Natural Disasters and Entrepreneurship Activity

ABSTRACT

We propose that natural disasters discourage economic development in the short-run by inhibiting entrepreneurship start-up activity, which is largely responsible for job creation and growth. Our findings indicate that natural disaster events decrease start-up activity in the short-run (i.e., 1-2 years) but have no effect beyond that term. Furthermore, this relationship is driven by climatic natural disasters in low and middle-income countries and geologic disasters in high-income countries.

Keywords: Natural Disasters, Entrepreneurship, Economic Development

JEL codes: L26, M13, O11, O44, Q54

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1. Introduction

Several studies estimate the impact of natural disasters on economic development[1]. The findings, however, are inconclusive. Theory suggests different types of disasters can have diverse—even opposite—effects on growth. Traditional neo-classical growth models (Solow 1956) predict that the reduction of the capital-labor ratio temporarily drives countries away from their long-run growth path, while the endogenous growth models provide less clear-cut predictions. Models based on Schumpeter's theory of creative destruction may even predict higher growth rates following natural disasters since these shocks can work as an accelerator for upgrading the destroyed capital stock (Crespo-Cuaresma et al., 2008). While the debate focuses

[1] Skidmore & Toya (2002) and Felbermayr & Gröschl (2014).

primarily on the impact of natural disasters on economic development, less attention has been given to the underlying mechanisms at work, such as entrepreneurship.

Entrepreneurship is vital for economic growth[2] due to its ability to create jobs (Decker et al., 2014; Haltiwanger et al., 2013; Lucas & Boudreaux, 2018). Natural disasters, however, substantially hamper this process by making it difficult for owners to return to normal operations (Chamlee-Wright, & Storr, 2009; Grube & Storr, 2018), and due to large scale production networks (Carvalho, 2014), firm productivity is likely to decrease in the aftermath (Boehm et al., 2019; Tahbaz-Salehi et al., 2017). We hypothesize, therefore, that short-term entrepreneurship activity will decline following a natural disaster. Importantly, if natural disasters curtail new business creation, then this explains how natural disasters affect economic growth.

The purpose of our study is to examine how natural disasters affect entrepreneurship start-up activity. This is important because previous studies overlook this channel and theorize that natural disasters affect a nation's capital stock, which influences subsequent economic growth (Crespo-Cuaresma et al., 2008). Our study, however, offers entrepreneurship as an alternative channel through which natural disasters affect economic development. We find that natural disaster events decrease start-up activity in the short-run (i.e., 1-2 years) but have no effect beyond that. We also find this relationship is driven by climatic natural disasters in low and middle-income countries and geologic disasters in high-income countries.

2. Empirical Analysis

[2] Wennekers et al. (1999); Boudreaux & Caudill (2019).

To test the hypothesis that natural disasters affect entrepreneurial start up activity, we use data from 79 countries from 2006-2016[3]. Our dependent variable, new business density, is the number of newly registered limited-liability firms as a percentage of the country's working age population (ages 15-64), normalized by 1000. It comes from World Bank's Doing Business database. We gather data on natural disasters from the Emergency Events Database (EM-DAT) maintained by the Centre for Research on the Epidemiology of Disasters (CRED). CRED uses specific criteria[4] to include natural disasters in the database. Our analysis includes earthquakes, floods, slides, volcanic eruptions and windstorms. We include several controls that might influence start-up activity. We include three variables (time required to start a business, number of start-up procedures, cost of start-up procedures) to capture the costs of doing business (Djankov et al., 2002). We include economic variables (GDP (log) PPP, GDP growth, domestic credit provided by financial sector) and demographic variables (population in largest city, primary education completion rate). Lastly, we include a variable to control for corruption's influence on entrepreneurship activity (Dutta & Sobel, 2016). Except for corruption, which we gather from the World Governance Indicators (WGI), all control variables are from the World Bank. We estimate the following model:

$$ln\ \mathrm{NBD}_{it} = \beta_0 + \beta_1 ln\ \mathrm{NBD}_{it-1} + \sum_{j=1}^{J} \alpha_j\ ln\ D_{jit-1} + \sum_{k=1}^{K} \delta_k X_{kit} + \beta_2 \nu_i + \beta_3 \lambda_t + \varepsilon_{it}$$

where NBD_{it} is new business density for country i in year t, and $\mathrm{NBD}_{it\text{-}1}$ is new business density for country i in year t-1. Because new business density is power law distributed, we transform both NBD measures using the natural logarithm and include the lagged variable to account for

[3] The online appendix provides the data sources, variable definitions, and descriptive statistics.

[4] http://www.emdat.be/explanatory-notes

entrepreneurial dynamism (Dutta & Sobel, 2016). D_{jit-1} includes three natural disaster variables (total disasters, climatic disasters (floods and windstorms), and geologic disasters (earthquakes, slides and volcanic eruptions)) for disaster j in country i in year t-1 and year t-2. We transform these variables using the natural logarithm and add one to account for multiple zeros. We use disaster data from the previous two years because contemporaneous values are unlikely to affect new business entry if the disaster occurs during the same year but in a later month as new businesses enter the market. X_{kit} includes k control variables for each country i in year t. ν_i is the country-specific fixed effect, λ_t is the year fixed effect, and ε_{it} is the error term. We use heteroscedastic-consistent standard errors that are robust clustered at the country-level**.**

We begin with a measure of total disaster events but ensuing regressions examine the separate effects of climatic and geologic events that might affect economic activity differently (Crespo-Cuaresma et al., 2008; Skidmore & Toya, 2002). Extrapolating from this literature, we propose two reasons why climatic and geologic events might affect entrepreneurship activity differently. First, climatic events affect a broader area than geologic events, which causes more widespread devastation. Second, effective weather forecasting enables people to prepare for climatic events whereas geologic events occur without warning.

[Insert Table 1 about here]

Columns 1 and 2 of Table 1 examine the relationship between natural disaster events and entrepreneurship activity. Natural disasters in the previous one and two years correspond to decreased start-up rates in subsequent years for almost all measures. The one exception is geologic events have no effect on business start-up rates after one year.[5] Because the dependent variable and disaster variables are transformed using the natural logarithm, we interpret estimates as

[5] We tested different lags for events and found no evidence of an effect beyond two years for any measure.

elasticities. Therefore, a one percent increase in natural disaster events is associated with a 4 to 5 percent decrease in start-up activity in subsequent periods.

Because natural disasters are more devastating in developing countries (Toya & Skidmore, 2007), we split our sample into two categories: high income and low/middle income. We report these findings in columns 3 and 4 of Table 1. Our estimates show that natural disasters affect entrepreneurship activity differently depending on the type of disaster and level of development. Specifically, geologic events discourage start-up activity in high-income countries, and climatic events discourage start-up activity in low/middle income countries. Climatic events have a strong impact on low/middle income countries because they have fewer resources for preparedness and mitigation than high income countries. In addition, climatic events in low/middle income countries tend to have more of an impact on agriculture production than geologic events.

As a robustness test, we augmented our model with a measure of stock market returns (%) to test whether the performance of the economy effects our results. Our results are qualitatively similar when we include this additional variable in our model. We also estimated our baseline model using the dynamic-panel approach of SGMM using a two-step Windmeijer-Corrected (WC) standard error in order to control potential sources of endogeneity. We found that climatic events correspond to decreased start-up activity in low and middle income countries, but we found no effect of any natural disaster event on subsequent start-up activity for high income countries (results available in an online appendix).

3. Conclusions

Our contribution is to show that natural disaster events discourage entrepreneurship activity. This finding speaks to the research on natural disasters and economic development, which has overlooked the role that entrepreneurs have in job creation and growth. Moreover, we find

that climatic natural disasters discourage start-up activity in low/middle income countries and geologic disasters discourage start-up activity in high-income countries. The good news, however, is that we only uncover a temporary short-term effect. Future research should consider a more robust evaluation of the long-run effects of disasters on economic growth and entrepreneurship activity.

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Table 1. Regression Results for Full Sample, High Income Sample, and Low/Middle Income Sample

	Full Sample		High Income	Low/Middle Income
	(1)	(2)	(3)	(4)
NBD (log) $_{t-1}$	0.481****	0.479****	0.56****	0.463****
	(0.045)	(0.044)	(0.065)	(0.060)
Corruption (WGI)	0.104	0.102	0.100	0.119
	(0.101)	(0.099)	(0.171)	(0.121)
Cost of business start-up procedures (% of GNI per	-0.001****	-0.001****	-0.004****	-0.0006****
	(0.0001)	(0.0001)	(0.000)	(0.000)
Time required to start a business (days)	0.003	0.003	0.005	0.003
	(0.002)	(0.002)	(0.003)	(0.003)
Start-up procedures to register a business (number)	-0.009*	-0.009*	-0.031	-0.003
	(0.027)	(0.027)	(0.019)	(0.042)
GDP (log) PPP, inflation adjusted	0.043	0.043	-0.053	0.035
	(0.048)	(0.048)	(0.141)	(0.061)
GDP growth (annual %)	0.012***	0.012***	0.003	0.015**
	(0.004)	(0.004)	(0.005)	(0.006)
Population in largest city (% of Total Population)	2.04	2.005	3.392	2.956
	(2.76)	(2.731)	(3.11)	(3.85)
Primary completion rate total (% of relevant age group)	0.005***	0.005***	0.006	0.005**
	(0.002)	(0.002)	(0.004)	(0.002)
Domestic credit provided by financial sector (% of GDP)	-0.0003	-0.0003	-0.0004	-0.002
	(0.001)	(0.001)	(0.001)	(0.002)
Natural Disasters				
Total events (log) $_{t-1}$	-0.049**			
	(0.021)			
Total events (log) $_{t-2}$	-0.046**			
	(0.02)			
Climatic events (log) $_{t-1}$		-0.044**	-0.009	-0.06****
		(0.022)	(0.023)	(0.029)
Climatic events (log) $_{t-2}$		-0.042**	-0.015	-0.044
		(0.019)	(0.024)	(0.031)
Geologic events (log) $_{t-1}$		-0.058*	-0.114	-0.044
		(0.029)	(0.073)	(0.034)
Geologic events (log) $_{t-2}$		-0.022	-0.159*	0.012
		(0.034)	(0.084)	(0.033)
Constant	-0.676	-0.702	-0.398	-0.866
	(0.592)	(0.581)	(0.916)	(0.741)
Year Effects?	Yes	Yes	Yes	Yes
Country Effects?	Yes	Yes	Yes	Yes
Number of Observations	433	433	179	254
Number of Countries	79	79	79	79
F-test	26.96	38.72	52.71	59.10
R^2 within variance	0.518	0.518	0.598	0.514

Note – Dependent variable is new business density. Standard errors are robust-clustered at the country-level and reported in parentheses. Model estimated by OLS with year and country fixed effects. * p<0.10, ** p<0.05, *** p<0.01, **** p<0.001