Economic Impacts of Global Terrorism: From Munich to Bali

James R. Barth, Tong Li, Don McCarthy, Triphon Phumiywasana and Glenn Yago

War, Terrorism and Investors
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Motivation for Study

- Increase in terrorist incidents world-wide
- Increased intensity of these incidents
- Relatively new area of empirical study prompted need for broader study:
  - Cross-country (149)
  - Longitudinal across time (35 years)
Terrorism Defined

“Violence, or the threat of violence, calculated to create an atmosphere of fear and alarm...Directed against civilian targets...for political motives carried out in a way to achieve maximum publicity” (National Memorial Institute for the Prevention of Terrorism)

Terrorism measures:

- Number of incidents
- Number of fatalities and injury caused by these incidents
Dataset

- National Memorial Institute for the Prevention of Terrorism - MIPT Terrorism Knowledge Database
- More than 20,000 terrorist incidents since 1968
- The panel data used in our study includes 149 countries and covers 35 years (1970-2004)
Terrorist Incidents Summarized

- Middle East/Persian Gulf Region leads the world in shares of incidents and fatalities/injuries
- Countries with high political risk (e.g. Israel, Lebanon) consistently appear in the top ten countries ranked by terrorism measures
- Top ten also include high income countries (e.g. France, U.S.)
- Increased spike in incidents and fatalities/injuries since 1990
Selected Major Terrorist Incidents Over Time

Source: MIPT (2005) and Milken Institute.
Changing Pattern of Terrorist Incidents

Terrorist targets have changed since the 1970:

- **Diplomatic targets**
  - In 1970s, 41% of targets
  - Since 2000, only 2%

- **Private targets (private citizens and property)**
  - In 1970s, only 1%
  - Since 2000, 30% of targets

- Fatalities and injuries were focused on military targets in the 1970s; now have shifted to private and business targets
Higher political risks are significantly correlated with higher level of terrorist activities.

<table>
<thead>
<tr>
<th></th>
<th>Law and Order</th>
<th>Religious Tensions</th>
<th>Internal Conflict</th>
<th>Ethnic Tensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Incidents</td>
<td>0.04</td>
<td>-0.14</td>
<td>-0.33***</td>
<td>-0.11</td>
</tr>
<tr>
<td>Number of Incidents /GDP (USD billions)</td>
<td>-0.3***</td>
<td>-0.23**</td>
<td>-0.45***</td>
<td>-0.14</td>
</tr>
<tr>
<td>Number of Incidents /Population (millions)</td>
<td>0.09</td>
<td>-0.18**</td>
<td>-0.2**</td>
<td>-0.06</td>
</tr>
<tr>
<td>Fatalities and Injuries /Number of Incidents</td>
<td>-0.09</td>
<td>-0.08</td>
<td>-0.03</td>
<td>-0.07</td>
</tr>
<tr>
<td>Fatalities and Injuries /GDP (USD billions)</td>
<td>-0.21**</td>
<td>-0.32***</td>
<td>-0.37***</td>
<td>-0.21**</td>
</tr>
<tr>
<td>Fatalities and Injuries /Population (millions)</td>
<td>0.05</td>
<td>-0.25***</td>
<td>-0.27***</td>
<td>-0.13</td>
</tr>
</tbody>
</table>

Note: *, ** and *** denote significance at 10, 5, and 1 percent level,
Impacts of Terrorism on Economic Activity

Literature suggests that terrorist activities may:

- depress GDP growth,
- destroy physical and human capital,
- deter foreign direct investment,
- hinder bilateral trade,
- have a positive effect on the price of defense stocks and negative effect on non-defense stocks.
Empirical Model

\[ I_{it} = \alpha + \gamma_i + \tau_t + \beta' X_{it} + \delta' \text{TER}_{it} + \varepsilon_{it} \]

- \( I_{it} \equiv \) dependent variables
  (\( i \) denotes country, \( t \) denotes time period)
- \( X_{it} \equiv \) common control variables
- \( \text{TER}_{it} \equiv \) terrorism variables
- \( \alpha \equiv \) constant coefficient
- \( \gamma_i \equiv \) country fixed effects
- \( \tau_t \equiv \) time-period fixed effects
- \( \beta \equiv \) control coefficients
- \( \delta \equiv \) terrorism coefficients
- \( \varepsilon_{it} \equiv \) error terms
## Correlations for Terrorism Variables Included in Regressions

<table>
<thead>
<tr>
<th></th>
<th>Number of Incidents /Population</th>
<th>Number of Incidents /GDP</th>
<th>Fatalities and Injuries /Population</th>
<th>Fatalities and Injuries/GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>TERPOP (Number of Incidents /Population)</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TERGDP (Number of Incidents/GDP)</td>
<td>0.38***</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TERIPOP (Fatalities and Injuries /Population)</td>
<td>0.61***</td>
<td>0.15***</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>TERIGDP (Fatalities and Injuries /GDP)</td>
<td>0.14***</td>
<td>0.25***</td>
<td>0.6***</td>
<td>1</td>
</tr>
</tbody>
</table>

Note: *, ** and *** denote significance at 10, 5, and 1 percent level, respectively.
### Summary of Empirical Results

<table>
<thead>
<tr>
<th></th>
<th>GDPG (Real GDP per Capita Growth)</th>
<th>CAPGP (Capital Formation to GDP)</th>
<th>SMC (Stock Market Capitalization to GDP)</th>
<th>STRA (Stock Traded Value to GDP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TERIPOP (Number of Incidents /Population)</td>
<td>- *</td>
<td>- **</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>TERGDP (Number of Incidents/GDP)</td>
<td>- *</td>
<td>- ***</td>
<td>- *</td>
<td>+**</td>
</tr>
<tr>
<td>TERIPOP (Fatalities and Injuries /Population)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>- ***</td>
</tr>
<tr>
<td>TERIGDP (Fatalities and Injuries /GDP)</td>
<td>-</td>
<td>- ***</td>
<td>- **</td>
<td>+</td>
</tr>
</tbody>
</table>
Summary of Empirical Results (Continued)

<table>
<thead>
<tr>
<th>Event Type</th>
<th>GDPG (Real GDP per Capita Growth)</th>
<th>CAPGP (Capital Formation to GDP)</th>
<th>SMC (Stock Market Capitalization to GDP)</th>
<th>STRA (Stock Traded Value to GDP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TGT1 (Private Citizens and Property Incidents/Population)</td>
<td>-*</td>
<td>-*</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>TGT2 (Business Incidents/Population)</td>
<td></td>
<td>-***</td>
<td>+*</td>
<td>+*</td>
</tr>
<tr>
<td>TGT3 (Transportation Incidents/Population)</td>
<td></td>
<td>+</td>
<td>+</td>
<td>+***</td>
</tr>
<tr>
<td>TGT4 (Diplomatic Incidents/Population)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>TGT5 (Government Incidents/Population)</td>
<td>-**</td>
<td>-**</td>
<td>-</td>
<td>+*</td>
</tr>
<tr>
<td>TGT6 (Military Incidents/Population)</td>
<td>-*</td>
<td>-</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>TGTPRI (Private, Business and Transportation Incidents/Population)</td>
<td>-*</td>
<td>-**</td>
<td>+*</td>
<td></td>
</tr>
<tr>
<td>TGTPUB (Diplomatic, Government, Military Incidents/Population)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+*</td>
</tr>
</tbody>
</table>
Conclusions

- Generally find negative and significant impact on GDP growth and capital formation, consistent with Blomberg, Hess, and Orphanides (2004)
- Mixed results on stock market capitalization to GDP
  - Defense and security industries
- Positive impact on value of stocks traded to GDP
  - General increased activity
  - Defense and security stocks
- Private sector targets (TGTPRI) have a negative and significant impact on GDP growth and capital formation
Future Implications

- Economic costs of terrorism are real at the global level
- Terrorist incidents:
  - Lead to a re-allocation of resources to less productive uses (e.g. defense and security)
  - Destroy capital
  - Increase levels of fear and uncertainty
- Possible extensions of this research; impact on other areas
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\[ TER_{it} = \sum_{k=1}^{n} \left[ \left( \frac{RDays_{itk}}{TDays_t} \right) \ast TER_{itk} \right] \]
Empirical Results
Dependent Variable: Real GDP per Capita Growth

- Control variables: Capital formation/GDP, trade/GDP (previous period), GDP per capita (previous period), population growth, inflation
- The greater the number of terrorist incidents per million population, the lower the real GDP per capita growth
- The higher the number of terrorist incidents per $US billion GDP, the lower the real GDP per capita growth
Empirical Results
Dependent Variable: Capital Formation/GDP

- Control variables: trade/GDP (previous period), GDP per capita (previous period), population growth, inflation
- The higher the number of terrorist incidents per million population, the lower the capital formation as a percentage of GDP
- The higher the number of terrorist incidents per $billion GDP, the lower the capital formation as a percentage of GDP
- The higher the fatalities and injuries per $billion GDP, the lower the capital formation as a percentage of GDP.
Empirical Results
Dependent Variable: Stock Market Capitalization/GDP

- Control Variables: inflation and real GDP per capita growth
- The higher the number of terrorist incidents per $billion GDP, the lower the stock market capitalization as a percentage of GDP
- The higher the fatalities and injuries per $billion GDP, the lower the stock market capitalization as a percentage of GDP
Empirical Results  
Dependent Variable: Value of Stocks Traded/GDP

- Control variables: inflation and real GDP per capita growth.
- The higher the number of terrorist incidents per US billion GDP, the higher the value of stock traded as a percentage of GDP.
- The higher the fatalities and injuries per million population, the lower the value of stock traded as a percentage of GDP.
Empirical Results

Independent variables: number of terrorist attacks per million population grouped by target

- More terrorist attacks at private citizens and property per million population is related to:
  - lower capital formation/GDP,
  - higher stock market capitalization/GDP,
  - higher value of stocks traded/GDP.

- More terrorist attacks at airlines, airports, transportation, utilities and telecommunication targets is related to:
  - lower real GDP per capita growth,
  - lower capital formation/GDP,
  - higher value of stocks traded/GDP.