

# Risk Measurement and Management

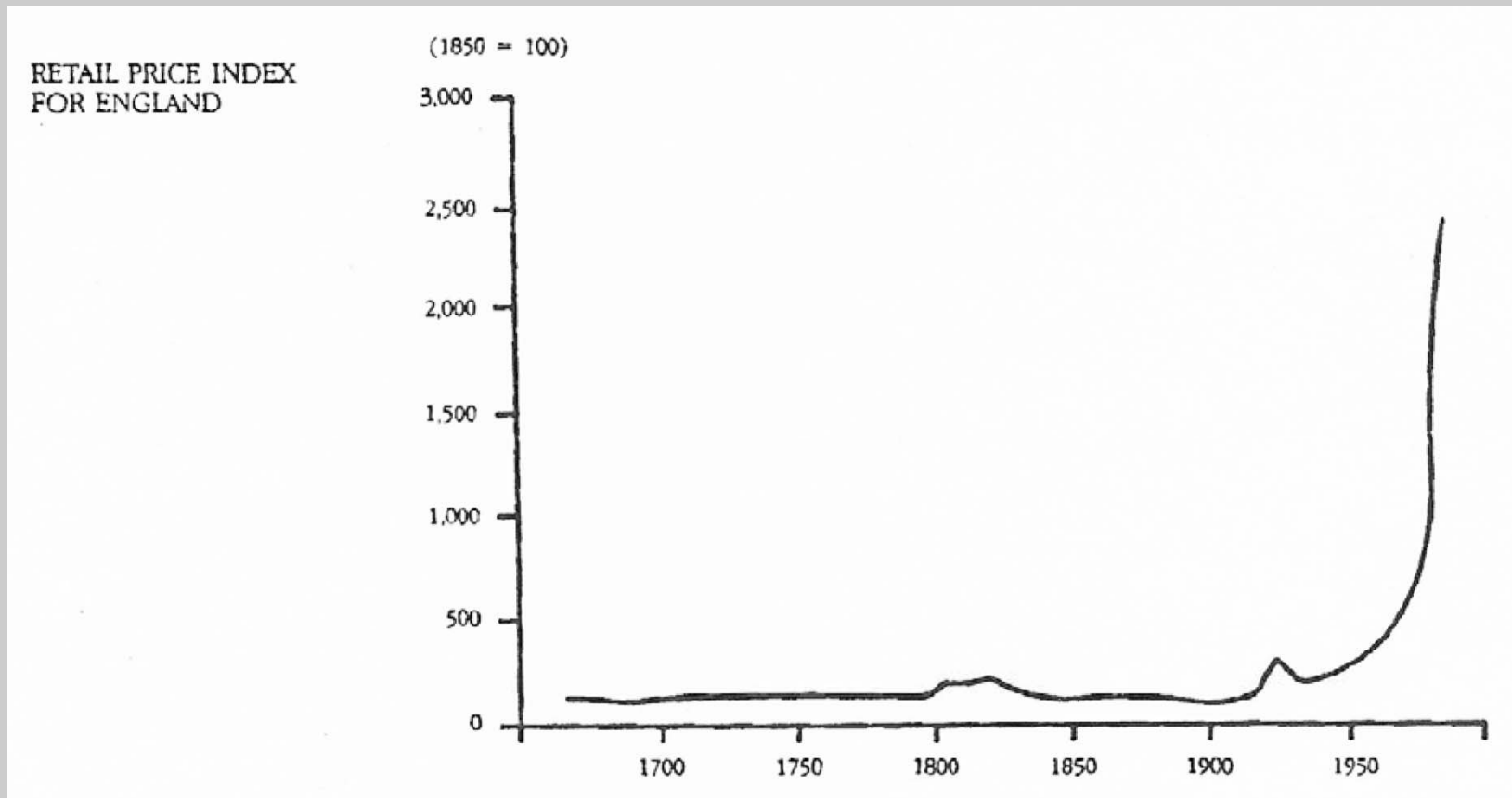
Prepared for the Federal Reserve Bank of Chicago/DePaul  
University Risk Symposium  
April 6, 2010  
by

Dr. Joseph R. Mason  
Hermann Moyse, Jr./Louisiana Bankers Association Endowed Professor  
of Banking and Associate Professor, Louisiana State University  
and  
Senior Fellow, The Wharton School

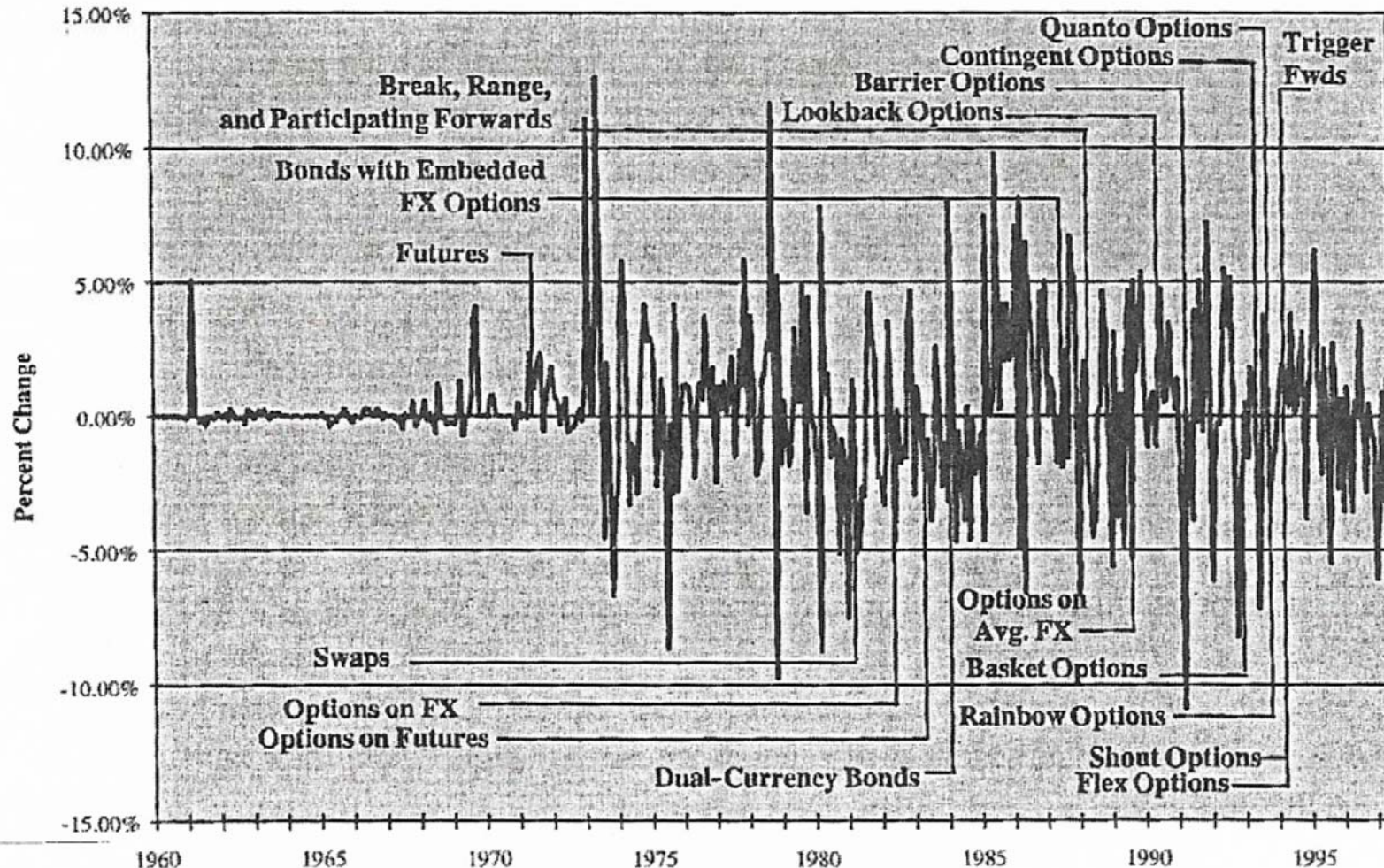
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# Price Risk

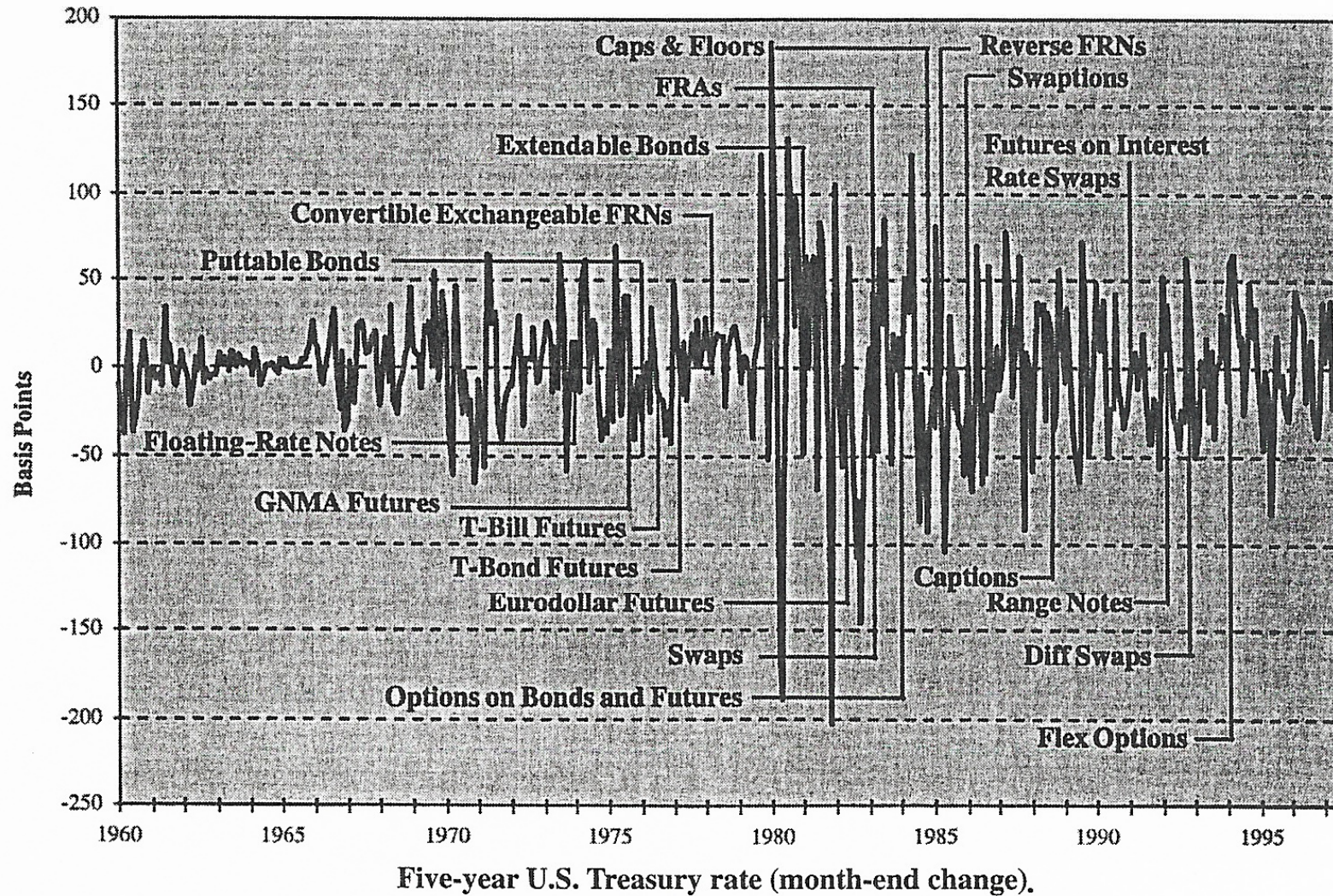


# Response to FX Risk

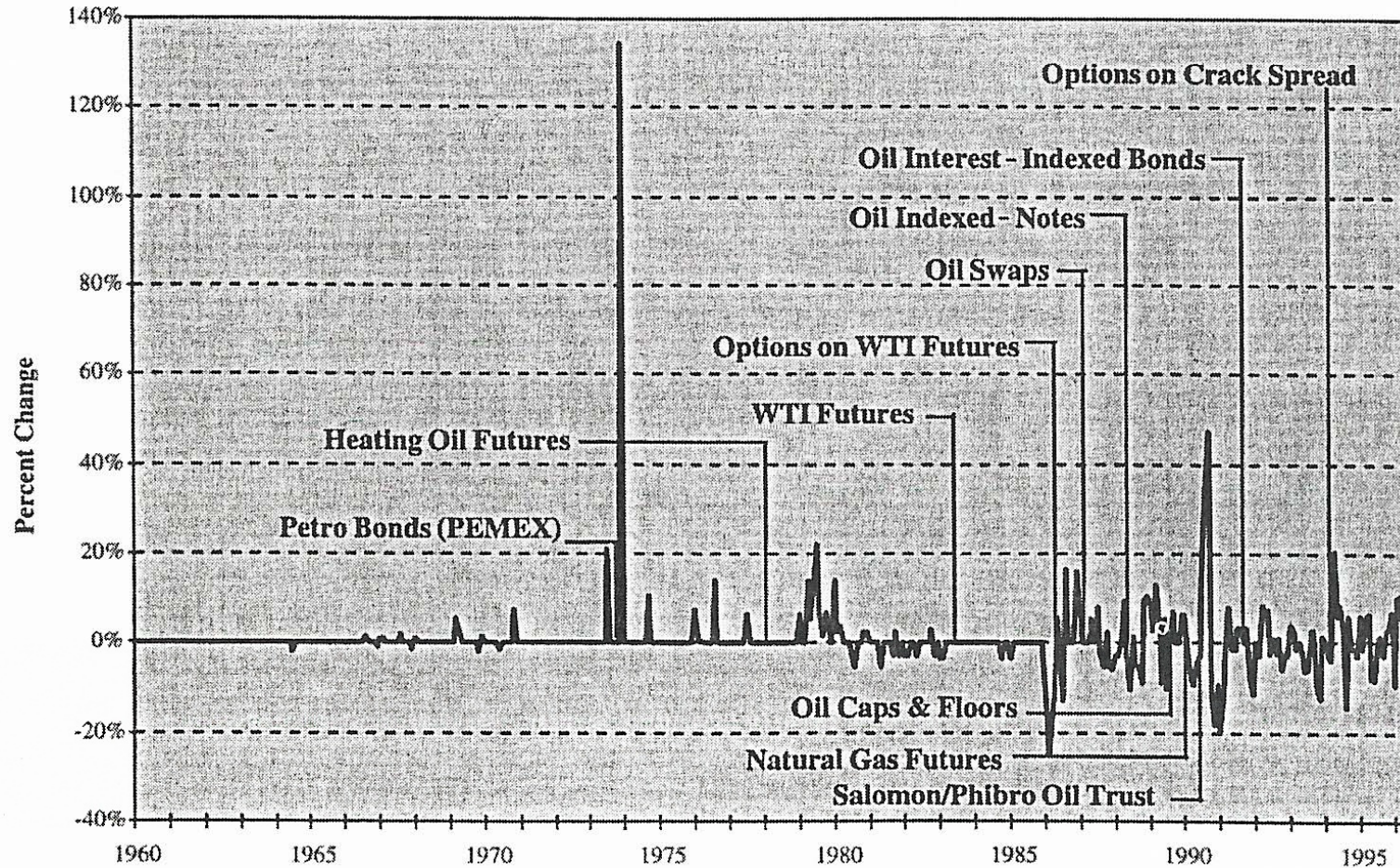


Percent change in U.S. dollar—  
Deutsche mark exchange rate (month-end).

# Response to IRR

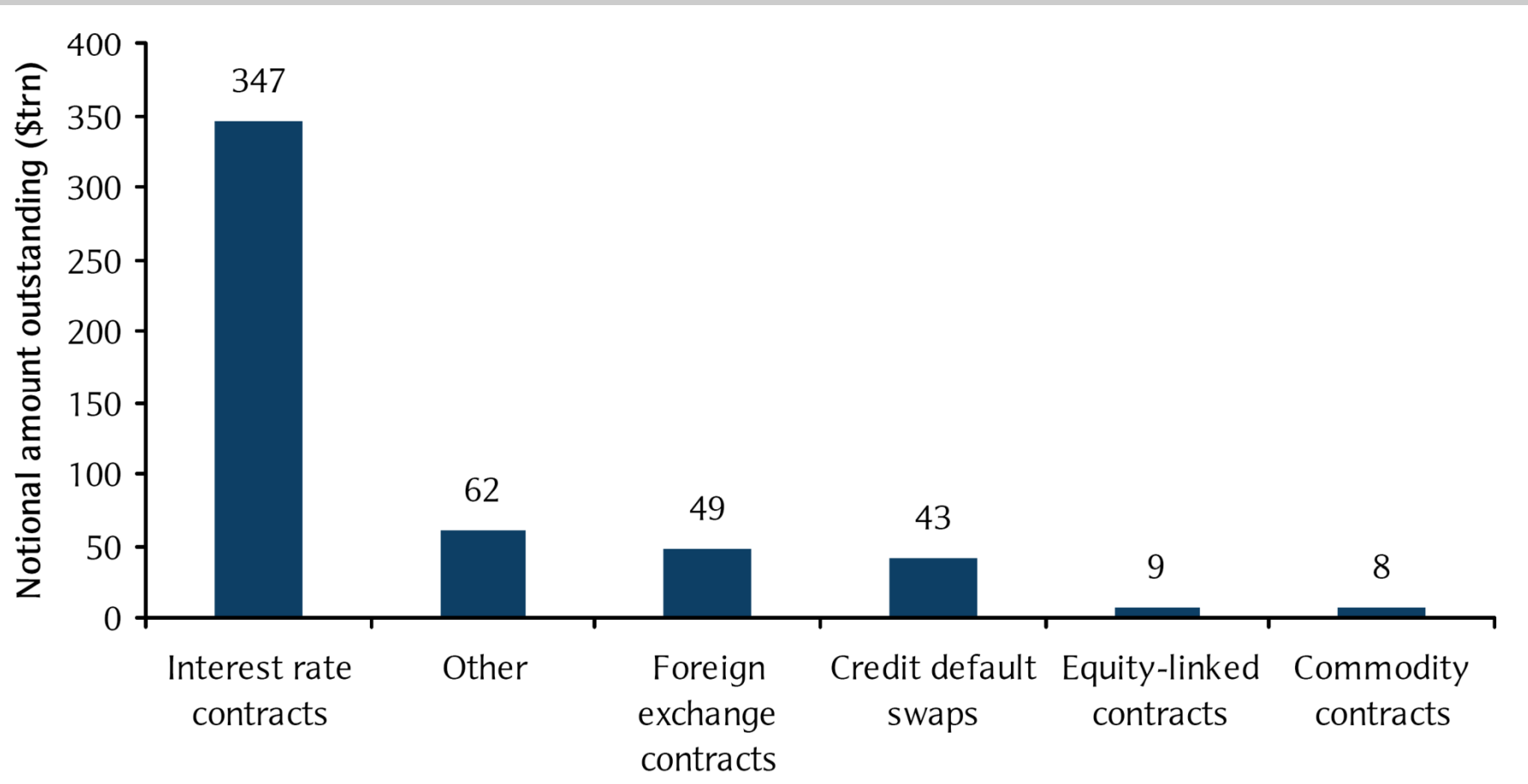


# Response to Commodity Risk



Percentage change in West Texas Intermediate Posted Prices (beginning of month).

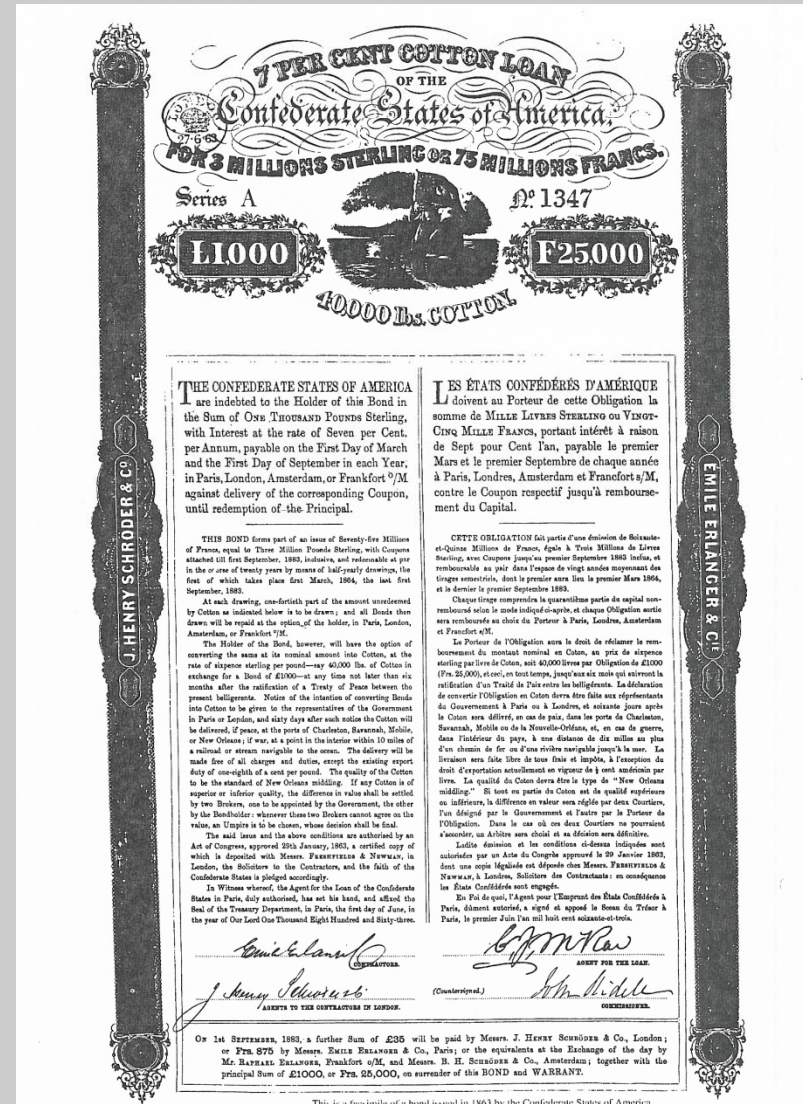
# Responses to Known Risks



Source: *Counterparty risk in credit markets*, Barclays Capital, Quantitative Credit Strategy, 20 Feb 2008

# Few of these products are “new”

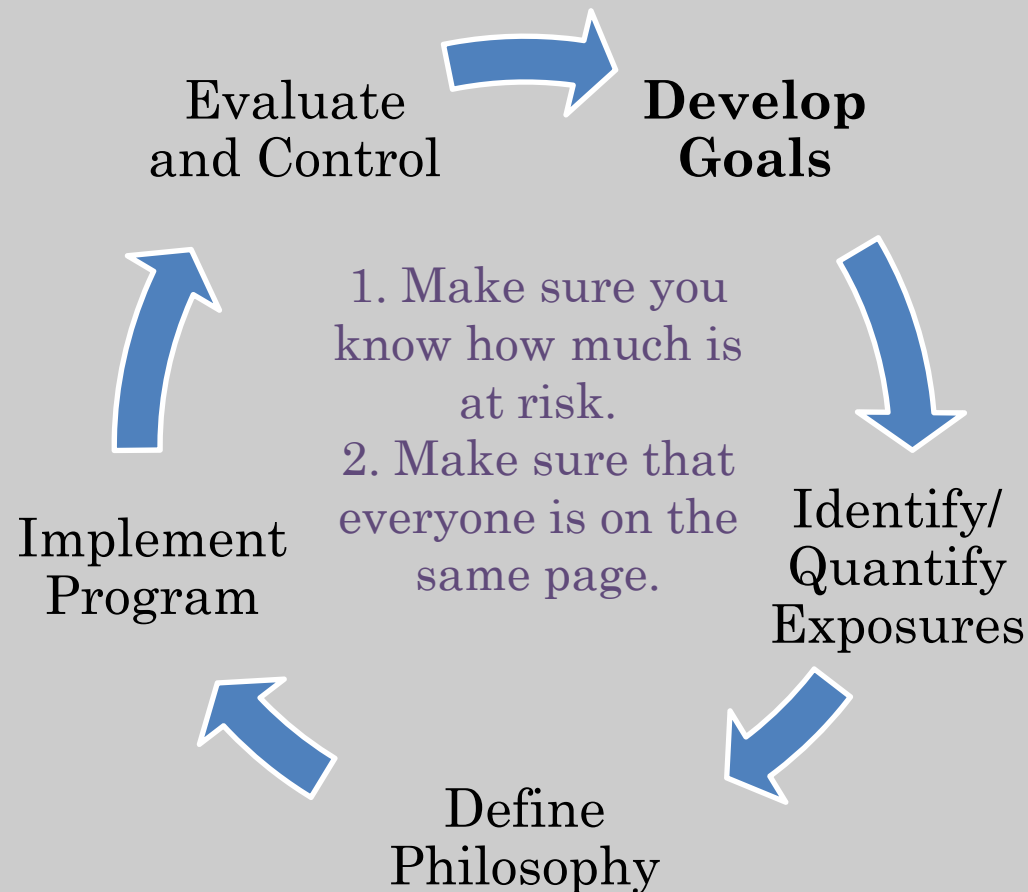
- Hybrid Securities
  - Cotton bonds issued by the Confederate South.
  - Denominated in Confederate \$ as well as French francs and pounds sterling.
  - Convertible into cotton at bondholder’s request.
  - Essentially dual-currency cotton-indexed bonds.



This is a facsimile of a bond issued in 1863 by the Confederate States of America.

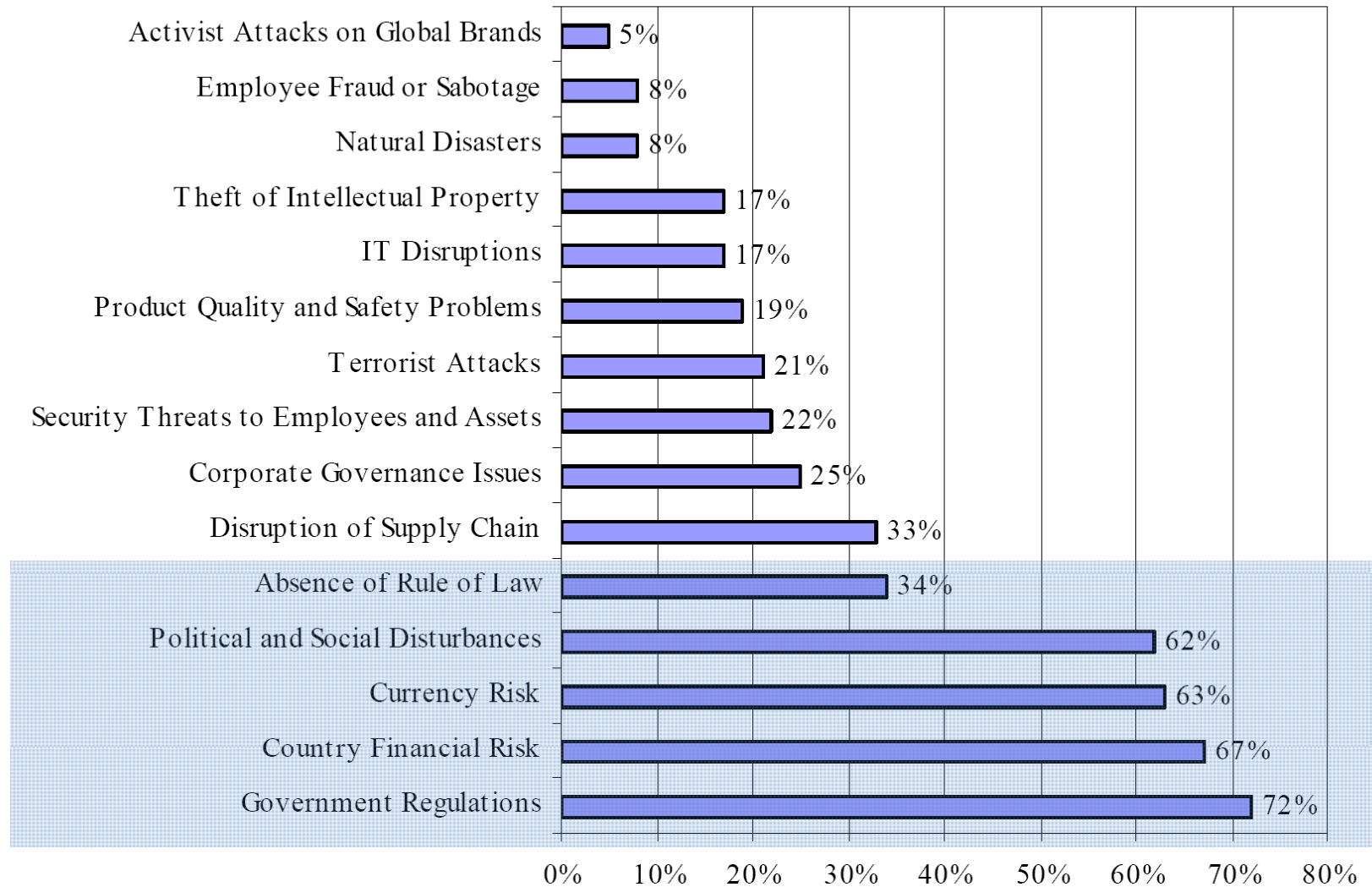
# Implementing a Risk Management Program

## Five Step Risk Management Cycle





# Critical Corporate Risks

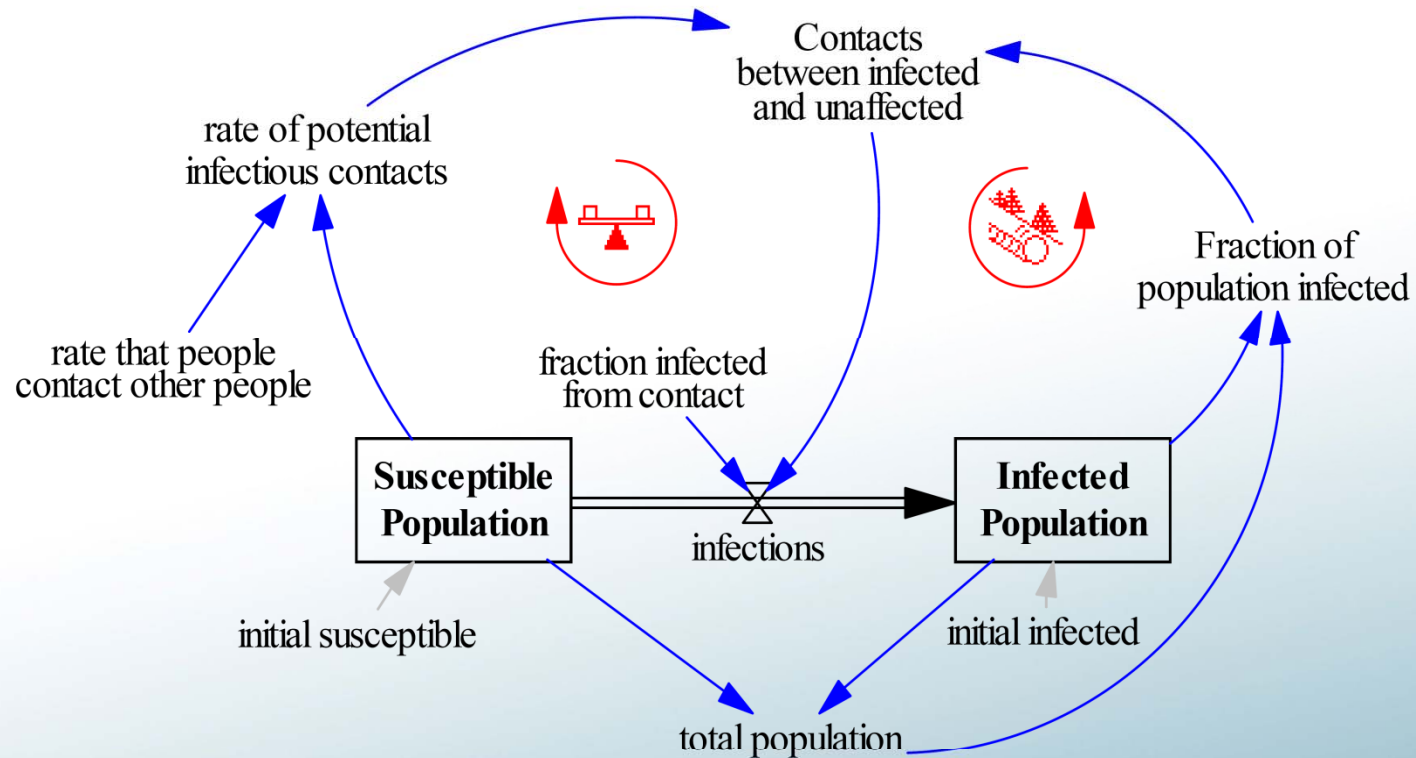


# Implementing a Risk Management Program

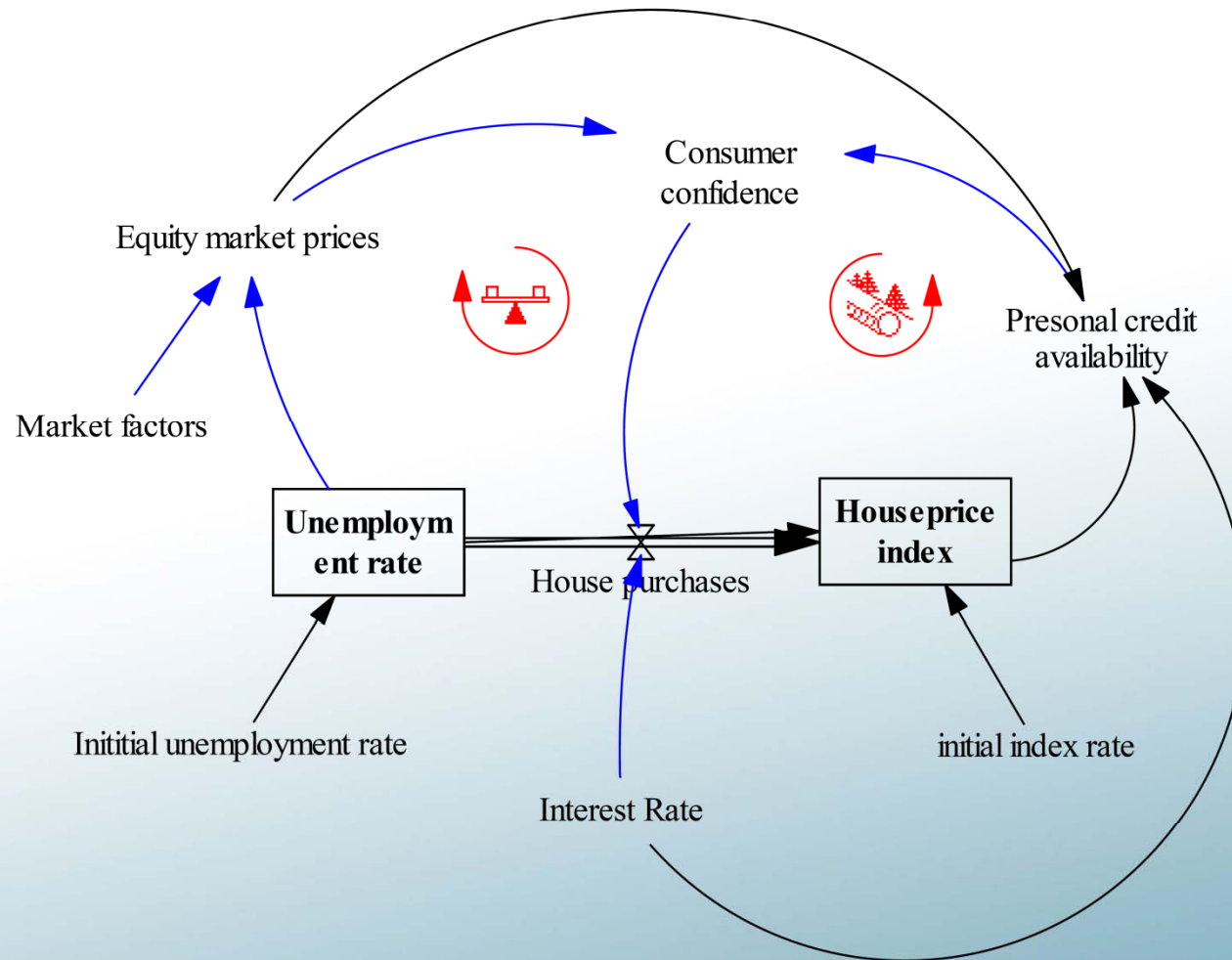
## Five Step Risk Management Cycle



# Epidemic/Pandemic ERM Visualization



# Financial Crisis ERM Visualization

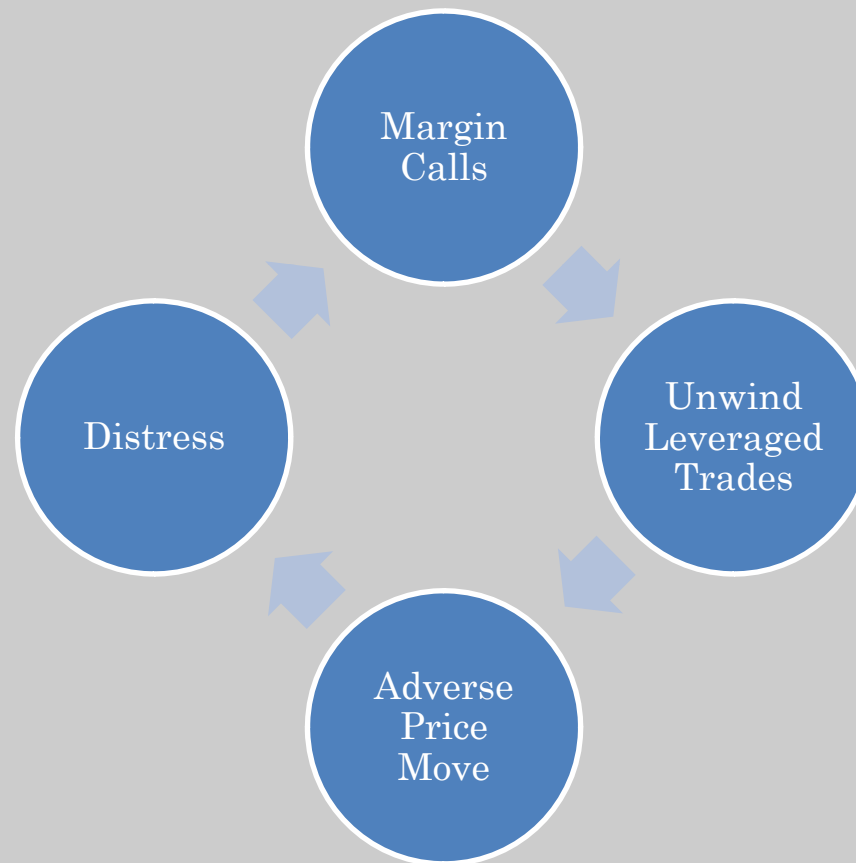


# Millennium Bridge

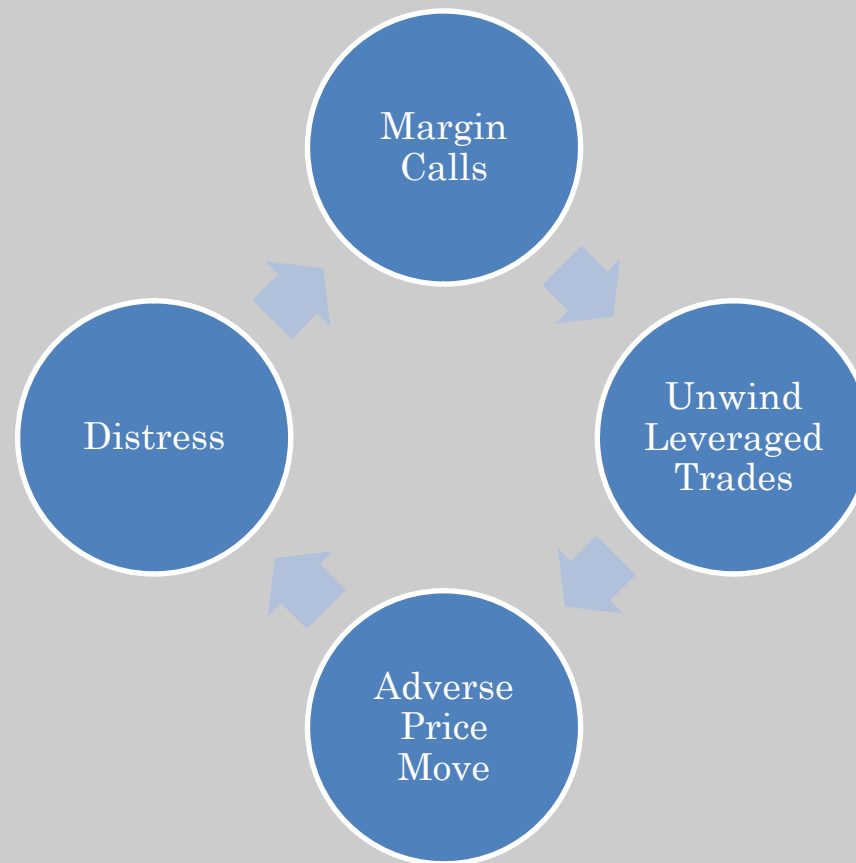


[http://news.bbc.co.uk/1/hi/english/static/in\\_depth/uk/2000/millennium\\_bridge/default.stm](http://news.bbc.co.uk/1/hi/english/static/in_depth/uk/2000/millennium_bridge/default.stm)

# LTCM 1998

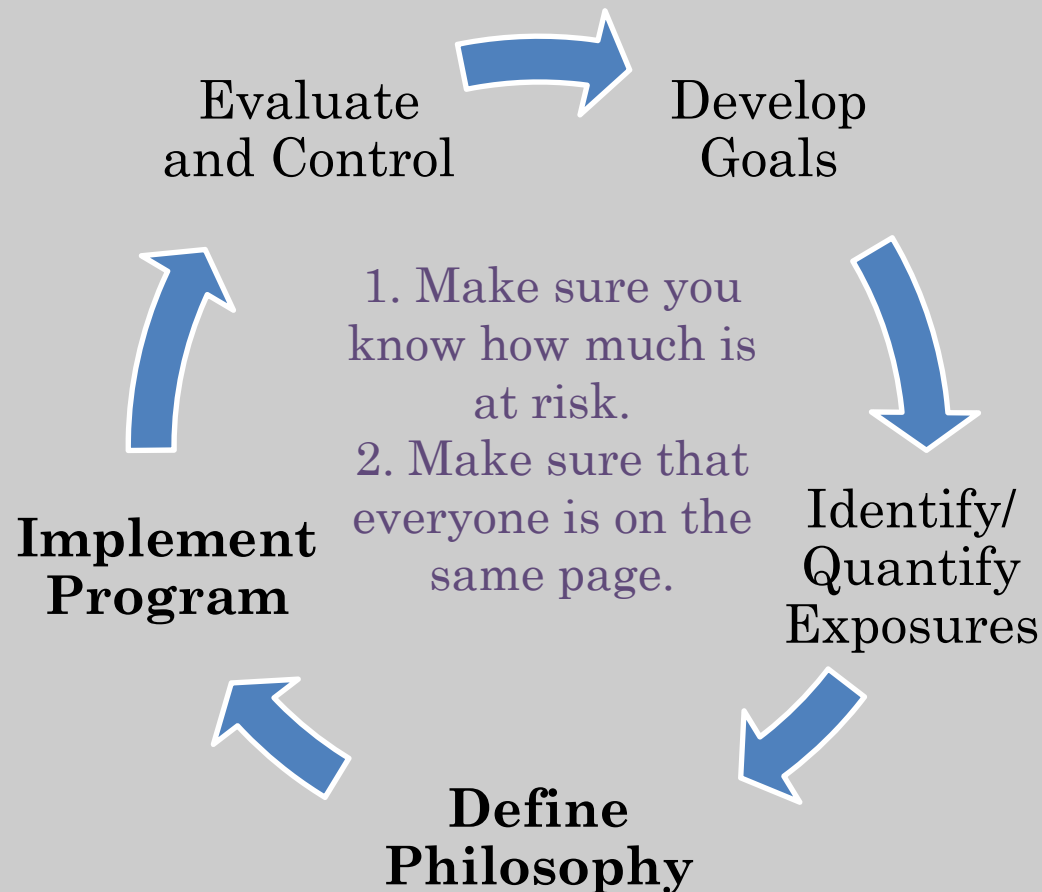


# Credit Crisis 2007-8



# Implementing a Risk Management Program

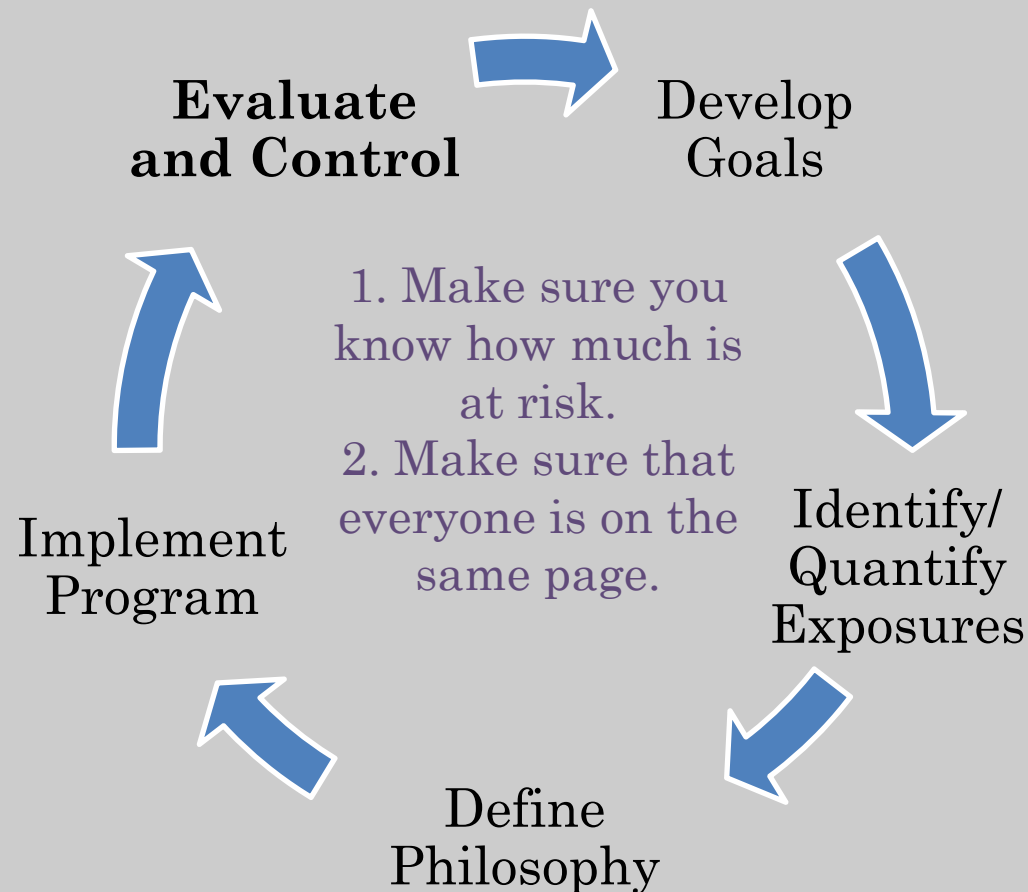
## Five Step Risk Management Cycle





# Implementing a Risk Management Program

## Five Step Risk Management Cycle



## Stress Testing: Space Shuttle Main Engine LOX Turbopump



This photo shows the exhaust from the pre-burner that is used to generate the hot gases to drive the space shuttle engine LOX (Liquid Oxygen) turbopump during the test. For a typical turbopump test, the low pressure tank is pressurized to simulate the NPSH (Net Positive Suction Head) of the space shuttle turbo pump inlet. The high pressure LOX and hydrogen tanks are pressurized to approximately 1500 psi in order to control the starting flows into the pre-burner. The valve resolution problems experienced when controlling a wide range of flows are solved by controlling three fast acting electro-hydraulic valves in parallel in each propellant line. The acceleration of the turbopump is less than 4 seconds to simulate main engine operation which requires the high pressure propellant tanks to be ramped in pressure to 9000 psi. The liquid hydrogen is conditioned by a liquid/gas mixer to simulate shuttle main engine inlet temperatures. The high response control system controls the tank pressurization, propellant flow, temperature and turbopump speed. The abort system monitors over 200 parameters and calculations and initiates shutdown or test termination if an anomaly is detected.

Source: EDF, Inc., <http://www.edfinc.com/pages/shuttlepump.htm>

## Key Scenario: Does It Work When You Push the Button?

Site: Elugelab Island, Enwetak atoll, Marshall Islands

Detonation: Surface

Type: Fission/Fusion

The device called Sausage, detonated in the Mike test was the first true thermonuclear bomb ever tested. However, the Sausage was not a deliverable weapon. It was an enormous, complex device, 80 inches wide and 244 inches long. The entire assembly weighted 82 metric tons. Sausage was built using Teller-Ulam principles of staged radiation implosion. Interestingly Teller himself didn't participate in development. Los Alamos Panda Committee, directed by J. Carson Mark did the job. TX-5 fission bomb was used as a fuse (primary stage). Super cooled, liquid hydrogen was used as a thermonuclear fuel. *The Cab*, the building which housed the device, was located on the zero island. A plywood tube was assembled from the Cab to the furthest island, where the detection station was, some 2 miles away. The tube was filled with Helium, to allow radiation rays travel faster before it was consumed by the fireball.

The explosion yielded 10.4 Mgt. Mike's fireball measured 3 miles. The cloud formed by Mike shot was immense. Stabilized, it reached 135 000 ft high, and stretched 60 miles in diameter, which eventually spread over 1000 miles.

Mike destroyed the entire Elugelab island. The crater formed as a result of the explosion measured 6240ft (1.5Km) across and 164ft (53m) deep. Following the test, high levels of radiation covered most of the Enwetak atoll.

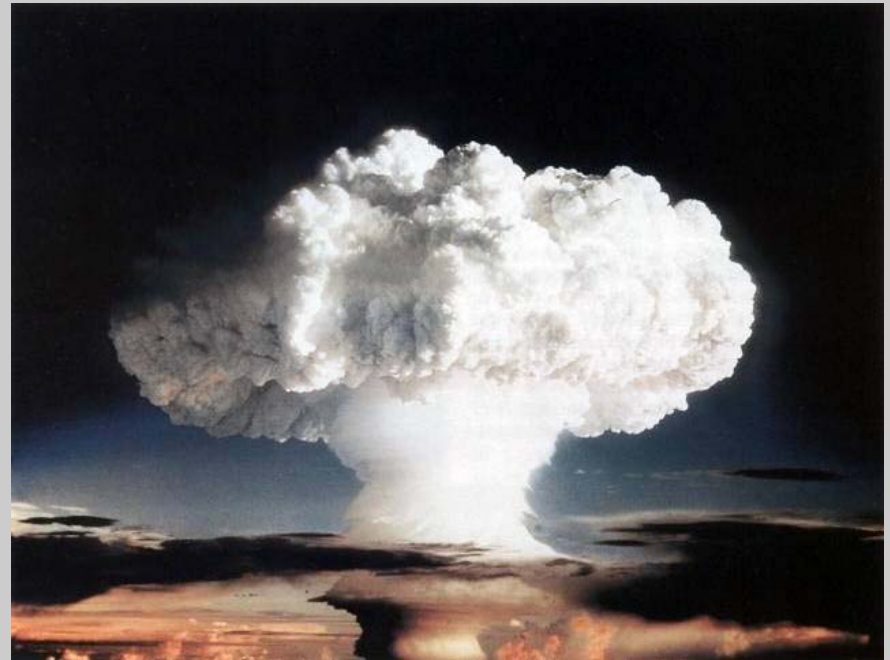
This was 4th largest test ever conducted by US, (the largest at that time). For comparison, this is more than all allied bombs dropped during WW II together.

Test: Mike

Operation: Ivy

Date: 31 October 1952

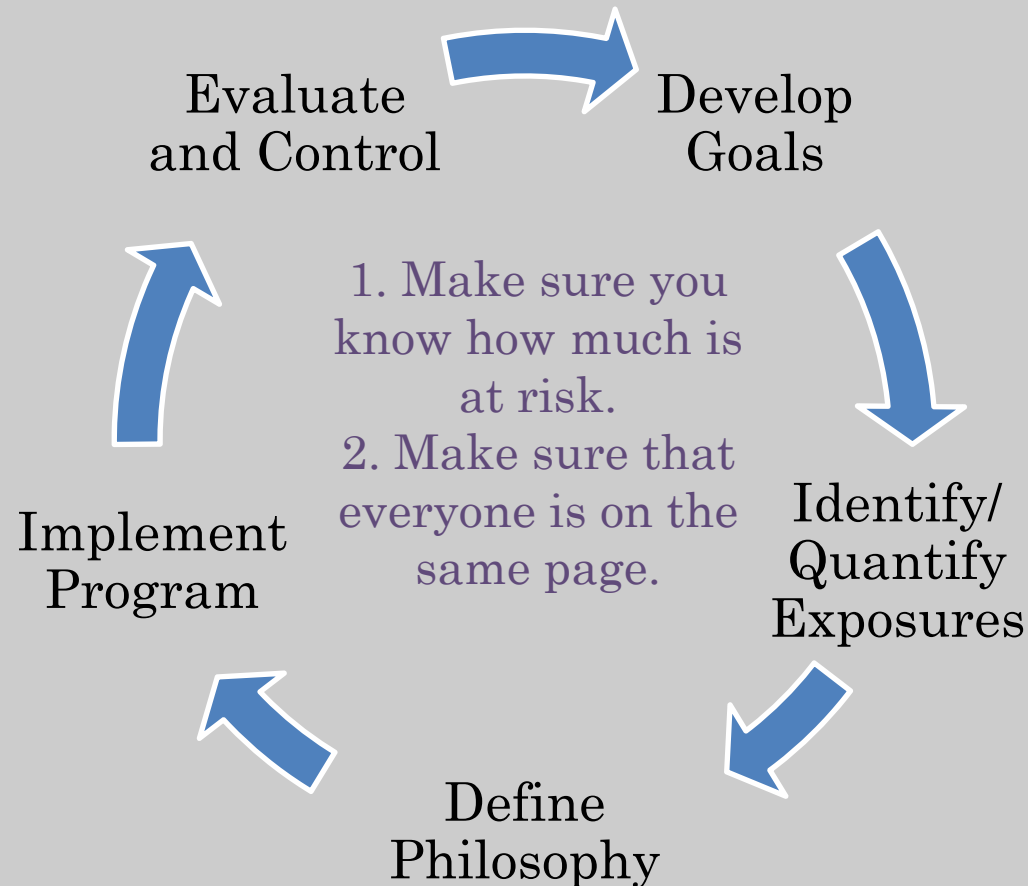
Yield: 10.4 Megatons



source: <http://zvis.com/nuclear/dimg.php3?ivymike5,ivymike>

# Implementing a Risk Management Program

## Five Step Risk Management Cycle

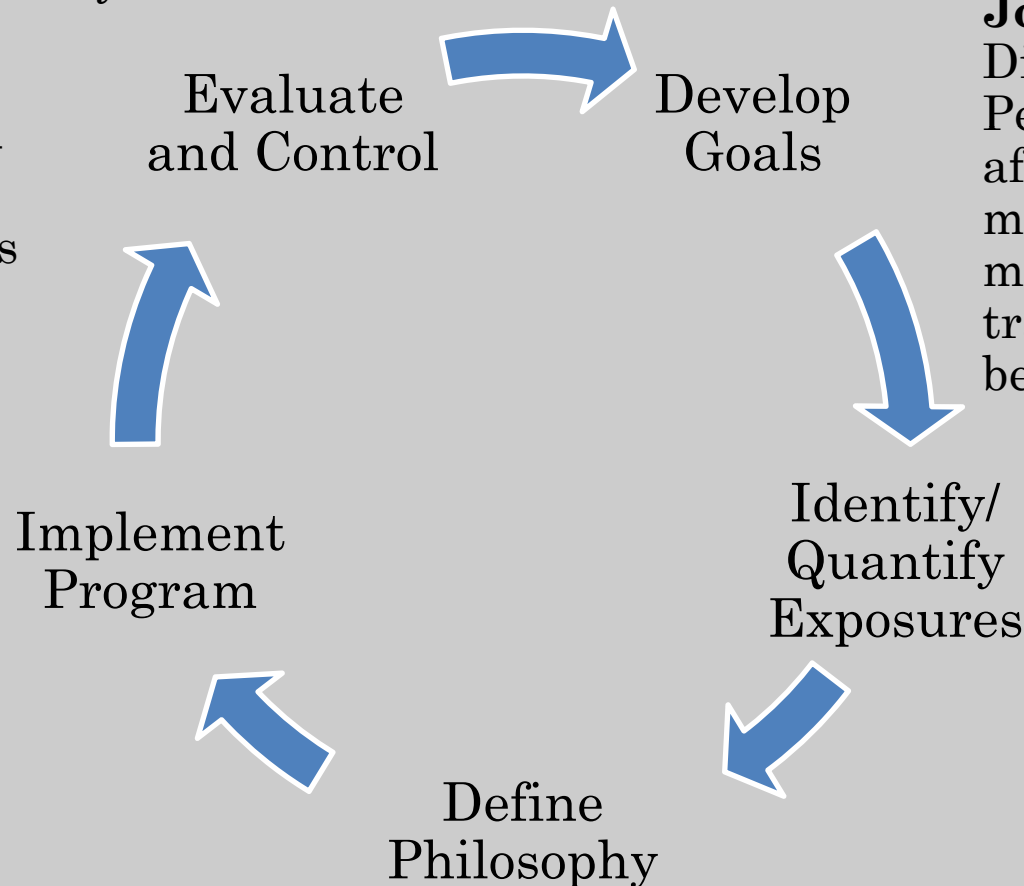


# What happens when you don't follow the cycle?

**Jerome Kerviel** – €5b lost at Societe Generale in January 2008.

**Joseph Jett** – Dismissed by Kidder-Peabody in 1994 after hundreds of millions of dollars made from his bond trading were found to be phantom profits.

**Nick Leeson** – £827m loss brought Barings bank to insolvency overnight in 1995



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