these antecedents, economic crisis intensifies the effect of entrepreneurial persistence on building entrepreneurial resilience in high-tech sector. Then, we propose the following hypothesis.

H2c: The positive relationship between entrepreneurial persistence and entrepreneurial resilience in high-tech sector moderated by entrepreneurial confidence (fear of failure and skills) is intensified during an economic crisis

Figure 1 shows our proposed conceptual model.

Methodology

Sample

To test our theoretical model, we build a dataset from the Global Entrepreneurship Monitor (GEM) project, the Doing Business project (World Bank), the Entrepreneurship Survey (World Bank), and the International Labour Organization (ILOSTAT database). The GEM project is an annual cross-national study of entrepreneurial attitudes and activities based on a random stratified sample (by gender and education) of a minimum of 2000 adults from 18 to 64 years old each year per participant country (Reynolds et al., 2005). From the GEM Adult Population Survey (APS) respondents interviewed from 2007 to 2014, we identified 518,726 individuals across 24 European countries.[1] We complemented the individual-level dataset with information at the country-level using the Doing Business project and the

[1] During the analyzed period, the participant countries in the GEM Project were: Austria, Belgium, Czech Republic,Croatia, Denmark, Estonia, Finland, France, Germany, Greece, Hungry, Ireland, Italy, Latvia, Lithuania, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, and United Kingdom. We also decided to analyse the European context due to the different impacts of the GFC across the globe.

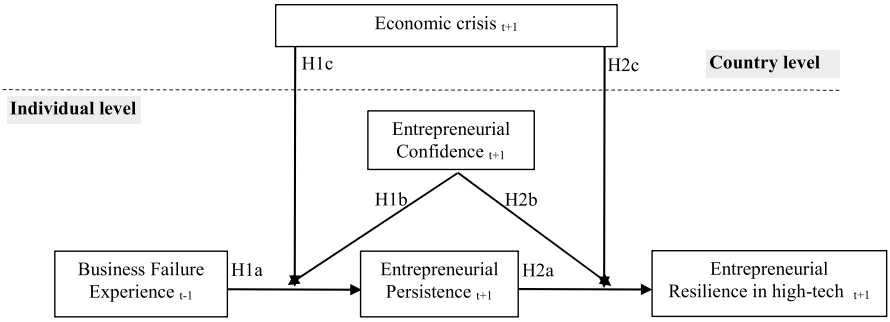

Fig. 1 Proposal conceptual model

World Bank Entrepreneurship Survey that gathers global data annually on the conditions related to development business of small and medium-sized enterprises (World Bank, 2020), as well as macroeconomic indicators (ILOSTAT, 2020).

Variables

Table 1 shows the variables used in this analysis.

Dependent variable: We used two individual-level dependent variables that come from the GEM APS survey. First, *entrepreneurial persistence* is a dichotomous variable that takes value 1 when an individual has simultaneously perceived entrepreneurial opportunities to be explored in the next six months (identification of opportunities) and has personal networks with entrepreneurs that have created a business in the last two years (known entrepreneurs) (Bosma, 2013); otherwise, the variable takes value 0.[2] According to Caliendo et al. (2020), entrepreneurial persistence includes the motivation and decision to continue to actively pursue an entrepreneurial opportunity and do so in the face of adversity or attractive alternatives. Second, *entrepreneurial resilience* is a dichotomous variable that takes value 1 when an individual with prior business failure is engaged in entrepreneurial activities in high-tech sectors[3] in the following twelve months after failure (Guerrero & Peña-Legazkue, 2019; Simmons et al., 2019); otherwise, the variable takes value 0.[4]

[2] Proxy calculated using two GEM indicators: TEA and business failure per each year.

[3] Our focus is the European context, the APS methodology adopts the ISIC_Rev 2 classification like EUROSTAT. According to this classification, high-technological sectors are related to certain manufacturing sectors with different levels of technology intensity more affected during the exogenous shakeouts. For further detail about which sectors are considered as high-tech, please review the following methodological note [https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:High-tech_classification_of_manufacturing_industries].

[4] Proxy calculated using two GEM indicators: identification of opportunities and know entrepreneurs per each year.

Table 1 Description of variables

Type	Variable	Question (Codebooks)	Proxy in our study	Source
Country-level controls	Unemployment	The percentage of total labour force estimate per county. The share of the labour force without work but available for and seeking employment		ILOSTAT
	Insolvency	The time to resolve insolvency is the number of years from the filing for insolvency in court until the resolution of distressed assets		Doing Business, World Bank
	Business density	New business density measures the number of new limited liability corporations registered in the calendar year		Entrepreneurship Survey, World Bank
	GDP per capita	The extent to which the distribution of income among individuals or households within an economy deviates from a perfectly equal distribution. Thus, a Gini index of 0 represents perfect equality, while an index of 100 implies perfect inequality		World Bank
Individual-level controls	Gender (ref: male)	What is your gender?	Gender is measured by a dichotomous variable that takes the value 1 when the participant reported a male gender	GEM (Codebook, 2014)
	Age	What is your age? (GEM Codebook, 2014).	Age measures the number of years since the date of birth of each participant	
	Generational cohort (ref: Millennials) Generation Y Baby boomers		The generational cohort is measured by a categorical variable estimated by the participants' age: the value 1 for Generation Y (born after 1980), the value 2 for Generation X (born 1965–1980), and the value 3 for Baby Boomers (born 1946–1964).	
	Education (ref: no education) primary school secondary school technical school tertiary school	**What is your educational level?** (GEM Codebook, 2014).	A categorical variable estimated by the participants' educational status: the value 1 for no education, the value 2 for primary school, the value 3 for secondary school, the value 4 for technical school, and the value 5 for tertiary school.	

Table 1 (continued)

Type	Variable	Question (Codebooks)	Proxy in our study	Source
	Personal income (ref: low income) medium income higher income	**What is your personal income?** (GEM Codebook, 2014).	A categorical variable estimated by the participants' income per year: the value 1 for low income (less than 33,000 dollars/year), the value 2 for medium-income (from 34,000 to 67,000 dollars/year), and the value 3 for higher income (more than 67,000 dollars/year).	
Period	Year	Survey year from 2007 to 2014	A dummy variable for capturing the effect of the business cycle period. In this vein, the external shock variable takes the value 1 to capture the financial recession period (from 2007 to 2010) and value 0 for the period afterward (from 2011 to 2014)	
Explanatory	**Entrepreneurial resilience**	Who is involved in a nascent firm or new firm with less than 42 months (TEA) and, at the same time, in the past 12 months, have shut down, discontinued, or quit a business that did not continue its activities (GEM Codebook, 2014).	A dichotomous variable takes the value 1 when an individual with prior business failure is engaged in entrepreneurial activities in high-tech sectors in the following twelve months after the failure; otherwise, value 0	
	Entrepreneurial persistence	Who think that in the next 6 months there will be good opportunities for starting a business in the area where they live (identification of opportunities), and at the same time, know someone personally who started a business in the past 2 years (known entrepreneurs) (GEM Codebook, 2014).	A dichotomous variable takes the value 1 when an individual has simultaneously perceived entrepreneurial opportunities to be explored in the next six months (identification of opportunities) and has personal networks with entrepreneurs that have created a business in the last two years (known entrepreneurs)	

Table 1 (continued)

Type	Variable	Question (Codebooks)	Proxy in our study	Source
	Entrepreneurial skills	Who say they have the knowledge, skill, and experience required to start a new business (GEM Codebook, 2014).	A dichotomous variable that takes the value 1 when the individual believes they have the knowledge, skills, and experience required to start a business; otherwise, value 0	
	Fear of failure	Who said fear of failure would prevent them from starting a new business (GEM Codebook, 2014).	A dichotomous variable that takes the value 1 when the employee believes that fear of failure would prevent him or her from starting a business; otherwise, value 0	
	Business Failure	Who in the past 12 months, have shut down, discontinued, or quit a business that did not continue its activities (GEM Codebook, 2014).	A dichotomous variable that takes the value 1 when the individual recognizes that they have discontinued business in the last twelve months; otherwise, value 0	

Explanatory variables: At the individual level, we included a set of variables that captures individuals' attitudes toward entrepreneurship (Bosma, 2013; Guerrero & Peña-Legazkue, 2019; Simmons et al., 2019). *Business failure* is a dichotomous variable that takes the value 1 when the individual recognizes that they have discontinued business in the last twelve months; otherwise, value 0. *Entrepreneurial skill* is a dichotomous variable that takes the value 1 when the individual believes they have the knowledge, skills, and experience required to start a business; otherwise, value 0. *Fear of Failure* is a dichotomous variable that takes the value 1 when the employee believes that fear of failure would prevent him or her from starting a business; otherwise, value 0. At the country-level, we also included a moderator using the year of the survey (from 2007 to 2014) and the dummy variable for capturing the effect of the business cycle period. In this vein, the external shock variable takes the value 1 to capture the financial recession period (from 2007 to 2010) and value 0 for the period afterward (from 2011 to 2014). Likewise, we build a dummy variable for effect in less/more affected European economies.[5]

Control variables: At the individual level, we included a set of five control variables based on previous GEM studies (Bosma, 2013; Guerrero & Peña-Legazkue, 2019). *Age* measures the number of years since the date of birth of each participant. *Gender* is measured by a dichotomous variable that takes the value 1 when the participant reported a male gender. The *generational cohort* is measured by a categorical variable estimated by the participants' age: the value 1 for Generation Y (born after 1980), the value 2 for Generation X (born 1965–1980), and the value 3 for Baby Boomers (born 1946–1964). *Education* is measured by a categorical variable estimated by the participants' educational status: the value 1 for no education, the value 2 for primary school, the value 3 for secondary school, the value 4 for technical school, and the value 5 for tertiary school. *Income* is measured by a categorical variable estimated by the participants' income per year: the value 1 for low income (less than 33,000 dollars/year), the value 2 for medium-income (from 34,000 to 67,000 dollars/year), and the value 3 for higher income (more than 67,000 dollars/year).

At the country-level, we included a set of four control variables based on previous studies (Faria et al., 2010; Galindo & Méndez, 2014; Fu et al., 2020). *Unemployment* measures the percentage of total labour force estimate per county. Concretely, unemployment refers to the share of the labour force without work but available for and seeking employment. This variable came from the ILOSTAT database (Faria et al., 2010). *Insolvency* measures the time to resolve insolvency is the number of years from the filing for insolvency in court until the resolution of distressed assets (this variable came from the Doing Business project of the World Bank). *New business density* measures the number of new limited liability corporations registered in the calendar year (this variable came from the World Bank Entrepreneurship Survey). *GINI* measures the extent to which the distribution of income among individuals or households within an economy deviates from a perfectly equal distribution. Thus, a Gini index of 0 represents perfect equality, while an index of 100 implies perfect inequality (this variable came from the World Bank). We used this variable

[5] According to the European Commission (2018), the most affected economies during the most recent financial crisis were Greece, Spain, Portugal, Italy, Romania, Ireland, Lithuania, Estonia. More specifically, these countries were the less resilient economies during the impact, recovery, and medium run.

because it is related to poverty in terms of income distribution and economic growth (Galindo & Méndez, 2014).

Statistical model

Our dataset captured information at the individual-level (Level 1) and country-level (Level 2). We conducted a Two-Stage Least Squares (2SLS) estimator. The 2SLS allows creating an instrumental variable (entrepreneurial persistence). Stage 1 helps to test the positive effect of previous business failure experience on the development of persistence (H1a) as well as the effect of entrepreneurial confidence (H1b) and economic crisis (H1c) on the configuration of entrepreneurial persistence:

$$\text{Equations stage 1: } y2 = \pi 0 + \pi 1 z1 + \pi 2 z2 + ... + v$$

where y2 = entrepreneurial persistence; z1 = entrepreneurial confidence; and z2 = economic crisis. Then, we ran the stage 2 to test the effect of our instrumental variable y2 (entrepreneurial persistence – H2a), as well as the effect of entrepreneurial confidence (H2b) and economic crisis (H2c) on the configuration of entrepreneurial resilience in high-tech sectors.

$$\text{Equations stage 2: } y1 = \beta 0 + \beta 1 y2 + \beta 2 z1 + \beta 2 z2 + ... + u1$$

where y1 = entrepreneurial resilience in high-tech sectors, y2 is the endogenous part of the stage 2 (entrepreneurial resilience in high-tech sectors), z1 = entrepreneurial confidence; and z2 = economic crisis (Model 1). The correlation matrix reveals that most of the explanatory variables are not highly correlated (Table 2). We created interactions to capture the effect of entrepreneurial skills and fear of failure on the main explanatory variables (business failure and entrepreneurial persistence, Model 2). Afterward, we test the effect of the external shocks in both models by splitting the sample into crises and recession periods.

Results

Table 3 shows our results.

Entrepreneurial persistence (stage 1)

Regarding the individual-level analysis, all models show that the propensity to be persistent in entrepreneurship increases when the individual experiences recent business failure. Model 1a shows that having business experience increases entrepreneurial persistence [0.284, $p < 0.001$]. Regarding the moderation effect of entrepreneurial confidence, all models show that individuals who perceive that they have the entrepreneurial skills needed to develop entrepreneurial initiatives increase the propensity to be persistent in

Table 2 Descriptive statistic and correlation matrix

		N	Mean	S.D.	Min	Max	1	2	3	4	5	6	7
1	Entrepreneurial resilience in high-tech sectors	518726	0.01	0.05	0.00	1.00	1						
2	Entrepreneurial persistence	518726	0.09	0.28	0.00	1.00	0.0298*	1					
3	Unemployment	518726	11.64	6.69	3.65	27.47	-0.0046*	-0.0433*	1				
4	Insolvency	518726	1.60	0.70	0.40	4.00	0.0107*	0.0110*	0.1404*	1			
5	New business density	518726	4.7	3.27	0.48	16.36	0.0042*	0.001	-0.3644*	-0.1582*	1		
6	GINI	518726	32.86	3.30	23.70	37.70	0.0007	-0.0689*	0.4861*	0.0366*	0.1319*	1	
7	Gender (ref: male)	518726	0.47	0.50	0.00	1.00	0.0244*	0.0655*	0.0348*	0.0160*	-0.0399*	-0.0014	1
8	Age	518726	43.74	14.17	18.00	64.00	-0.0110*	-0.0778*	-0.0872*	-0.0501*	0.0816*	-0.0189*	-0.0353*
9	Age*Age	518726	2114.43	1286.17	324.00	4096.00	-0.0130*	-0.0776*	-0.1029*	-0.0474*	0.0941*	-0.0293*	-0.0323*
10	Generational cohorts	518726	2.25	0.79	1.00	3.00	-0.0076*	-0.0787*	-0.0981*	-0.0717*	0.0724*	0.0050*	-0.0369*
11	Education	518726	1005.76	558.61	0.00	1720.00	0.0125*	0.0749*	-0.1214*	-0.0223*	0.0465*	-0.1029*	0.0080*
12	Personal income	518726	23187.35	31156.13	33.00	68100.00	0.0135*	0.0805*	-0.0003	-0.0160*	-0.0474*	-0.0419*	0.0937*
13	Year	518726	2010.32	2.36	2007.00	2014	-0.0023	0.0422*	0.4255*	0.1944*	-0.1885*	-0.0529*	0.0261*
14	Business failure	518726	0.02	0.13	0.00	1.00	0.4086*	0.0213*	0.0003	0.0239*	-0.0004	0.0007	0.0318*
15	Entrepreneurial skills	518726	0.36	0.48	0.00	1.00	0.0384*	0.1772*	0.1361*	0.0494*	-0.0767*	0.0262*	0.1348*
16	Fear of failure	518726	0.38	0.48	0.00	1.00	-0.0170*	-0.0246*	0.1690*	0.0843*	-0.1180*	0.0654*	-0.0577*
17	Business failure x skills	518726	0.01	0.10	0.00	1.00	0.3692*	0.0357*	0.0147*	0.0248*	-0.0075*	-0.0027*	0.0308*
18	Business failure x fear of failure	518726	0.01	0.07	0.00	1.00	0.1591*	0.0078*	0.0200*	0.0312*	-0.0135*	0.0051*	0.0107*
19	Crisis	518726	0.50	0.50	0.00	1.00	0.002	-0.0442*	-0.3517*	-0.1904*	0.1176*	0.0563*	-0.0222*

Table 2 (continued)

		8	9	10	11	12	13	14	15	16	17	18	19
8	Age	1											
9	Age*Age	0.9829*	1										
10	Generational cohorts	0.8921*	0.8296*	1									
11	Education	-0.1485*	-0.1574*	-0.1285*	1								
12	Personal income	-0.0381*	-0.0582*	-0.0011	0.2092*	1							
13	Year	-0.0371*	-0.0345*	-0.1453*	-0.0024	-0.0398*	1						
14	Business failure	0.0077*	0.0037*	0.0103*	0.0086*	0.0073*	-0.0009	1					
15	Entrepreneurial skills	-0.0311*	-0.0498*	-0.0251*	0.0883*	0.0989*	0.1364*	0.0686*	1				
16	Fear of failure	-0.0694*	-0.0796*	-0.0653*	-0.0335*	-0.0348*	0.1729*	-0.0161*	0.0072*	1			
17	Business failure x skills	0.0045*	0.0005	0.0042*	0.0087*	0.0092*	0.0244*	0.7826*	0.1351*	-0.0016	1		
18	Business failure x fear of failure	0.0005	-0.0025*	0.0006	-0.0004	-0.0037*	0.0251*	0.5593*	0.0537*	0.0939*	0.5107*	1	
19	Crisis	0.0590*	0.0573*	0.1470*	-0.0133*	0.0614*	-0.8847*	0.0024	-0.1243*	-0.1689*	-0.0202*	-0.0250*	1

Table 3 Two-stage least-squares regression

Stage 2: Entrepreneurial Resilience in high-tech sectors (re-entry)		Model 1a			Model 1b						Model 2a		
					Financial crisis (2007–2010)			Financial recession (2011–2014)					
		C	RSE	P>|t|	C	RSE	P>|t|	C	RSE	P>|t|	C	RSE	P>|t|
Country-level controls	Unemployment	-0.115	0.004	***	-0.137	0.004	***	-0.133	0.004	***	-0.115	0.004	*
	Insolvency	0.105	0.005	**	0.228	0.005	**	0.518	0.005	***	0.105	0.005	*
	Business density	0.084	0.002	***	0.269	0.002	***	-0.105	0.002	***	0.084	0.002	*
	GDP per capita	0.260	0.005	***	0.215	0.005	***	0.218	0.005		0.260	0.005	*
Individual-level controls	Gender (ref: male)	0.485	0.010	***	0.489	0.010	***	0.236	0.010	***	0.485	0.010	*
	Age	0.390	0.003		0.300	0.003	*	0.300	0.003		0.390	0.003	
	Age*Age	0.242	0.000	*	0.239	0.000		0.239	0.000	*	0.242	0.000	*
	Generational cohort (ref: Millennials)												
	Generation Y	-0.216	0.002	***	-0.280	0.002	**	-0.218	0.004	***	-0.216	0.002	*
	Baby boomers	-0.273	0.003	***	-0.188	0.003	**	-0.240	0.003	***	-0.273	0.003	*
	Education (ref: no education)												
	primary school	-0.515	0.037	***	0.695	0.037		-0.343	0.037	*	-0.515	0.037	*
	secondary school	0.590	0.016	***	0.760	0.016	**	-0.595	0.024	***	0.590	0.016	*
	technical school	0.638	0.016	***	0.855	0.016		-0.153	0.005	***	0.638	0.016	*
	tertiary school	0.809	0.002	***	0.904	0.002	***	-0.833	0.008	***	0.809	0.002	*
	Personal income (ref: low income)												
	medium income	-0.651	0.001	***	-0.545	0.001	***	0.674	0.001	***	-0.651	0.001	*
	higher income	0.735	0.003	***	0.773	0.003	***	0.713	0.006	***	0.735	0.003	*
Period of analysis	**Year (ref: 2007)**												
	2008	0.716	0.022	***	0.734	0.022	***				0.716	0.022	*
	2009	0.835	0.028	***	0.859	0.028	***				0.835	0.028	*
	2010	-0.635	0.026	***	0.653	0.026					-0.635	0.026	*

Table 3 (continued)

Stage 2: Entrepreneurial Resilience in high-tech sectors (re-entry)		Model 1a			Model 1b						Model 2a		
					Financial crisis (2007–2010)			Financial recession (2011–2014)					
		C	RSE	P>|t|	C	RSE	P>|t|	C	RSE	P>|t|	C	RSE	P>|t|
	2011	0.640	0.027	***							0.640	0.027	*
	2012	0.645	0.002	***				-0.174	0.003	***	0.645	0.002	*
	2013	-0.683	0.002	***				-0.129	0.002	***	-0.683	0.002	*
	2014	-0.518	0.001	***				-0.164	0.003	***	-0.518	0.001	*
Explanatory	**Entrepreneurial persistence**	**2.958**	**1.063**	***	**2.094**	**0.097**	***	**3.031**	**1.084**	***	**1.037**	**0.221**	*
	Entrepreneurial skills	**3.703**	**0.171**	***	**2.042**	**0.08**	***	**4.529**	**0.115**	***	**4.445**	**1.065**	*
	Fear of failure	**-0.145**	**0.029**	***	**-0.082**	**0.106**	***	**-0.256**	**0.005**	***	**-0.799**	**0.062**	*
	Entrepreneurial persistence x skills										**1.213**	**0.230**	*
	Entrepreneurial persistence x fear of failure												
Stage 1: Entrepreneurial persistence		**C**	**RSE**	**P>|t|**	**C**	**RSE**	**P>|t|**	**C**	**RSE**	**P>|t|**	**C**	**RSE**	**P>|t|**
Country-level controls	Unemployment	-0.275	0.009	***	-0.153	0.009	***	-0.133	0.009	***	-0.275	0.009	***
	Insolvency	-0.111	0.005	**	0.242	0.005	**	-0.273	0.005	***	-0.111	0.005	**
	Business density	0.091	0.007	***	0.191	0.007	***	0.150	0.007	***	0.091	0.007	***
	GDP per capita	-0.277	0.008	***	-0.177	0.008	***	-0.077	0.008		-0.277	0.008	***
Individual-level controls	Gender (ref: male)	0.199	0.01	***	0.205	0.010	***	0.194	0.010	***	0.199	0.010	***
	Age	-0.412	0.003	***	-0.146	0.003	***	-0.01	0.003		-0.412	0.003	
	Age*Age	0.412	0.000	**	0.148	0.000	**	0.113	0.000	**	0.412	0.000	**
	Generational cohort (ref: Millennials)												
	Generation Y	-0.231	0.002	***	-0.189	0.002	**	-0.262	0.002	***	-0.231	0.002	***

Table 3 (continued)

Stage 1: Entrepreneurial persistence		**C**	**RSE**	**P>|t|**	**C**	**RSE**	**P>|t|**	**C**	**RSE**	**P>|t|**	**C**	**RSE**	**P>|t|**
	Baby boomers	-0.292	0.003	***	-0.197	0.003	**	-0.342	0.004	***	-0.292	0.003	***
	Education (ref: no education)												
	primary school	0.515	0.037	***	0.212	0.003		0.147	0.002	**	0.515	0.037	***
	secondary school	0.590	0.016	***	0.624	0.003	**	0.344	0.002	***	0.590	0.016	***
	technical school	0.638	0.016	***	0.402	0.003	*	0.590	0.002	***	0.638	0.016	***
	tertiary school	0.809	0.002	***	0.828	0.003	***	0.754	0.003	***	0.809	0.002	***
	Personal income (ref: low income)												
	medium income	0.151	0.001	***	0.150	0.001	***	0.150	0.001	***	0.151	0.001	***
	higher income	0.360	0.003	***	0.460	0.001	***	0.460	0.001	***	0.360	0.003	***
Period of analysis	**Year (ref: 2007)**												
	2008	-0.116	0.022	***	-0.149	0.002	***				-0.116	0.022	***
	2009	-0.035	0.028	***	-0.398	0.002	***				-0.035	0.028	***
	2010	0.135	0.026	***	-0.126	0.002					0.135	0.026	***
	2011	0.072	0.027	***							0.072	0.027	***
	2012	0.121	0.000	***				-0.247	0.012	***	0.121	0.000	***
	2013	0.083	0.002	***				-0.183	0.015	***	0.083	0.002	***
	2014	0.318	0.001	***				-0.232	0.015	***	0.318	0.001	***
Explanatory	**Business failure**	**0.284**	**0.003**	***	**0.198**	**0.001**	***	**0.137**	**0.042**	***	**0.180**	**0.003**	***
	Entrepreneurial skills	**1.511**	**0.009**	***	**1.915**	**0.001**	***	**1.075**	**0.010**	***	**1.519**	**0.009**	***
	Fear of failure	**-0.157**	**0.008**	***	**0.180**	**0.004**	***	**-0.166**	**0.012**	***	**-0.157**	**0.008**	*
	Business failure x skills										**0.527**	**0.064**	**
	Business failure x fear of failure												
Test	N	518726			240585			278141			518726		
	Pseudo R-square	0.279			0.263			0.292			0.28		

Table 3 (continued)

Stage 1: Entrepreneurial persistence		**C**	**RSE**	**P>|t|**	**C**	**RSE**	**P>|t|**	**C**	**RSE**	**P>|t|**	**C**	**RSE**	**P>|t|**
	F	916.35			527.44			617.46			881.21		
	Prob > F	***			***			***			***		
Stage 2: Entrepreneurial Resilience in high-tech sectors (re-entry)		**Model 2b**			**Model 2c**								
					Financial crisis (2007–2010)			**Financial recession (2011–2014)**					
		C	**RSE**	**P>|t|**	**C**	**RSE**	**P>|t|**	**C**	**RSE**	**P>|t|**			
Country-level controls	Unemployment	-0.115	0.004	***	-0.137	0.004	***	-0.133	0.004	***			
	Insolvency	0.105	0.005	**	0.228	0.005	**	0.518	0.005	***			
	Business density	0.084	0.002	***	0.269	0.002	***	-0.105	0.002	***			
	GDP per capita	0.260	0.005	***	0.215	0.005	***	0.218	0.005	*			
Individual-level controls	Gender (ref: male)	0.485	0.010	***	0.489	0.010	***	0.236	0.010	***			
	Age	0.390	0.003	*	0.300	0.003	*	0.300	0.003				
	Age*Age	0.242	0.000	**	0.239	0.000		0.239	0.000	*			
	Generational cohort (ref: Millennials)												
	Generation Y	-0.216	0.002	***	-0.280	0.002	**	-0.218	0.004	***			
	Baby boomers	-0.273	0.003	***	-0.188	0.003	**	-0.24	0.003	***			
	Education (ref: no education)												
	primary school	-0.515	0.037	***	0.695	0.037		-0.343	0.037	**			
	secondary school	0.590	0.016	***	0.760	0.016	**	-0.595	0.024	***			
	technical school	0.638	0.016	***	0.855	0.016		-0.153	0.005	***			
	tertiary school	0.809	0.002	***	0.904	0.002	***	-0.833	0.008	***			
	Personal income (ref: low income)												
	medium income	-0.651	0.001	***	-0.545	0.001	***	0.674	0.001	***			

Table 3 (continued)

Stage 2: Entrepreneurial Resilience in high-tech sectors (re-entry)		Model 2b			Model 2c					
					Financial crisis (2007–2010)			Financial recession (2011–2014)		
		C	RSE	P>|t|	C	RSE	P>|t|	C	RSE	P>|t|
	higher income	0.735	0.003	***	0.773	0.003	***	0.713	0.006	***
Period of analysis	**Year (ref: 2007)**									
	2008	0.716	0.022	***	0.734	0.022	***			
	2009	0.835	0.028	***	0.859	0.028	***			
	2010	-0.635	0.026	***	0.653	0.026				
	2011	0.640	0.027	***						
	2012	0.645	0.002	***				-0.174	0.003	***
	2013	-0.683	0.002	***				-0.129	0.002	***
	2014	-0.518	0.001	***				-0.164	0.003	***
Explanatory	**Entrepreneurial persistence**	**1.218**	**0.221**	***	**1.094**	**0.097**	***	**2.550**	**1.084**	***
	Entrepreneurial skills	**2.781**	**0.165**	***	**2.118**	**0.08**	***	**3.810**	**0.115**	***
	Fear of failure	**-0.617**	**0.049**	***	**-0.511**	**0.106**	***	**-0.559**	**0.005**	***
	Entrepreneurial persistence x skills				**3.225**	**0.128**	***	**0.183**	**0.010**	***
	Entrepreneurial persistence x fear of failure	**0.961**	**0.230**	**	**2.447**	**0.184**	*	**-0.205**	**0.010**	***
Stage 1: Entrepreneurial persistence		**C**	**C**	**RSE**	**P>|t|**	**C**	**RSE**	**P>|t|**	**C**	**RSE**
Country-level controls	Unemployment	-0.275	0.009	***	-0.153	0.009	***	-0.133	0.009	***
	Insolvency	-0.111	0.005	**	0.242	0.005	**	-0.273	0.005	***
	Business density	0.091	0.007	***	0.191	0.007	***	0.150	0.007	***
	GDP per capita	-0.277	0.008	***	-0.177	0.008	***	-0.077	0.008	

Table 3 (continued)

Stage 1: Entrepreneurial persistence		C	C	RSE	P>|t|	C	RSE	P>|t|	C	RSE
Individual-level controls	Gender (ref: male)	0.199	0.01	***	0.205	0.010	***	0.194	0.010	***
	Age	-0.412	0.003		-0.146	0.003	***	0.010	0.003	
	Age*Age	-0.412	0.000	**	-0.148	0.000	**	-0.113	0.000	**
	Generational cohort (ref: Millennials)									
	Generation Y	-0.231	0.002	***	-0.189	0.002	**	-0.262	0.002	***
	Baby boomers	-0.292	0.003	***	-0.197	0.003	**	-0.342	0.004	***
	Education (ref: no education)									
	primary school	0.515	0.037	***	0.212	0.003		0.147	0.002	**
	secondary school	0.590	0.016	***	0.624	0.003	**	0.344	0.002	***
	technical school	0.638	0.016	***	0.402	0.003	*	0.590	0.002	***
	tertiary school	0.809	0.002	***	0.828	0.003	***	0.754	0.003	***
	Personal income (ref: low income)									
	medium income	0.151	0.001	***	0.150	0.001	***	0.150	0.001	***
	higher income	0.360	0.003	***	0.460	0.001	***	0.460	0.001	***
Period of analysis	**Year (ref: 2007)**									
	2008	-0.116	0.022	***	-0.149	0.002	***			
	2009	-0.035	0.028	***	-0.398	0.002	***			
	2010	0.135	0.026	***	-0.126	0.002				
	2011	0.072	0.027	***						
	2012	0.121	0.000	***				-0.247	0.012	***
	2013	0.083	0.002	***				-0.183	0.015	***
	2014	0.318	0.001	***				-0.232	0.015	***
Explanatory	**Business failure**	**0.292**	**0.003**	***	**0.210**	**0.001**	***	**0.388**	**0.042**	***
	Entrepreneurial skills	**1.952**	**0.009**	***	**1.984**	**0.001**	***	**1.076**	**0.010**	***

Table 3 (continued)

Stage 1: Entrepreneurial persistence		C	C	RSE	P>|t|	C	RSE	P>|t|	C	RSE
	Fear of failure	**-0.172**	**0.008**	**	**0.819**	**0.004**	***	**1.361**	**0.012**	***
	Business failure x skills				**0.906**	**0.003**	***	**-0.240**	**0.010**	***
	Business failure x fear of failure	**-0.184**	**0.003**	***	**0.213**	**0.003**	***	**-0.231**	**0.010**	***
Test	N	518726			240585			278141		
	Pseudo R-square	0.281			0.264			0.293		
	F	881.16			527.44			617.46		
	Prob > F	***			***			***		

Bold emphasis reflected that the explanatory coefficients are statistically significant

Level of statistical significance: * $p \leq 0.100$; ** $p \leq 0.050$; *** $p \leq 0.001$

entrepreneurship [see Model 1a: 1.511, $p<0.001$], as well as that the entrepreneurial persistence decreases when individuals perceive a fear of failure [see Model 1a: -0.157, $p<0.001$]. While the interaction effect of business failure experience and entrepreneurial skills increases the propensity to be persistent in entrepreneurship [see Model 2a: 0.527, $p<0.05$], the interaction effect of business failure experience and fear of failure decreases the propensity to be persistent in entrepreneurship [see Model 2b: -0.184, $p<0.001$].

Regarding the contextual-level analysis, taking as reference 2007, results show that persistent individuals' propensity to entrepreneurship increased during the recession period (from 2011 to 2014). Concerning the moderation effect of external shocks, results show that the effect of business failure experience on entrepreneurial persistence is slightly higher in the financial crisis period [see Model 1b: 0.198, $p<0.001$] than in the economic recession period [see Model 1b: 0.137, $p<0.001$]. Similarly, in Model 1b, the effect of entrepreneurial confidence variables such as entrepreneurial skills [1.915, $p<0.001$ vs. 1.075, $p<0.001$] and fear of failure [0.180, $p<0.001$ vs. -0.166, $p<0.001$] on entrepreneurial persistence are highest in the period of crisis with respect to the period of recession. Likewise, results show that the interaction effect between business failure experience and entrepreneurial confidence variables (entrepreneurial skills and fear of failure) is considerably higher in the period of crisis than in the period of recession (see Model 2c).

Entrepreneurial resilience in high-tech sectors (stage 2)

The results in Table 3 show the influence of entrepreneurial persistence, entrepreneurial skills, and fear of failure. All models show that the propensity to be resilient after a business failure increases when individuals are persistent. Results show the significant role of entrepreneurial persistence on entrepreneurial re-entries in high-tech sectors [see Model 1a: 2.958, $p<0.001$]. At the individual-level determinants, all models show that the propensity to re-entry into entrepreneurship in high-tech sectors after a business failure increases when individuals have entrepreneurial skills [see Model 1a: 3.703, $p<0.001$] but decreases when individuals perceive fear of failure [see Model 1a: -0.145, $p<0.001$].

Regarding the contextual-level determinants, results show the effect of external shocks on entrepreneurial resilience in high-tech sectors. Contrarily than the observed effect on entrepreneurial persistence, results show that the effect of entrepreneurial persistence on entrepreneurial resilience in high-tech sectors after a business failure is slightly higher in the recession crisis period [see Model 1b: 2.094, $p<0.001$] than the financial recession period [see Model 1b: 3.031, $p<0.001$]. Similarly, the effect of entrepreneurial confidence variables on entrepreneurial resilience in high-tech sectors after a business failure is highest in the period of recession [see Model 2c].

Visualization of marginal effects

According to Baron (2000), entrepreneurs engage in counterfactual "if only" type thinking more than other groups, mainly about prior entrepreneurial persistence. Figure 2 illustrates the marginal effects on the moderation role of entrepreneurial

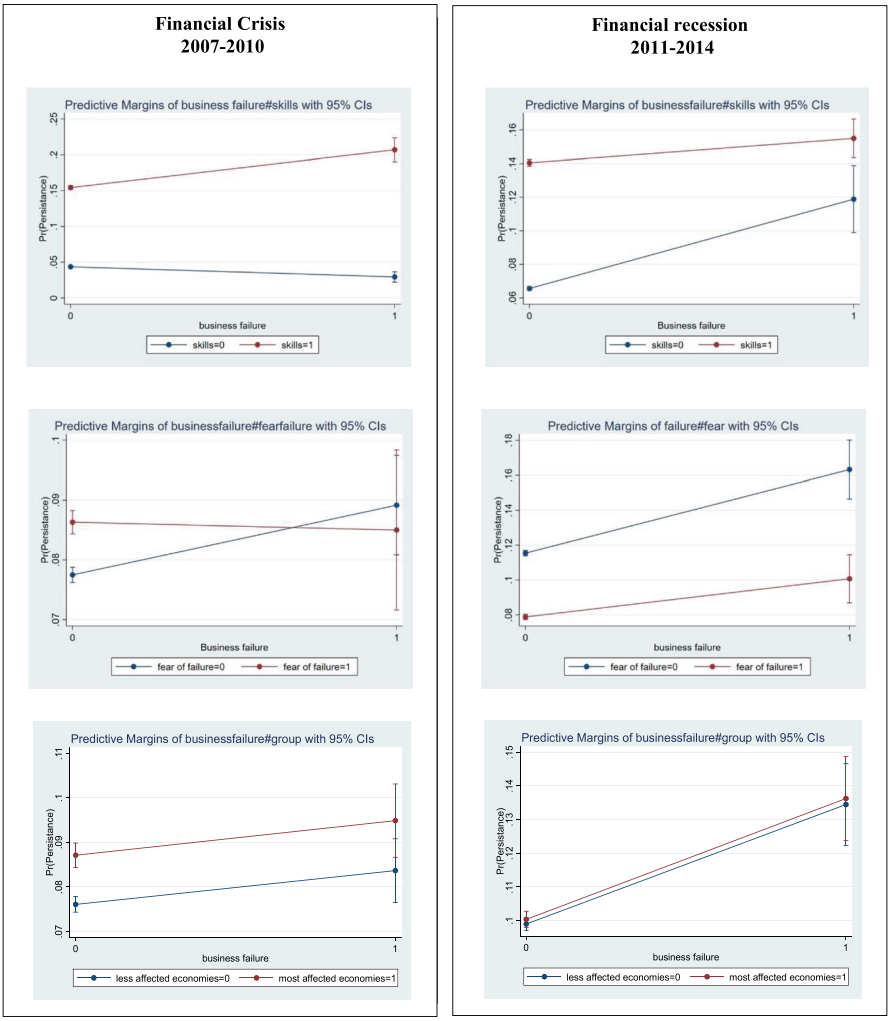

Fig. 2 Marginal effects (Model 1: Entrepreneurial persistence)

confidence (skills and fear of failure) in the relationship between prior business failure and entrepreneurial persistence. *Regarding entrepreneurial skills*, in the crisis period (2007–2010), entrepreneurial skills reinforce the entrepreneurial persistence of individuals with business failure experience. Then, in the recession period (2011–2014), the intensity that individuals with prior business failure are persistent iindividuals with/without entrepreneurial skills. *Regarding fear of failure*, in the crisis period (2007–2010), the absence of fear of failure reinforces the persistence propensity of an individual with prior business failure experience. Then, in the recession period (2011–2014), individuals with/without fear of failure may reinforce the persistence propensity of an individual with prior business failure experience.

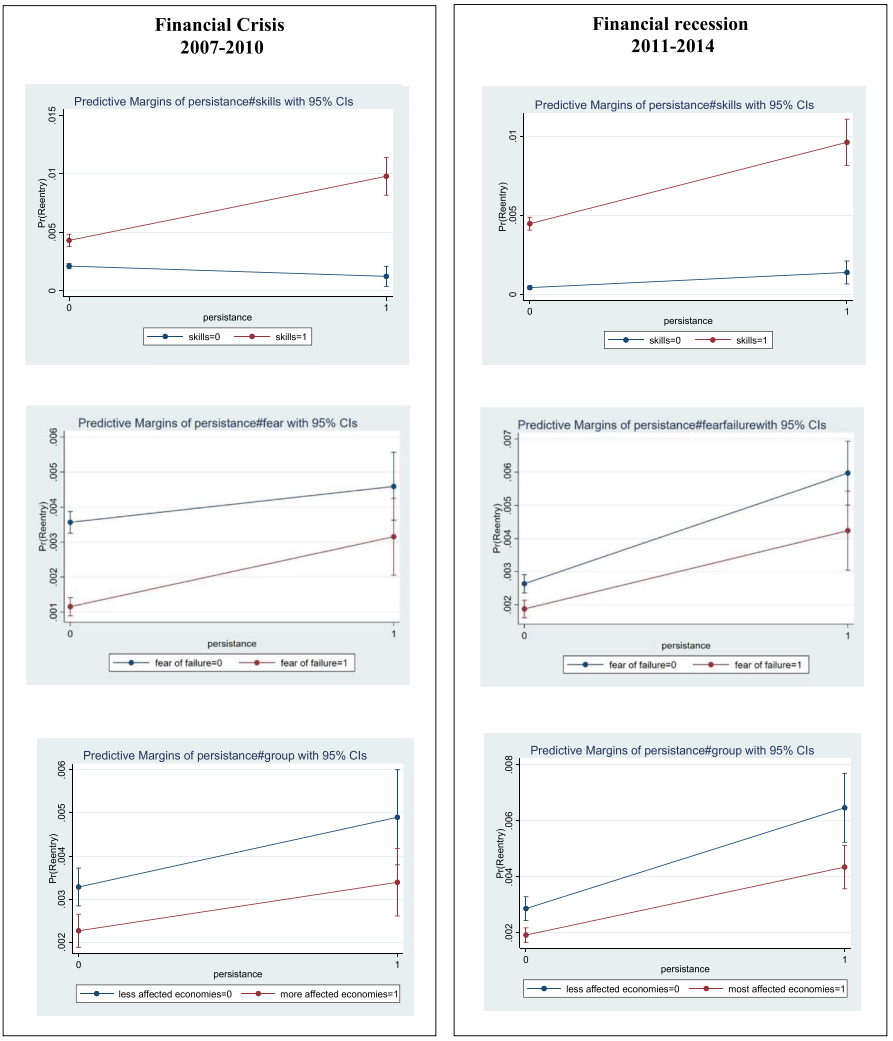

Fig. 3 Marginal effects (Model 2: Entrepreneurial resilience in high-tech sectors)

Given that the business failure experience can be a formative learning experience (Cope, 2011), it is beneficial to society and the economy for those that experienced failure (and assimilated its lessons) to return to the entrepreneurial sphere. Especially in challenging times, the identification and exploitation of new opportunities following the business failure indicate entrepreneurial persistence. In the crisis period (2007–2010), the probability that individuals with prior business failure will be persistent into entrepreneurship highly increases when they are based on the most affected economies (Spain, Greece, Italy, Portugal, Ireland). Then, in the recession period (2011–2014), the probability that individuals with a prior business failure

experience will be persistent intro entrepreneurship is almost the same for individuals based on the most than individuals based on less affected economies.

Figure 3 illustrates the marginal effects on the moderation role of entrepreneurial confidence (skills and fear of failure) in the relationship between entrepreneurial persistence and entrepreneurial resilience in high-tech sectors after failure. *Regarding entrepreneurial skills*, in the crisis period (2007–2010), entrepreneurial skills reinforce the probability that persistent individuals re-enter into entrepreneurial high-tech sectors after failure. While in the recession period (2011–2014), the probability that persistent individuals re-enter into entrepreneurial high-tech sectors after failure is similar for individuals with/without entrepreneurial skills. In the crisis period (2007–2010), the absence of fear of failure reinforces the probability that persistent individuals re-enter into entrepreneurial high-tech sectors after failure. While in the recession period (2011–2014), the probability that persistent individuals re-enter into entrepreneurship in high-tech sectors after failure is similar for individuals with/without fear of failure. *In the crisis period (2007–2010), the context of the context increases* entrepreneurial re-entry in high-tech sectors when re-entrepreneurs with persistence are based on the most affected economies. While in the recession period (2011–2014), the probability that persistent individuals re-enter into entrepreneurship in high-tech sectors after failure is almost the same for individuals based on the most or less affected economies.

Discussion

Hypothesis testing

Entrepreneurial persistence

The first stage of our proposed conceptual model included mechanisms that explain entrepreneurial persistence: (a) at the individual level, the antecedent (business failure experience) and the moderator (entrepreneurial confidence), and (b) at the contextual level, the moderator role of financial crisis and financial recession.

At the individual-level, the first mechanism suggests that prior experience with business failure predicts entrepreneurial persistence. Our findings support this idea by evidencing a positive effect of prior business failure experiences on entrepreneurial persistence, which supports our H1a. These findings are similar to the prior empirical studies McGrath (1999) and Funken et al. (2020) developed. Interestingly, our study also shows that older male entrepreneurs take longer to learn from a business failure experience when compared to their younger counterparts (see Lin & Wang, 2019). The second mechanism, based on prior studies (Caliendo et al., 2020; Chen et al., 2018), suggests that entrepreneurial confidence is a good predictor of entrepreneurial persistence. In this study, we proposed the moderation effect of entrepreneurial confidence (operationalised through entrepreneurial skills and fear of failure) on the relationship between prior failure experience and entrepreneurial persistence. The interaction effect of business failure experience and entrepreneurial skills increases the propensity to be persistent in entrepreneurship, supporting our H1b. It suggests that

persistent individuals' propensity to entrepreneurship increases when individuals with prior business failure experience also perceive that they have the skills/knowledge needed to develop an entrepreneurial initiative (Koellinger et al., 2007). However, while our results confirmed the demotivating effect of fear of failure in those with fewer ambitions like Morgan and Sisak (2016) and Mitchell and Shepherd (2011), it is expected that persistent individuals' propensity to entrepreneurship decreases when individuals with prior business failure also fear failure to be involved in new entrepreneurial initiatives (Hayward et al., 2010; Ucbasaran et al., 2013). Therefore, our results demonstrate that when an entrepreneur acquires failure experience, overconfidence is critical for configuring his/her entrepreneurial persistence by identifying new opportunities and networks (see Caliendo et al., 2020).

At the contextual level, our results suggest that recent business failure experiences could engage the persistence of these individuals in challenging times (e.g., financial crisis). A plausible explanation could be that those individuals have acquired invaluable experience, resulting in them being persistent and managing external crises based on their acquired learning of managing internal crises (Caliendo et al., 2020; Guerrero & Peña-Legazkue, 2019; Williams et al., 2017). Likewise, our results show that the moderation effect of entrepreneurial confidence is considerably higher in the crisis than in the recession period. A plausible explanation could be that persistence is configured based on all individuals' skills and experiences, given the need for survival under uncertain conditions (González-Pernía et al., 2018; Walsh & Cunningham, 2017). Thus, Hypothesis 1c is supported.

Entrepreneurial resilience

The second stage of our proposed conceptual model included mechanisms that explain entrepreneurial resilience: (a) at the individual level, the antecedent (entrepreneurial persistence) and the moderator (entrepreneurial confidence), and (b) at the contextual level, the moderator role of financial crisis and financial recession.

At the individual-level, our findings confirmed that entrepreneurial persistence predicts entrepreneurial persistence, supporting our H2a. A plausible explanation is that the entrepreneur needed to recover and learn to adapt enough to the market so they could re-enter – not only is this a signal of entrepreneurial persistence, but it is also indicative of the qualities central to entrepreneurial resilience in high-tech sectors, as noted by Williams et al. (2017) and Mitchell and Shepherd (2011). Our results also show that the propensity to re-enter entrepreneurial high-tech sectors after a business failure increases when persistent individuals have entrepreneurial skills, as well as that persistent individuals without fear of failure are more likely to re-enter entrepreneurial high-tech sectors after a business failure, supporting H2b. Fear clouds rational thought, and a fear of failure can instigate impulsive reactions rather than reasoned action (Walsh & Cunningham, 2017). The absence of fear of failure enables the entrepreneur to persist and adapt to the market circumstances with a reasoned response. Therefore, when an entrepreneur is confident in their skillset, it induces entrepreneurial action and promotes entrepreneurial re-entry in high-tech sectors following a prior failure experience.

Regarding the contextual-level determinants, the effect of entrepreneurial persistence on entrepreneurial resilience is slightly higher in the recession crisis period than in the financial recession period. This effect suggests that persistence in entrepreneurship in high-tech sectors after a business failure is more pronounced during uncertain times. A plausible explanation is that starting a business (or indeed re-entering the market) during times of economic crisis is more difficult than entering during times of prosperity, as there are more resource constraints. Therefore, persistence during and after a crisis holds greater pre-eminence and is more fundamental to building resilience than persistence during prosperity (Espinoza-Benavides et al., 2021; Morgan & Sisak, 2016). Although entrepreneurial confidence plays a crucial role in the recession because the entrepreneur must be self-assured that they possess the skills necessary to succeed – believing in one's skills promotes entrepreneurial action in high-tech sectors (Walsh & Elorriaga-Rubio, 2019), the experience of failure can leave lasting effects on those who experience it, one of which is a fear of failure because the non-presence of fear of failure enables the entrepreneur to instigate entrepreneurial action unencumbered by such fear. It explains why our results show a higher effect of entrepreneurial confidence on entrepreneurial persistence in a crisis than in a recession period. During a crisis period, there is a considerably higher interaction between entrepreneurial persistence in high-tech sectors and overconfidence is fundamental to instigating entrepreneurial action (Chen et al., 2018; Szerb & Vörös, 2021, Koellinger et al., 2007), but its presence is even more critical during difficult economic periods when entrepreneurial action is riskier. This persistence during periods of sustained adversity leads to resilience, as identified by Shepherd et al. (2020). Thus, Hypothesis 2c is supported.

Implications to the academic community

Contributions

Our study contributes to the entrepreneurship literature as follows.

First, this paper extends the ongoing academic debate about the determinants of entrepreneurial persistence proposed by Caliendo et al. (2020) and entrepreneurial resilience after business failure (Guerrero & Espinoza-Benavides, 2021a, b). Concretely, our theoretical model proposed several individual and contextual mechanisms, and our results provided light on their crucial role in this dynamic and multilevel process. Nevertheless, the complexity of entrepreneurial resilience and entrepreneurial persistence requires an in-depth analysis through evolutionary stages to understand all key roles of each antecedent and the consequences of configuring this entrepreneurial trajectory.

Second, this paper extends the debate about how re-entrepreneurs in high-tech sectors could be more equipped to manage exogenous shakeouts (i.e., economic recessions, natural disasters, pandemics) based on the learning gained from managing organizational crises (i.e., financial crisis, business failures) (Williams et al., 2017). Many entrepreneurship studies have paid attention to the effect of external conditions on entrepreneurial density (i.e., entries and exits). However, there is not enough

evidence about how these external events generate internal crises in the organizations (i.e., more than just closing, reducing personnel, contracting profitability, and viability) and how these organizations are prepared to manage external crises based on their failure experiences.

Third, this paper extends the debate about resilience at the country level—specifically, the resilience in high-tech sectors of less and more affected European economies in the most recent financial crisis (European Commission, 2018). The study of entrepreneurial resilience in high-tech sectors has been concentrated at the individual or organizational levels. However, little is known about how entrepreneurial ecosystems or knowledge-based countries could be more (or less) technologically resilient than others during exogenous shakeouts (i.e., economic crisis, natural disasters, pandemics). It opens a new research opportunity for studying entrepreneurial and innovative resilience at the country level.

Future Research Agenda

The academic discussion on the factors that contribute to entrepreneurial persistence still has many opportunities for future research.

At the individual level, there are several theoretical approaches that could explain the undiscovered mechanisms for entrepreneurial persistence after a business failure experience in adverse contexts. One possible area of research could focus on understanding how individuals manage their emotions, mental health issues, creative processes, and socio-economic needs simultaneously, especially under challenging external conditions. Psychological, learning, and management theories can offer valuable insights into this process. For example, the multi-dexterity approach could help to understand the decision-making ability of re-entrepreneurs and new entrepreneurs who face multiple simultaneous tensions (Guerrero, 2021).

At the organizational level, the high-tech sector is undoubtedly important. However, there are also other sectors that have emerged as a result of spillover effects after crises. This creates an opportunity to explore the emergence of new sectors or the rejuvenation of existing ones due to the entrepreneurial resilience process of re-entrepreneurs during challenging times (Audretsch & Guerrero, 2023). For instance, the COVID-19 pandemic has had winners and losers in the digitalization process, and it has combined multiple chains of values. At the contextual level, there are ample opportunities for research at the contextual level concerning the role of each ecosystem actor in reintegrating entrepreneurs who have suffered a business failure, and their participation in providing ecosystem conditions that promote entrepreneurial resilience (Guerrero & Espinoza-Benavides, 2021a, b). For instance, the role of intermediaries in resilient processes during challenging times, the role of government in creating conducive policies for the growth of entrepreneurship, and the role of other ecosystem actors in fostering an environment of resilience among entrepreneurs (Guerrero et al., 2023).

Implications

For policymakers

The recent exogenous shock emerging due to the macroeconomic fallout from the pandemic has made previously profitable businesses unviable in the current circumstances. Our results provide insights about re-entrepreneurs' contribution to high-tech sectors (entrepreneurial resilience – re-entry after a business failure) in less and more affected European economies. Based on these results, policymakers may design support and enable re-entrepreneurs in high-tech sectors with the appropriate mechanisms (i.e., not only monetary but also enhancing their entrepreneurial skills via mentoring) to re-entry into entrepreneurship in high-tech sectors, thereby allowing the economy to emerge from this crisis with a resilience (Guerrero et al., 2023), lessening the timeframe and negative impact of the economic repercussions following the pandemic characterized by the emergence of multiple types of digital entrepreneurship (Ibáñez et al., 2021; Yáñez-Valdés et al., 2023). The implementation of policy actions based on business failures' learning should also be oriented to reduce the stigma of failure, as well as implement support mechanisms (i.e., including individuals with business failure experiences as professional supports as resilient high-tech entrepreneurial role models) for novel high-tech entrepreneurs to manage exogenous shakeouts (i.e., entrepreneurial resilience in digital sectors during the COVID-19 pandemic).

For entrepreneurs and re-entrepreneurs in high-tech sectors

While the pandemic is unforeseen, the market turmoil it is wreaking is not unfamiliar territory; a little over a decade ago, the Global Financial Crisis impacted economies worldwide, affecting a broad spectrum of nations. Based on our results and exploiting the new digital technologies, one of the main implications of our study for the re-entrepreneurs in high-tech sectors may be enhancing/stimulating the building of high-tech re-entrepreneurs' networks. Entrepreneurial confidence plays a relevant role in the configuration of entrepreneurial persistence and resilience. It implies that this community could take advantage of prior business failure learning experiences of members of this type of network, as well as identifying partners and tech-digital initiatives for supporting the creation of new ventures to reactivate the economy. Directly or indirectly, this action will represent a light at the end of the tunnel of many novel high-tech entrepreneurs that are not able to manage internal crisis created by the external crisis. By learning from the past financial crisis (European Commission, 2018), overcoming the effects of the global pandemic demands the collaboration and empathy of all entrepreneurial ecosystem agents (entrepreneurs, re-entrepreneurs, government agencies, investors, educators, financial institutions, health organizations).

Limitations

This study has several limitations. First, the main limitation of this study was the dataset used for testing our hypotheses. The GEM dataset provides useful information for

understanding individuals' attitudes towards entrepreneurship. However, our dependent and explanatory proxies were built based on the available dataset. It means that we provide interesting insights while maintaining several controls related to emotions, passion, and other relevant constructs associated with persistence and resilience. It means that many factors will contribute to entrepreneurial resilience, including some that we mentioned, such as learning and support networks, but others, including dynamic capabilities, such as abilities to reconfigure resources. Unfortunately, there is a more complex relationship between entrepreneurial persistence and resilience in high-tech sectors, high-tech entrepreneur needs to be able to learn from adversity and reconfigure resources. Entrepreneurial persistence is a sufficient capability for entrepreneurial resilience in high-tech sectors, but it is not necessary. Future research should consider this limitation and administrate a survey that includes objective/subjective metrics to capture the complexity of this relationship. Second, we approximated the temporal effect of the economic crisis based on the available years in the cross-sectional GEM dataset. However, the trajectory of entrepreneurial re-entries in high-tech sectors (resilience), the identification of opportunities and networking (persistence), and skills and fear of failure (confidence) under challenging times demand an in-depth longitudinal dataset. Furthermore, the utilisation of secondary data sources has resulted in using a single-item measure for 'fear of failure', which limits our ability to fully ascertain the nuanced complexity of fear of failure within the entrepreneurial experience. A natural extension of this study should be analysing the trajectory of re-entrepreneurs and novel entrepreneurs enrolled in high-tech sectors during crisis and recovery periods. We should seek a measure of how high-tech entrepreneurs respond to adversity over time. Third, we analysed the context effect of the economic crisis by considering the less and more affected European countries. However, a dynamic analysis of entrepreneurship resilience in high-tech sectors needs to explore this event per entrepreneurial stage and per country across the globe. Finally, implementing robustness tests was another limitation due to the previous one. In this study, we provide a visualization of the marginal effects of the interaction of the analysed variables in the two analysis periods. It provides a confirmation of the proxies, but future research should demand additional robustness tests.

Conclusions

This study examined the high-tech re-entrepreneurs' response to exogenous shakeouts (during/after the GFC) by the relevant role of their business failure experiences on the configuration of entrepreneurial resilience in high-tech sectors through entrepreneurial persistence in Europe. For overcoming the exogenous shakeout effects (economic crises), our study shows that prior business failure experiences configure the entrepreneurial persistence (identification of new technological, innovative, or digital opportunities, as well as digital/technological networks for exploiting them), as well as contributing entrepreneurial resilience in high-tech sectors (the re-entry into entrepreneurship in high-tech sectors after facing a recent business failure caused by external conditions). The presence or absence of entrepreneurial

confidence will intensify this effect. We hope this study motivates other researchers to continue advancing this research line.

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Data availability The datasets generated and analyzed during the current study are not publicly available.

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