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Journal of Small Business and Enterprise Development

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Article information:

To cite this document:

Javier Monllor Nezih Altay , (2016), "Discovering opportunities in necessity: the inverse creative destruction effect", Journal of Small Business and Enterprise Development, Vol. 23 Iss 1 pp. 274 - 291

Permanent link to this document:

<http://dx.doi.org/10.1108/JSBED-10-2014-0172>

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Discovering opportunities in necessity: the inverse creative destruction effect

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Abstract

Purpose – The purpose of this paper is to investigate the changes in perceptions and actions taken on post-disaster entrepreneurial opportunities.

Design/methodology/approach – Utilizing worldwide data on natural disasters (EMDAT) and entrepreneurial perceptions (Global Entrepreneurship Monitor (GEM)), the authors apply analysis of covariance to compare entrepreneurial opportunity perceptions and actions before and after a disaster took place.

Findings – The study found that natural disasters have a significant and positive impact on entrepreneurial opportunity perceptions and actions but not on perceptions of self-efficacy, fear of failure and entrepreneurial intentions.

Research limitations implications – One limitation of the study is the use of the secondary data. While the GEM data as well as the EMDAT data are country specific, disasters usually have a direct impact on a region of a country rather than affecting the whole country's behavior.

Practical implications – The results hold important policy implications. The fact that disasters increase entrepreneurial action implies that local government institutions should include entrepreneurial action as part of the post-disaster recovery process. By providing assistance and access to resources, government institutions could further increase entrepreneurial action and could increase the number of opportunities perceived by individuals which would lead to new and innovative businesses, in addition to the rebuilding of pre-existing firms.

Originality/value – Natural disasters are frequently considered to be the cause of small business failures or an obstacle to their performance, while simultaneously thought to be a vital component of post-disaster reconstruction. To date, few researchers have attempted to understand the impact of these events on entrepreneurial tendencies, behaviors and activities, even though the authors barely understand how they could serve as a source of entrepreneurial opportunity and innovation. This research is one of the first attempts to shed some light into this interesting and important phenomenon.

Keywords Self-efficacy, Entrepreneurship, Entrepreneurial motivation, Natural disasters, Opportunity, Entrepreneurial perceptions

Paper type Research paper

Introduction

Since the day humans settled in vulnerable areas, they have been exposed to a myriad of disasters. Some have had a substantial impact on human life; some destroyed the environment, and some brought significant economic damage locally as well as globally. For example, in 2010 natural disasters caused 295,000 deaths around the world. The year 2011 on the other hand, broke the record on economic losses with \$380 billion (Munich RE, 2012). As populations shift to vulnerable urban areas and their densities increase, and as supply chains grow and their interdependencies tighten, the effects of such disruptive events will only intensify. Despite their frequency and impact, economic and business research on disasters is surprisingly limited.

We believe there is a pressing need for better understanding the role natural disasters play in economic and business performance for the following reasons.

First, the frequency and intensity of natural disasters are shown to be increasing (Emanuel, 2005). Second, there is compelling evidence that disasters are becoming more economically costly (Horwich, 2000), as they impair business functions and decrease the productive capacity of firms operating in the affected region (Miller, 1991). And third, natural disasters are rarely isolated events due to the global nature of markets and supply networks. Consequently, local catastrophes increasingly result in indirect global consequences (Wagner and Bode, 2006; Gassebner *et al.*, 2006; Altay and Ramirez, 2010). For example, the March 2011 earthquake and following tsunami in Japan created supply shortages and consequently wide spread disruptions among firms in the electronics, automotive and even fashion industries around the globe. Such disruptions in supply have been known to create opportunities for smaller agile firms to capture market share from larger inflexible firms. One such example is the case of Chiquita and Dole. After hurricane Mitch destroyed banana plantations in Central America, fresh produce giant Dole, having no alternative supply sources, lost 4 percent market share to its much smaller rival Chiquita, which was able to obtain bananas from as far as Australia (Sheffi, 2005).

While destructive in nature, disasters also create opportunities for investment and growth. Damaged physical assets and technology could be replaced with better and more productive versions. Stronger businesses may lose market share both in regional and national markets allowing new or smaller ventures to enter these markets (Alesch *et al.*, 2001). Reconstruction efforts may lead to more resilient institutions and improve the business climate (Das, 1998), especially in peripheral regions (Benneworth, 2004; Arbuthnott and von Friedrichs, 2012). Disruption of traditions and policies, and weakening of existing organizational structures may even create a favorable climate for innovation and entrepreneurial pursuits. A relevant article in the *Wall Street Journal* showcasing five firms with innovative solutions against flooding provides anecdotal evidence that “mother nature is also the mother of invention” (Needleman, 2011, p. B5).

On the one hand, disasters have a significant impact on the entrepreneurial economy by constraining the entrepreneur’s ability to act freely and limiting resources that used to be easily available pre-disaster. For example, disasters weaken or destroy the institutions that enforce property rights and contracts, limit the amount of financing and capital available, increase price volatility and cause severe supply shortages (Sautet, 2008). In addition to limiting resources, they also have a negative impact on psychological variables that impact entrepreneurial intentions and behavior. Natural disasters are unpredictable, exogenous events (Gaibullov and Sandler, 2008). While entrepreneurs can assess the probabilities of being affected, they can never be certain of their occurrence and in many instances can fall prey to a false sense of security as time passes and false alarms (in the case of hurricanes or tornadoes, for example) increase. This thus potentially increases uncertainty, risk and therefore decreases entrepreneurial intentions and action (Brück *et al.*, 2011).

On the other hand, these failures of institutions create new opportunities for entrepreneurs to exploit. While government will undoubtedly play a big role in post-disaster recovery, much of the work will take place at the grass-roots level with small entrepreneurs filling the voids left in the market. Understanding how entrepreneurs innovate within a post-disaster context, where resources are scarce and freedom of action is hindered, is essential, since entrepreneurial action is fundamental in recovering from such events and returning to a pre-disaster state or even progressing past a pre-disaster state. However, the exact role that local entrepreneurs and small businesses play within post-disaster recovery is not well understood (Galbraith and Stiles, 2006). Despite their

undeniable impact on the socio-economic fabric of the affected populations, very few publications address the relationship between catastrophic events and entrepreneurial efforts.

This paper is exploratory in nature. It investigates perceptions of entrepreneurs and their intentions related to entrepreneurial opportunities after a natural disaster as well as actions taken by these individuals. Our general goal is to better understand how natural disasters impact nascent entrepreneurship. Consequently, the specific objectives of this research are twofold: first, to make a significant scholarly contribution to entrepreneurship literature by exploring the relationship between disasters and entrepreneurial opportunity perception and action; second, to guide recovery planning efforts by providing empirical evidence regarding the impact of natural disasters on entrepreneurial action. As Galbraith and Stiles (2006) elegantly put forward “understanding how small firms successfully respond within a post-disaster recovery environment may be critical in framing future relief efforts targeted toward the local business community.” If we understand entrepreneurial action and processes, policies could be developed that encourage entrepreneurial action as part of the post-disaster recovery strategy (Galbraith and Stiles, 2006).

Literature review

Research on the impact of external shocks on the macro-economy, supply chains and an individual firm's performance has been limited. Dacy and Kunreuther (1969) probably established the groundwork for a theory on the economics of natural disasters. Their work suggests that the gross domestic product (GDP) is generally found to increase in the periods immediately following a natural disaster. Worthington and Valadkhani (2004) focus on financial markets and show that large natural disasters have an influence on market returns. Altay and Ramirez (2010) show that although at different intensities, every echelon in a supply chain gets affected from natural disasters. Ramirez and Altay (2008) bring the analysis to firm level and show the impact of disasters on the operational performance of the firm.

Studies focussing on long-term effects also show positive correlations between the frequency of climatic disasters and GDP per capita growth along with human capital accumulation and total factor productivity growth (Skidmore and Toya, 2002). One possible explanation for this phenomenon is that “disasters provide opportunities to update the capital stock and adopt new technologies” (Skidmore and Toya, 2002, p. 681). This theory embodies Schumpeter's idea of “creative destruction,” in which endogenous impulses such as new products, new methods of production or transportation or new markets become the engine for growth (Schumpeter, 1942). Creative destruction is the disruptive process of transformation that accompanies radical innovation. Innovative entrepreneurs enter the market and their actions destroy the value of established companies.

Casson (1982/2003) argues that while creative destruction and catastrophic events both cause temporary economic distress (e.g. layoffs of workers with obsolete skills could be considered as the price of new innovation) in the long term, society as a whole enjoys a rise in overall quality of life from entrepreneurial services as long as opportunities for improved coordination and innovation exist. Similarly, Johnstone and Lionais (2004) suggest that depleted communities lend themselves well to fostering entrepreneurial behavior. We visualize extreme events as a form of disruptive process of transformation. While these events bring destruction to a region's economy and its established communities, they also create new opportunities and serve as a force of

innovation that could potentially jump-start new and creative entrepreneurial ventures. The process of creative destruction is therefore inverted in the face of extreme events. While entrepreneurship acts to destroy the value of current incumbents, extreme events act as the destructive force that creates opportunities for innovation and are exploited by innovative and entrepreneurial companies (Noy and Vu, 2010).

Natural disasters are frequently considered to be the cause of small business failures (Beaver and Jennings, 2005) or an obstacle to their performance (Morrison and Teixeira, 2004). Few researchers have attempted to understand the impact of these events on entrepreneurial tendencies, behaviors and activities (Crowards and Coulter, 1999; ECLAC, 2002; Rasmussen, 2004), even though entrepreneurship is considered a vital component of post-disaster reconstruction (Galbraith and Stiles, 2006). Even less understood is how disasters could serve as a source of entrepreneurial opportunity and innovation.

Opportunities lie at the core of entrepreneurship. Conceiving and developing the right opportunities for new businesses is one of the most important abilities of a successful entrepreneur (Stevenson and Gumpert, 1985). To date, Brück *et al.* (2011) conducted the only study that looked at this question. They found that extreme events have a significant positive impact on the perception of rewards. They also showed that while terrorist attacks have a significant positive impact on entrepreneurial action, natural disasters, on the other hand, tend to impact entrepreneurial action negatively.

Research questions

This is an exploratory study with which we attempt to expand on Brück *et al.*'s (2011) preliminary work in the following three ways:

- (1) We bring an important theoretical lens with which to study the phenomenon, in our case, in the form of Schumpeter's creative destruction framework (in fact a more accurate term would be destructive creation as discussed in Noy and Vu, 2010). We investigate whether disasters increase or decrease the perception of an entrepreneur's ability to start and run a business (i.e. self-efficacy) and the presence of entrepreneurial opportunities (i.e. opportunity recognition).
- (2) We expand current knowledge by not only studying how extreme events impact entrepreneurial perceptions, but also entrepreneurial intentions and behavior/action.
- (3) We scrutinize whether extreme events affect an individual's fear of failure.

Data and methodology

Data were taken from two data sets. Entrepreneurship data were drawn from the Adult Population Surveys, collected by the Global Entrepreneurship Monitor (GEM). GEM is the largest survey-based study of entrepreneurship in the world. Data are collected in exactly the same way and at the same time every year in over 80 countries since 1999. Every year, national teams conduct a survey of at least 2,000 people within the adult population, collecting data on attitudes toward entrepreneurship in the general population and whether the individuals are engaged or not in start-up activity or own or run a business. The survey does not ask the respondents whether they have been involved in a disaster or if they have observed relief operations to a disaster. Thus the questions and the answers are independent of respondents' experience with disasters.

The GEM data set provides a comprehensive set of measurements aimed at describing several aspects of the entrepreneurial make-up of a country. In addition to early-stage entrepreneurial action, GEM identifies “established business owners,” entrepreneurial motivation and documents the characteristics of all entrepreneurs with respect to product novelty, intensity of competition, employment and expansion plans, and use of technology. Finally, GEM looks at the socio-economic characteristics of populations; as well as their subjective perceptions and expectations about the entrepreneurial environment. This data set is of considerable value to researchers studying entrepreneurship (Acs *et al.*, 2013; Troilo, 2010; Griffiths and Kickul, 2008; Thomas and Mancino, 2007).

Disaster data were compiled from EMDAT, a database maintained by the Center for Research on the Epidemiology of Disasters at the Catholic University of Louvain in Belgium. The EMDAT data are compiled from different sources such as the United Nations, the US Office of Foreign Disaster Assistance, reinsurance firms, humanitarian organizations and news agencies. The database lists individual events in chronological order and includes date, type of disaster and several measures of affected populations, damage estimates and notes about the main sources of data for any particular event. In the EMDAT database disasters are placed in two categories (natural and technological) each with several sub-categories. In the current research, we focussed only on natural disasters. We also excluded chronic events such as famine since such catastrophes may last decades in some cases, forcing local populations to an exodus.

The data analyzed covered all years from 2000 until 2007. Prior to analysis, both data sets were matched based on the country where the disaster took place and the survey data were collected. For analysis, only those records where the disaster date and the date surveys were administered were 12-month apart or less were utilized. After the merger of both data sets, we were left with a total of 7,460 data points.

Dependent variables

We aimed to explore how the occurrence of natural disasters impact a variety of factors that have been studied and shown to impact entrepreneurial behavior. Behavior after all is what we really wanted to understand. Do natural disasters drive individuals to act on the opportunities that are created by the ensuing environment and how does this behavior compare to the time before the event took place? To conduct the analysis, we used responses to the following GEM question: “You (alone or with others) are currently trying to start a business.”

A second variable we looked at was opportunity perceptions. Recently, researchers have proposed a creation view of entrepreneurship (Alvarez and Barney, 2007; Sarasvathy, 2001) that, in contrast to the traditional “discovery” view, which focusses on objective characteristics of the entrepreneur, views opportunities as objectively constructed. An opportunity is “an image in the entrepreneur’s mind” (Penrose, 1959), and this image is what drives start-up behavior. Since “opportunities are [...] in the eye of the beholder” (Krueger, 2000), perceptions play a critical role that can predict individuals’ entrepreneurial intentions (Krueger, 1993, 2000) and their efforts to create a venture (Edelman and Yli-Renko, 2010). Responses to the following GEM question: “In the next 6 months there will be good opportunities to start a business” were used to conduct this analysis.

Next in our study, we looked at self-efficacy. Ajzen’s (1991) theory of planned behavior proposes that three antecedents (personal attraction, subjective norm and perceived behavioral control) shape individual behavioral intentions. Perceived skills

have also been shown to play a significant and positive role in shaping behavioral intentions (Liñan, 2008) since people who have a higher level of self-efficacy feel more competent to overcome perceived obstacles and persist in the effective search and organization of activities in the midst of uncertainty (Trevelyan, 2009). It has also been shown that self-efficacy improves goal setting for an individual and his business and has a positive impact on persistence to achieve these goals (Erikson, 2002). To ascertain skill perceptions, respondents were presented with the question “You have the knowledge and skills to start a new business.”

Fear of failure is one barrier that has a significant impact on entrepreneurial intentions (Wagner, 2007; Ardagna and Lusardi, 2008) since it is a measure of attitude toward risk which Kihlstrom and Laffont (1979) argue is related to the decision to become an entrepreneur. Welpel *et al.* (2012) found that fear decreases entrepreneurial exploitation even when opportunities with highly positive characteristics are present and it also reduces the impact of positive opportunity evaluations. Fear of failure was measured with the question: “Fear of failure would prevent you from starting a new business.”

We were also interested in the effects natural disasters had on entrepreneurial intentions. It has been shown that when individuals are asked to formulate a specific plan indicating when, where and how they will carry out the intended action, the correspondence between intended and actual behavior dramatically increases (Ajzen *et al.*, 2009). This effect has been found to impact normal as well as disagreeable tasks. The GEM question: “You (alone or with others) plan to start a business in the next 3 years” was used to measure entrepreneurial intentions.

Finally, to further understand how disasters impact entrepreneurship, we examined variables that measure whether the individual was partaking in necessity (necessity early-stage entrepreneurial action (NESEA)) or opportunity (opportunity early-stage entrepreneurial action (OESEA)) based entrepreneurship. There are a variety of reasons and motives that drive entrepreneurial behavior. Entrepreneurs may be pushed into starting businesses out of necessity because they have no other options and need a source of income or they may be pulled into starting businesses because they have recognized what they believe is a viable opportunity that will increase their independence or their income. We believe this distinction is relevant to our study, as we posit that disasters create new opportunities and if correct, expect to see an increase in opportunity-driven entrepreneurship after a disaster (Bosma *et al.*, 2012; Williams, 2008). GEM measures NESEA and OESEA with the question: “Are you involved in this start-up to take advantage of a business opportunity or because you have no better choices for work?” (Table I).

Covariates

For studies like this one, using an unbiased measure of disaster impact is critical. The number of events at a location does not necessarily translate into actual damage

Dependent variables

Start-up action	You (alone or with others) are currently trying to start a business
Opportunity	In the next 6 months there will be good opportunities to start a business
Skills	You have the knowledge and skills to start a new business
Fear of failure	Fear of failure would prevent you from starting a new business
Intentions	You (alone or with others) plan to start a business in the next 3 years

Table I.
Dependent variables
and their
descriptions

experienced. Frequent events striking a sparsely populated area may not cause significant damage to the local economy. For this reason we also consider the number of people affected as a proxy for potential disruptions. If a disaster affects a considerably large portion of the population in a country, it has the potential of disturbing the availability and productivity of the labor force even when little physical damage is created.

It can be argued that the number of people affected is also an imperfect measure since it does not consider physical damage to infrastructure, which may be critical to business sectors. Consequently, we consider a measure of the monetary damage a disaster causes. It can be seen that developed countries exhibit some of the greater economic losses. For example, only 6 percent of the earthquakes in our sample occurred in Japan but those events account for 58 percent of the economic losses.

The measures discussed so far in literature render cross-country comparisons meaningless because raw figures are not normalized. For example, countries with higher populations will be more likely to exhibit a higher number of people affected. At the same time, developed countries (with more valuable assets and infrastructure) will be more likely to exhibit higher monetary damages. A better way to compare the relative impact of a disaster is to normalize the variables. Following Altay and Ramirez (2010) we define *aff/pop* as the ratio of the total people affected by disasters by year over the population of the country. We define *dam/gdp* as the ratio of yearly monetary damage over the total GDP of the country. Higher values of these variables indicate that the disaster had a bigger impact on the country. While these measures are normalized Altay and Ramirez (2010) point out that there still are several potential problems that must be dealt with.

First, while the two variables described above are both proxies for damage and are positively correlated with each other, we believe they are hardly equivalent. For example, in our sample period Morocco had only one earthquake that reported no affected people, but US\$400 million in damages. On the other extreme we see that countries such as Argentina and Australia experienced earthquakes that affected people but created no monetary damage. A second problem is that under the “affected” umbrella, a wide variety of cases could occur. Some of the affected people may need only food or clean water for a few days while others may require hospitalization. People who need temporary shelter or food supplies are given the same weight as those who suffer severe physical injuries. Third, we lose the informational content of the frequency count of disasters. Lacking a theoretical framework one can only assume that a yearly aggregation of damages or number of people affected is the correct methodology. For example, we have no way to know if the impact on firm performance of three small floods in one year is the same as one large one. Fourth, the selection of a single measure could be misleading. For example, if we only look at the number of affected people, the 2010 earthquake in Haiti affected 3,000,000 people (roughly 33 percent of the population) while the 2010 earthquake in Chile affected about 2,000,000 (roughly 15 percent of the population). A casual observer could conclude that the impact of the Haiti quake was twice as big. A look at the death toll provides a different conclusion. Almost 230,000 have been confirmed dead in Haiti (an astounding 2.56 percent of the population) while < 500 in Chile (0.003 percent of the population). Under this measure, the impact of the Haiti earthquake was 800 times stronger.

The extant literature provides no theoretical framework that indicates which proxy should be the most relevant for use in a business setting. Webb *et al.* (2002) suggest that number of deaths is not a good indicator of disaster impact, while Heger *et al.* (2008)

found that a simple disaster count was most explanatory. Others proposed composite measures based on a weighted average of disaster count, death toll and monetary loss (Mao *et al.*, 2007). To capture the explanatory power of each parameter in our analysis, we adapted a simple composite measure of disaster damage created by Altay and Ramirez (2010) based on all available information:

$$\text{Dis_impact} = [(0.25 \times \text{aff}/\text{pop}) + (0.25 \times k/\text{pop}) + (0.25 \times \text{count}/\text{total}) + (0.25 \times \text{dam}/\text{gdp})]$$

In the equation, *aff/pop* is the ratio of number of people affected over population of the country, *k/pop* is the number of people killed over the population of the country, *count/total* is the ratio of disasters impacting a specific country over the total number of disasters in a given year and *dam/gdp* is the ratio of disaster damage over GDP.

Age and gender demographics were also included as control variables in the analysis to control for their effects. These variables have been identified as individual factors that are systematically associated with entrepreneurship and have consistently been used to distinguish between and among individuals as sources of entrepreneurship (Seawright *et al.*, 2013; Evans and Leighton, 1986; Hisrich and Brush, 1986).

Independent variable

Data were separated into two distinct groups: before and after a disaster. Dates when the GEM survey data were taken was compared to the date the natural disaster occurred and a variable was created that identified each data point into the before disaster or after disaster group. Only those data points when the survey was taken 12 months before or after a disaster was kept for analysis (Table II).

Analysis

Data analysis was performed using analysis of covariance (ANCOVA). This analytic tool is considered appropriate for testing theory at early stages of development, where research questions are more concerned with the existence of effects than with the relative strength of relationships developed in the conceptual model (Pedhazur and Schmelkin, 1991). Survey data from each country collected before a disaster and after a disaster was analyzed and compared to search for statistically significant changes. ANCOVA

	Minimum	Maximum	Mean	SD
People killed	1	95	17.09	20.230
Total affected	2	9,670	455,060.33	1,393,980.457
Estimated damage	0.10	1,250	1,911.239	9,781.599
Start-up action	0.00	1.11	0.122	0.118
Intentions	0.00	2.46	0.296	0.370
Opportunities	0.00	4.05	0.529	0.432
Skills	0.00	18.33	1.143	1.051
Fear of failure	0.00	3.50	0.386	0.307
OESEA	0.00	1.00	0.071	0.071
NESEA	0.00	1.00	0.024	0.034
Disaster impact score	0.00	0.07	0.018	0.014

Table II.
Descriptive statistics

provides results similar to ANOVA while controlling for any potential effect that might be attributed to disaster impact, which was introduced through the calculation of a composite variable (Altay and Ramirez, 2010) together with age and gender.

Results and discussion

Our study focussed on examining the differences in entrepreneurial perceptions of opportunities, skills, entrepreneurial intentions, fear of failure and behavior before and after a natural disaster takes place. The following ANCOVA analyses examined these differences between these two groups while controlling for any variance attributed to disaster impact level, age and gender.

For perceptions of opportunity, the analysis, presented in Table III, found a slight significant difference between the two groups (before and after a disaster) with perceptions of opportunity being higher after the occurrence of a natural disaster. This construct explained 9 percent of the variance in opportunity perceptions compared to less than 1 percent of the total variance in the construct when disaster-level impact, age and gender effects were not accounted for. An illustration of the difference can be seen in Figure 1.

Table IV contains results for our analysis of the effects that natural disasters had on entrepreneurial intentions. The analysis did not find a statistically significant difference in entrepreneurial intentions before and after a disaster.

The next analysis (see Table V) looked at how the perceptions of respondents regarding their knowledge and skill level necessary to start a new business differed between the two groups. The main effect was not significant while controlling for disaster impact, age and gender.

Table III.
Results of analysis
for opportunity
perceptions

	MS	F	p
Main effects			
Survey date	0.681	3.935	0.047
Covariates			
Gender	60.148	347.585	0.000
Age	49.211	284.383	0.000
Impact	1.672	9.662	0.002

Note: R² = 0.087

Figure 1.
Results of analysis
for opportunity
perceptions

The analysis comparing fear of failure found no statistical difference between the two groups (Table VI).

We now compared entrepreneurial action between individuals before and after a disaster. The result showed a statistically significant difference in entrepreneurial action with that action increasing after a disaster while accounting for the effects of disaster impact level, gender and age and this. Table VII shows the results for the entrepreneurial action analysis. Figure 2 illustrates that the ratio of undertaking entrepreneurial action after a disaster is higher than prior a disaster.

Overall, we found that the impact of a disaster is clearly correlated with entrepreneurial action and even more interesting that the changes in the ratio of affirmative answers to negative answers to the GEM survey questions is lower before than after a disaster. The fact the respondent's entrepreneurial action increases even though entrepreneurial intentions, self-efficacy and fear of failure show no difference after a disaster posits an interesting question. Does the significant increase in entrepreneurial opportunity perceptions after a disaster that was found in our analysis

Table IV.
Results of analysis
for entrepreneurial
intentions

	MS	F	p
<i>Main effects</i>			
Survey date	0.005	0.049	0.825
<i>Covariates</i>			
Gender	26.812	268.248	0.000
Age	115.913	1,159.665	0.000
Impact	120.673	1,207.294	0.000
Note: $R^2 = 0.310$			

Table V.
Results of analysis
for entrepreneurial
self-efficacy

	MS	F	p
<i>Main effects</i>			
Survey date	0.344	0.378	0.538
<i>Covariates</i>			
Gender	891.653	982.058	0.000
Age	10.785	11.878	0.001
Impact	2.295	2.528	0.112
Note: $R^2 = 0.129$ (adjusted $R^2 = 0.128$)			

Table VI.
Results of analysis
for fear of failure

	MS	F	p
<i>Main effects</i>			
Survey date	0.097	1.326	0.250
<i>Covariates</i>			
Gender	9.701	132.193	0.000
Age	9.095	123.932	0.000
Impact	83.512	1,138.003	0.000
Note: $R^2 = 0.171$ (adjusted $R^2 = 0.171$)			

account for this increase in entrepreneurial action? It could be argued that the increase in start-up activity after disasters is not due to the creation of new and innovative businesses but to the reestablishment of pre-existing businesses that were eliminated or impacted by the disaster. A natural disaster creates gaps in the market when it eliminates or disrupts established businesses, supply chains and possibly whole industries.

To further understand these results, we conducted a final analysis where we looked at how OESEA and NESEA changed before and after a disaster. The OESEA variable is composed of respondents who were pulled into entrepreneurial action out of choice by perceived opportunities and a desire for independence or to increase their income. The NESEA variable on the other hand is composed of people who start businesses because they are pushed into entrepreneurship because they have no other options on the job market or opportunities are absent or unsatisfactory (Williams, 2008).

The results (see Table VIII) of this final analysis showed a statistically significant difference in OESEA but not in NESEA. The analysis shows that there was a significant increase in OESEA after a disaster while accounting for the effects of disaster impact level, gender and age and this. Figure 3 illustrates the results, where we included results for NESEA, even though that analysis showed no significant difference. We can also see that although not tested, OESEA is higher than NESEA.

Our results seem to support the idea that natural disasters create gaps and disrupt existing markets, which in turn create new opportunities that are perceived and exploited by entrepreneurs for independence and income and not necessarily out of necessity.

Table VII.
Results of analysis
for entrepreneurial
behavior

	MS	F	p
<i>Main effects</i>			
Survey date	0.324	33.768	0.000
<i>Covariates</i>			
Gender	5.072	527.879	0.000
Age	8.398	874.080	0.000
Impact	7.087	737.627	0.000
Note: $R^2 = 0.241$ (adjusted $R^2 = 0.241$)			

Figure 2.
Results of analysis
for entrepreneurial
action

It is surprising that we found no change in entrepreneurial intentions before and after a disaster. One possible explanation is due to the way our analysis was compiled. Future research might look into comparing results at varying time frames and comparing, for example, responses three, six and nine months after the disaster, thus conducting a longitudinal study that would highlight how these variables are impacted by temporal distance from the date the disaster took place. This work might help answer whether behavior, intentions, fear of failure, self-efficacy and other variables increase or decrease with time. We decided to analyze survey data that was taken 12 months prior to or after a disaster. This is a rather large time frame that might obfuscate any changes in entrepreneurial intentions as time passes after a disaster occurs. For example, an individual might not have an interest in starting a new venture three months after a rather large natural disaster, but his intentions might be different six or nine months after if and when he has taken care of more important issues, such as ensuring the safety and well-being of himself and his family and can then start looking for other alternatives and opportunities.

Our results also show no difference in the levels of fear of failure. One possible explanation is that individuals impacted by a catastrophic event are not afraid to launch new ventures since they have little to lose in the process. Starting a new company might be their only option in order to bring to market products and/or services that are necessary for survival, daily life and disaster recovery.

	MS	Opportunity <i>F</i>	<i>p</i>	MS	Necessity <i>F</i>	<i>p</i>
<i>Main effects</i>						
Survey date	0.049	12.919	0.000	0.003	3.718	0.054
<i>Covariates</i>						
Gender	2.605	686.085	0.000	0.074	92.191	0.013
Age	5.283	1,391.165	0.000	0.214	265.628	0.038
Impact	1.334	351.386	0.000	0.469	581.365	0.079
Note: $R^2 = 0.264$ (adjusted $R^2 = 0.264$)						

Table VIII.
Results of analysis
for entrepreneurial
action for
respondents who
were involved in
opportunity vs
necessity early-stage
entrepreneurial
action

Figure 3.
Results of analysis
for opportunity and
necessity early-stage
entrepreneurial
action

In addition, since many of these ventures might have already been in existence before the event took place, the individuals see these as a “safe bet” that had previously been tested and accepted in the market. As in the prior argument, the time frame for the data collection could also be a factor influencing the results. Fear of failure might vary during the 12 months after the disaster with it increasing or decreasing through time.

We realize that our results regarding opportunity perceptions and fear of failure are contradicting with the findings of Brück *et al.* (2011), in which they argued that disasters tend to decrease fear of failure and opportunity perceptions. As discussed in the above two paragraphs we did not find any statistically significant difference in the levels of these variables. This discrepancy between our study and the Brück *et al.* (2011) study could be due to several reasons: the two data sets are different. Our data set contains four more years of data; their data includes terrorism while our study focussed on natural disasters only; and the independent variable, i.e. disaster impact is measured differently. We used a composite measure which takes into consideration the number of affected people, death count, number of incidents in a given year and economic damage, whereas Brück *et al.* only used total number of individuals affected. Consequently, it is difficult to make a one-to-one comparison between their findings and ours.

Overall, our study results show evidence of the destructive creation effect of natural disasters embodied by Schumpeter’s framework (Schumpeter, 1942). Schumpeter argued that new products, methods of production or markets are the engines for growth. In the beginning of the paper we argued that natural disasters also act as disruptive processes that create an environment ripe for innovation. Our results support our hypothesis by showing that perception of entrepreneurial opportunities was higher after the occurrence of natural disasters together with entrepreneurial action. More specifically, OESEA was significantly higher after disasters while the same could not be said for NESEA, which further strengthens the argument that this action is due to the creation and perception of entrepreneurial opportunities and not out of necessity. While this opportunity/necessity dualism has been criticized for being too simplistic (Williams, 2008), we believe the circumstances presented by natural disasters cause a large shift that temporarily eliminates the fluidity that exists between necessity and opportunity motives.

Conclusion, implications and limitations

Natural disasters are destructive events that create temporary distress and economic tension in the regions they affect. Although the macro-economic impact of disasters has been investigated, their effect on individual sectors or businesses and more importantly on entrepreneurial action and perceptions has not been well researched. In this exploratory study our objective was to shed some light to the relationship between disasters and entrepreneurial intentions, perceptions and action. Our results indicate that natural disasters increase perceptions of opportunities and positively influence entrepreneurial behavior, specifically, actions that are driven by new opportunities and not as a response of necessity. We believe that this provides some support for our original argument that natural disasters act as a source of creative destruction that creates gaps in the market and opens up new opportunities that are then perceived by entrepreneurs and exploited.

Within the entrepreneurship literature, we feel that a future step would be to look for causal relationships between variables. Being an exploratory study, this research only considered the differences in perceptions before and after a disaster occurred. For example, the data could be analyzed to study how an individual’s perceptions of

opportunities, his self-efficacy and fear of failure all impact his entrepreneurial intentions and how those intentions lead to actions after a disaster. The level of disaster impact would likely moderate all of these relationships. The data could also be further scrutinized longitudinally to analyze responses at different times after a disaster took place. For example, responses could be grouped into different time frames (three, six, nine and 12 months, for example) to study how perceptions vary through time. These results could be used to determine and enact policies of when is the appropriate time for outside intervention and support of entrepreneurial disaster recovery.

Related to this last argument, a further avenue for research would be to study how entrepreneurial action starts after a disaster. This could be done through qualitative research such as structured interviews and focus groups in regions hit by a disaster. The findings then could be used to shape public policy. Such research may provide clues on what types of government policies would be beneficial in increasing entrepreneurial action, opportunity perceptions and reducing fear of failure. Entrepreneurship is an essential component in an area's rebuilding efforts, yet very little research has looked at how entrepreneurs impact those rebuilding efforts and what policies are essential to increase entrepreneurial action. These results hold important policy implications. Brück *et al.* (2011) posit that natural disaster induce a governmental intervention to aid coordination of social response and reconstruction efforts. This increased state intervention might indirectly discourage business creation, through discretionary behavior and unwarranted regulation. Brück *et al.* (2011) also found that, in several instances, government spending increases after terrorist events. Our findings could influence public institutions to enact policies that help increase entrepreneurial action in order to accelerate post-disaster recovery and direct resources specifically toward entrepreneurs pursuing OESEA instead of NESEA ventures in order to have greater impact and avoid resource waste. The fact that disasters increase entrepreneurial action implies that local government institutions should include entrepreneurial action as part of the post-disaster recovery process. Entrepreneurs are a vital resource of the rebuilding efforts and countries that carry significantly higher probabilities of being impacted by these events should implement systems to help smooth out the process of new venture creation. By providing assistance and access to resources, government institutions could further increase entrepreneurial action and could increase the number of opportunities perceived by individuals which would lead to new and innovative businesses, in addition to the rebuilding of pre-existing firms.

We recognize the limitations of our study. First, our secondary data have their weaknesses. For example, while the GEM data as well as the EMDAT data are country specific, disasters usually have a direct impact on a region of a country rather than affecting the whole country's behavior. Furthermore, GEM surveys are performed once a year but some countries are hit by multiple disasters every year. This makes a pre- and post-disaster analysis difficult. It is clear to us that further research on this subject is needed, based on these limitations, the lack of research in this area and the importance of this topic. A similar study conducted in a specific disaster prone region of a country could reveal stronger results. For example, hurricanes hit the Atlantic coast of the USA every year between August and November. Thus a survey conducted in Florida in June-July and then later in December-January may show clearer results for entrepreneurial behavior. Separately, the GEM-EMDAT data set could be further refined in an attempt to improve the strength of our results. We could also further improve the data by looking at specific time periods before and after a disaster takes place and consider the longitudinal changes in perceptions.

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Further reading

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