Flirting with disasters: Do firms financially plan for disasters?

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How do I measure disaster risk?

**A. Natural disaster risk index**

- Geophysical (earthquakes, mass movements, and volcanic activities), meteorological (extreme temperatures and storms), hydrological (floods and landslides), climatological (droughts and wildfires), and biological (epidemics) disaster groups

- Attributes of a natural disaster: Frequency, duration, economic cost, insured economic losses, human cost, complexity of natural disaster, overlapping natural disasters, and historical vulnerability of location to natural disaster

- Principal component analysis statistical estimation technique + normalization of score between 0 and 100

**B. Technological disaster risk index**

- Industrial accidents, transport accidents, and miscellaneous accidents

- Attributes of a technological disaster: Frequency, duration, economic cost, insured economic losses, human cost, complexity of technological disaster, overlapping technological disasters, and historical vulnerability of location to technological disaster

- Principal component analysis statistical estimation technique + normalization of score between 0 and 100

**Table 4: The impact of disaster risk on cash holdings**

<table>
<thead>
<tr>
<th>Dependent variable:</th>
<th>Cash / book assets</th>
<th>Cash / book assets</th>
<th>Logit cash holdings</th>
<th>Logit cash holdings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural disaster risk</td>
<td>0.0058*** (2.70)</td>
<td>0.0062*** (2.82)</td>
<td>0.0077*** (3.55)</td>
<td>0.0078*** (3.70)</td>
</tr>
<tr>
<td>Technological disaster risk</td>
<td>-0.0001 (0.04)</td>
<td>-0.0001 (0.04)</td>
<td>-0.0010 (0.17)</td>
<td>-0.0010 (0.19)</td>
</tr>
<tr>
<td>Constant</td>
<td>(5.64)</td>
<td>(5.39)</td>
<td>(4.88)</td>
<td>(4.69)</td>
</tr>
<tr>
<td>R2</td>
<td>0.37</td>
<td>0.41</td>
<td>0.41</td>
<td>0.41</td>
</tr>
<tr>
<td>Prob &gt; F</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
</tbody>
</table>

**Table 7: Short-term versus long-term effects of disaster risk on cash holdings**

\[ \beta_1 \times \text{natural disaster risk, t} + \sum_{t=1}^{T} \beta_2 \times \text{natural disaster risk, t} + \text{cash holdings}_{i,t} = \sum_{t=1}^{T} \beta_3 \times \text{natural disaster risk, t} + \text{natural disaster risk}_{i,t} + \epsilon_{i,t} \]

**Table 9: Disaster risk, internal financial constraints, and cash holdings**

<table>
<thead>
<tr>
<th>Dependent variable:</th>
<th>Cash / book assets</th>
<th>Dividend paying firm assets</th>
<th>Operating cash flow</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firm size</td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
</tr>
<tr>
<td>Internal constraint measure x natural disaster risk</td>
<td>-0.00007*** (3.62)</td>
<td>-0.00007*** (3.62)</td>
<td></td>
</tr>
<tr>
<td>Internal constraint measure x technological disaster risk</td>
<td>0.00007*** (3.62)</td>
<td>0.00007*** (3.62)</td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>(3.02)</td>
<td>(3.02)</td>
<td>(3.02)</td>
</tr>
<tr>
<td>Control variables</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Year, industry, and country FE</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Firm-year obs.</td>
<td>148,170</td>
<td>148,170</td>
<td>148,170</td>
</tr>
<tr>
<td>Adj. R2</td>
<td>0.48</td>
<td>0.48</td>
<td>0.48</td>
</tr>
<tr>
<td>Joint significance of interacted variables</td>
<td>0.00007*** (3.62)</td>
<td>0.00007*** (3.62)</td>
<td></td>
</tr>
</tbody>
</table>

**Conclusion and contributions to the literature**

- This study sheds lights on the willingness of firms to prepare simultaneously for different types of disaster risk.
- Firms have a natural disaster management policy that cope with possible negative implications for natural disaster strikes through the cash holdings channel.
- Firms do not prepare for technological disasters possibly due to the existence of information asymmetries about the firm.
- This paper introduces disaster risk indexes.

**Doctoral research**

- The role of disaster life cycle on corporate finance decisions
- Website: https://sites.google.com/view/bsgill