



# A Shock to the System

A Research Programme of the Cambridge Centre for Risk Studies

Taxonomy of Macro-Threats

**Archive Version 1.0**

Centre for  
**Risk Studies**



UNIVERSITY OF  
CAMBRIDGE  
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# Archive Version of Taxonomy 1.0

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Part of the Cambridge System Shock Risk Framework, A Research Programme of the Cambridge Centre for Risk Studies

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# Definition of Macro-Threat

- A potential cause of a socio-economic catastrophe that would threaten human and financial capital, damage assets, and disrupt the systems that support our society, at a national or international level

# Primary Categories of Macro-Threats



1  
Financial  
Shocks



5  
Natural  
Catastrophe



9  
Disease  
Outbreaks



2  
Trade  
Disputes



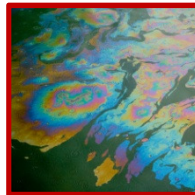
6  
Climatic  
Catastrophe



10  
Demographic  
Stress



3  
Geopolitical  
Conflicts



7  
Environmental  
Catastrophe



11  
Externalities



4  
Political  
Violence



8  
Technological  
Catastrophe



12  
Other  
Shocks



# Taxonomy of Macro-Threats

A framework for categorising socio-economic threats and collecting structured data



## 1 Financial Shocks

- 1.1 Asset Bubble
- 1.2 Financial Irregularity
- 1.3 Bank Run / Credit Default
- 1.4 Sovereign Structural Failure



## 5 Natural Catastrophe

- 5.1 Earthquake
- 5.2 Windstorm
- 5.3 Tsunami
- 5.4 Flooding
- 5.5 Volcanic Eruption
- 5.6 Geotechnical Hazards



## 9 Disease Outbreaks

- 9.1 Human Epidemics
- 9.2 Animal Epidemics
- 9.3 Plant Epidemics



## 2 Trade Disputes

- 2.1 Trade Sanctions
- 2.2 Tariff Wars
- 2.3 Nationalization
- 2.4 Cartel Pressure



## 6 Climatic Catastrophe

- 6.1 Drought
- 6.2 Freeze Event
- 6.3 Heat Wave



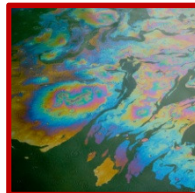
## 10 Demographic Stress

- 10.1 Longevity Stress
- 10.2 Population Migrations



## 3 Geopolitical Conflicts

- 3.1 Military Land War
- 3.2 Civil War
- 3.3 Blockades
- 3.4 External Interventions



## 7 Environmental Catastrophe

- 7.1 Sea Level Rise
- 7.2 Oceanic Circulatory System Change
- 7.3 Atmospheric System Change
- 7.4 Pollution Event
- 7.5 Destruction of Natural Habitat



## 11 Externalities

- 11.1 Meteorite
- 11.2 Space Weather



## 4 Political Violence

- 4.1 Terrorism
- 4.2 Separatism
- 4.3 Civil Disorder
- 4.4 Assassination



## 8 Technological Catastrophe






- 8.1 Nuclear Power Plant Accident
- 8.2 Industrial Accident
- 8.3 Infrastructure Breakdown
- 8.4 Technological Accident
- 8.5 Cyber-Catastrophe



## 12 Other Shocks








# 1 Financial Shock

SEC Class	Description	Historical Examples
 <b>1.1 Asset Bubbles</b>	Pricing inflation and sudden collapse for a major sector or asset class	2008 Sub-Prime Property Bubble 1999 'dot com' bubble 1999 1637 Amsterdam Tulip bubble 1720 South Sea Bubble
 <b>1.2 Financial Irregularities</b>	Fraud, rogue trader(s), Ponzi scheme(s) or other major irregularity	1995 Nick Leeson, Barings Bank 2008 Jerome Kerviel (\$7Bn) Societe Generale; 2009 Bernard Madoff ponzi scheme (\$18 Bn)
 <b>1.3 Bank Run</b>	Credit default for major banks, banking system or market participant	U.S. savings and loan crisis of the 1980s and 1990s 2007 run on Northern Rock (UK)
 <b>1.4 Sovereign Failure</b>	Debt default, currency devaluation or government failure	Black Wednesday UK Government withdrawal from ERM 1992 Russian crisis and LTCM 1994 Argentina crisis of 2001-2002
 <b>1.5 Other?</b>	Possible endemic cycles of boom-bust, agent-based representation of financial crisis	








## 2 Trade Disputes

SEC Class	Description	Historical Examples
 <b>2.1 Trade Sanctions</b>	Embargos and blockades of trade by one country on another, including the unilateral denial of commercial flows, goods, or services	2009 Russia-Ukraine Gazprom dispute disrupts gas supplies to Europe
 <b>2.2 Tariff Wars</b>	Protectionism through the imposition of taxation of a particular set of goods or services	2009 US tax on Chinese tyres; reciprocated by Chinese tax on US Chicken imports
 <b>2.3 Nationalization</b>	Sovereign appropriation of foreign-owned assets in that country	1956 Egypt nationalization of Suez canal, 1972 Pakistan nationalization of foreign assets
 <b>2.4 Cartel Pressure</b>	Trading bloc of suppliers applies pricing or supply pressures	1973 Opec Oil Crisis oil embargo "in response to the U.S. decision to re-supply the Israeli military"
 <b>2.5 Other?</b>		








# 3 Geopolitical Conflict

SEC Class	Description	Historical Examples
 <b>3.1 Military Land War</b>	Dispute between two or more nations results in military action, including bombardment, invasion of troops, or other destruction of infrastructure	Falklands War 1982; Gulf War Kuwait & Iraq 1990-1, Gulf War 2, Iraq , 2003; World War II 1939-45;
 <b>3.2 Civil War</b>	Internal conflict within a country	Darfur, Sudan 2009; Bosnia 1992-5;
 <b>3.3 Blockades</b>	Denial of supply of military matériel or essential civilian goods through use of force to impose restrictions on air travel, shipping, or land transportation	Israeli sea and land blockade of the Gaza Strip, since 2002; Co-ordinated blockade of Armenia by Turkey and Azerbaijan 1994
 <b>3.4 External Intervention</b>	Action by external forces to prevent national authorities pursuing internal policies deemed harmful or repugnant, e.g. no-fly zones	No-Fly Zone, Northern Iraq, 1991; NFZ Bosnia and Herzegovina, 1993–5; Libya?
 <b>3.5 Other?</b>		



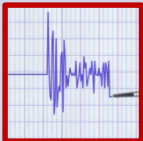
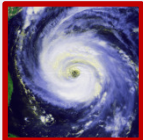





## 4 Political Violence

SEC Class	Description	Historical Examples
 <b>4.1 Terrorism</b>	Terrorist attack perpetrated by a group for political ends	World Trade Center Attack by Al Qaeda 2001; Sarin gas attack Tokyo Subway by Aum Shinrikyo 1995
 <b>4.2 Separatism</b>	Sustained campaign of violence for regional independence	Sri Lanka, Tamil Tigers
 <b>4.3 Civil Disorder</b>	Riots, strikes and civil disobedience, through to revolution	Fall of Berlin Wall 1989, Palestinian Intifada 2000-, France banlieues riots 2005; Arab Spring 2011
 <b>4.4 Assassination</b>	Assassination of a major political leader	Assassination of JFK 1963, Attempt on Reagan 1981, Benazir Bhutto 2007,
 <b>4.5 Other?</b>		


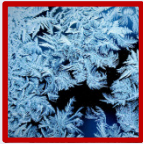




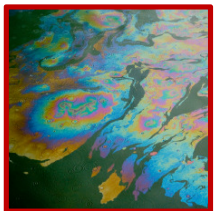
# 5 Natural Catastrophe

SEC Class	Description	Historical Examples
 <b>5.1 Earthquake</b>	Seismic fault rupture causes high levels of damage to infrastructure of a major populated area	Kobe Earthquake, Japan, 1995 Tokyo earthquake 1923 San Francisco earthquake 1908 Tohoku earthquake, Japan 2011 Northridge, California, 1994
 <b>5.2 Windstorm</b>	Hurricane/typhoon/cyclone wind system makes landfall onto a major populated area; European-type windstorm system, large scale, fast-moving, gale force wind speeds	Hurricane Katrina, USA, 2005; Hurricane Andrew, USA, 1992 European Windstorm Lothar 1999 Typhoon Mireille, Japan, 1991
 <b>5.3 Tsunami</b>	Coastal impact of a tidal wave, caused by offshore earthquake, marine landslide, or meteorite in the sea,	Boxing Day Tsunami 2004, Japan Tohoku 2011
 <b>5.4 Flood</b>	River Flood: High rainfall across one or more river system catchment areas, snow melt or other sudden water release causes rivers to burst their banks; Coastal Flood: sea surge from low pressure weather systems, and exceptional tides and winds causes sea water incursion inland	River: Queensland Australia 2011; Coastal: East Coast UK 1953
 <b>5.5 Volcanic Eruption</b>	Ash, pyroclastic hot gasses, lava, and lahar-triggered mudflows cause localized destruction and regional disruption	Ash eruption of Eyjafjallajökull, Iceland 2010; Pinatubo eruption, Philippines, 1990


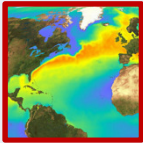





## 6 Climatic Catastrophe

SEC Class	Description	Historical Examples
 <b>6.1 Drought</b>	Extended period of below-average precipitation	1976 Drought in Europe Chinese Drought of 1941 American Dustbowl Drought 1930s Sahel Africa Droughts of 1970s
 <b>6.2 Freeze Event</b>	Extended period of below-average temperatures	Ice Storm Canada 1998; Ice Storm Idaho USA 1961 UK Dec 2010; Moscow, Russia, 2010
 <b>6.3 Heatwave</b>	Extended period of above-average temperatures	Russia 2010; US Heatwave 1980 Chicago Heatwave 1995
 <b>6.4 Other?</b>		




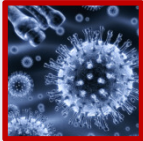



# 7 Environmental Catastrophe

SEC Class	Description	Historical Examples
 <b>7.1 Sea Level Rise</b>	Thermal expansion of the oceans or sudden ice shield melt changes sea level and coastline geography	Interglacial sea level rises in previous epochs
 <b>7.2 Ocean Circulatory System Change</b>	Sudden switch in the circulatory systems of the ocean, such as the Gulf Stream, caused by salination or thermal changes, causes regional climatic change	'Broecker' event 9,000 BC
 <b>7.3 Atmospheric Circulatory System Change</b>	Rapid or sustained periods of change in patterns of meteorological circulation, such as jet stream, causes regional climatic change	'Dansgaard-Oeschger' events 11,500 years ago
 <b>7.4 Pollution Event</b>	Spillage or major release of toxic chemicals into land or sea systems that causes environmental destruction	BP Oil Spill Deepwater Horizon 2010; Exxon Valdez oil spill 1989; Niger Delta Oil Spill 1998 Japan Mercury Pollution of Minamata Bay, 1956
 <b>7.5 Destruction of Natural Habitat</b>	Major forest fire, sudden erosion or man-made destruction that causes a major change in landscape or productive environment	Oakland, California, Fire, of 1991 Great Peshtigo Wild Fire, Wisconsin, 1871 New South Wales, Australia, Bush Fire, 2003 Indonesia Forest Fire 1982







# 8 Technological Catastrophe

SEC Class	Description	Historical Examples
 <b>8.1 Nuclear Meltdown</b>	Major core meltdown of a nuclear power station, causing radioactive fallout over a large area of population and economic and agricultural productivity	Chernobyl reactor disaster 1986, Three Mile Island 1979 Fukushima Daiichi Japan 2011 Windscale, UK, 1957
 <b>8.2 Industrial Accident</b>	Fire, explosion or release of toxic chemicals from an industrial complex, storage facility or during transportation	Toulouse France Explosion 2001; Union Carbide Factory; Bhopal India 1984 Bunsfield UK, 2005 Texas City Disaster, USA, 1947
 <b>8.3 Infrastructure Failure</b>	Blackouts in the electricity supply network and other systems failures due to accidents and technical breakdowns	Great New York Blackout of 2003; Enron California brown-outs 2000
 <b>8.4 Technological Accident</b>	New technological advance proves to have unexpected societal effects and causes disruption or harm to human populations	Bisphenol A (BPA) ban from use in baby bottle manufacturing, 2010
 <b>8.5 Cyber-Catastrophe</b>	Computer networks, communications and information technology systems destabilized by computer virus, hacking, denial of service attacks or other cyber-security issues	Pentagon Cyber Attacks, March 2011 Adidas Cyber Attacks 2011 'Flash Crash' cyber stock crash 6 May 2010; MyDoom/Novarg worm 2004; 'I Love You' Virus 2000;








# 9 Disease Outbreaks

SEC Class	Description	Historical Examples
 <b>9.1</b> Human Epidemics	Influenza pandemics, emerging infectious diseases and re-emergent disease epidemics that cause death and illness in human populations	Influenza Pandemic 1918; 2009 Swine Flu Pandemic; HIV/AIDS 1982+; SARS 2002
 <b>9.2</b> Animal Epidemics	Diseases in animals that cripple agricultural production of meat and poultry or destroy wildlife	Mad Cow Disease (BSE) Epidemic, UK, 1987 Swine Fever, Netherlands, 1997 Foot & Mouth cattle epidemic, Korea, 1997
 <b>9.3</b> Plant Epidemics	Diseases in plants that impact food production in many agricultural areas or cause destruction of the ecological environment.	Dutch Elm Disease, Europe, 1960s Sudden death syndrome (SDS) in soybeans US Corn Belt 2010; Wheat Stem Rust Outbreak, USA, 1962 Wheat Stem Rust Outbreak, West Africa, 1999
 <b>9.4</b> Other?		


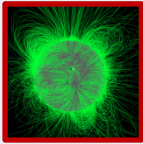



# 10 Demographic Stress

SEC Class	Description	Historical Examples
 <b>10.1</b> Longevity Stress	Aging population combined with falling fertility rates, causes stress on economic systems, resulting in collapse of pension schemes, health programs and social security systems	Municipal Pension Defaults, US cities, 2010 New Jersey Pension Fund insolvency, 2009 Ireland state pension credit downgrade, 2008
 <b>10.2</b> Population Migrations	Mass population movements cause instability and collapse of social infrastructure in the areas newly populated and depopulated	US Mass Migration to the industrial north 1930s India-Pakistan partition 1947 Economic migration of Latin Americans to North America
 <b>10.3</b> Other?		



# 11 Externalities

SEC Class	Description	Historical Examples
 <b>11.1</b> Meteorite	Ground impact of meteors that cause localized destruction, and dust clouds capable of causing periods of ash winter	Tunguska meteorite explosion, Russia 1908; Chicxulub Crater, Yucatan, Cretaceous–Tertiary extinction event
 <b>11.2</b> Solar Storm	Solar flare activity that can impact satellites, communication technology, power distribution systems and other infrastructure	Carrington Event geomagnetic storm of 1859;
 <b>11.3</b> Other?		