

# Illusion of Control

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# Jón Danielsson

- Director of the Systemic Risk Centre and professor of finance, London School of Economics (LSE)
- Books
  - *Financial Risk Forecasting*, Wiley (2011) [financialriskforecasting.com](http://financialriskforecasting.com)
  - *Global Financial Systems*, Pearson (2013) [globalfinancialsystems.org](http://globalfinancialsystems.org)
  - *Illusion of Control*, Yale University press (2022)
- Websites and social media
  - *Blog* [modelsandrisk.org](http://modelsandrisk.org) and [voxeu.org/users/jondanielsson0](https://voxeu.org/users/jondanielsson0)
  - *Daily risk forecast* [extremerisk.org](http://extremerisk.org)
  - Twitter, @JonDanielsson
  - LinkedIn, Jon Danielsson

## The illusion of control

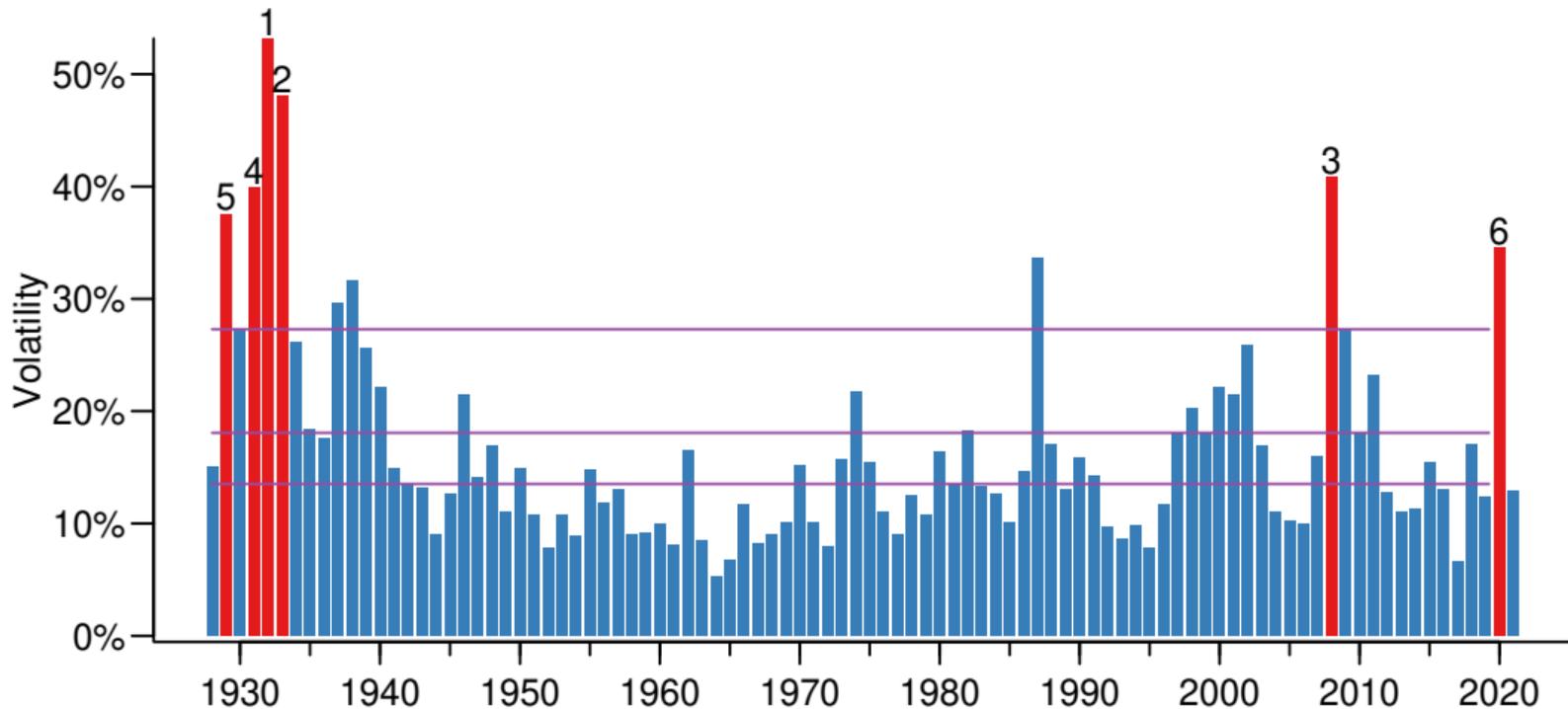
- Most important financial concerns are long term
- Short term risk usually is not very relevant
- Do risk management techniques used by industry and regulators reflect the importance of the long term
- Mostly not
- Instead focusing on the recent past — short term risk
- That is the *dissonance of the short and long term* in how we think about risk

## The riskiest year in the past century

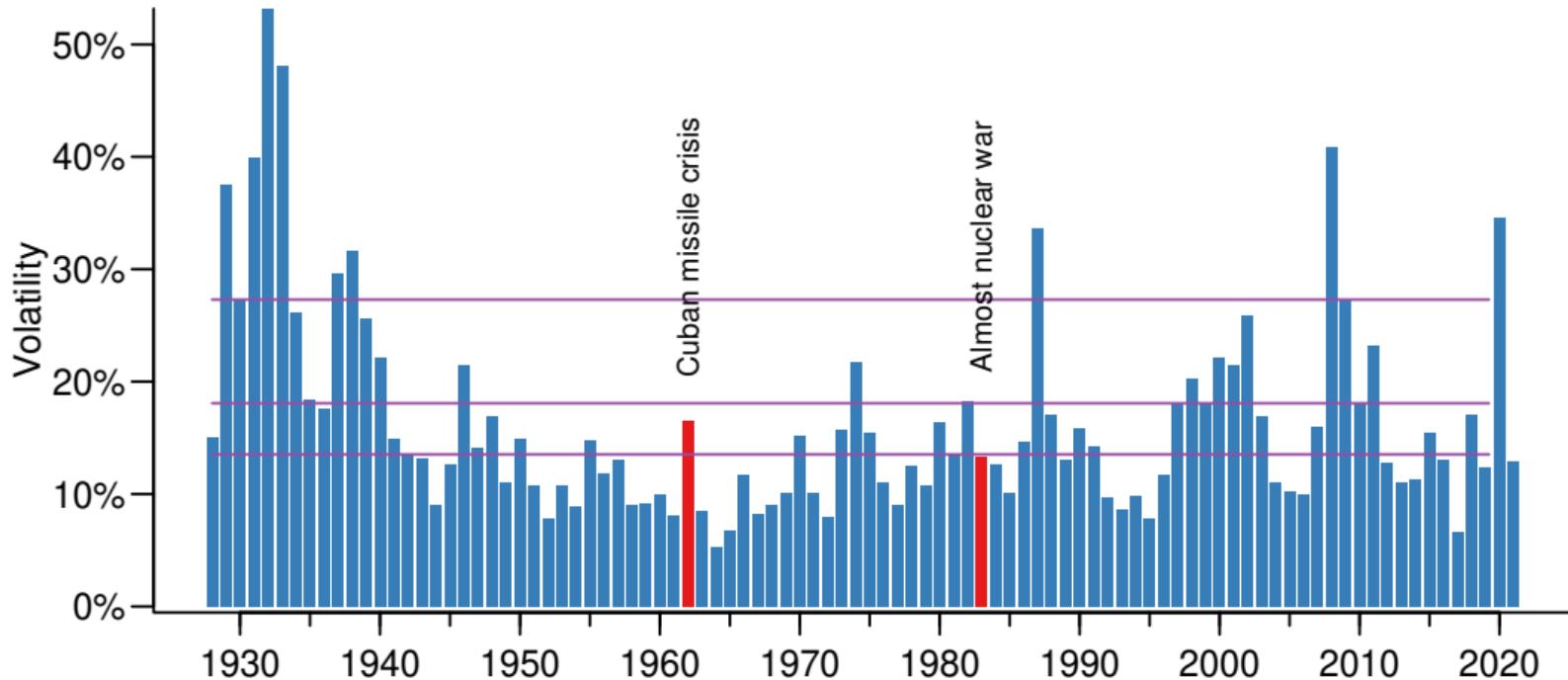
- Suppose we take almost a century of daily S&P 500
- And ask “*What year is the riskiest*”?
- The most obvious way to answer is look at volatility
  - Value-at-Risk and expected shortfall would give the same answer
  
- Is it 2008? 2020? 1930? 1972? 1987? or...

# Are the highest volatility years the riskiest?

S&P-500



# Nuclear threats



## 1983 and confirmation bias

- Andropov, the head of the Soviet Union
- Got the idea that the US was about to launch a preemptive nuclear attack on the Soviet Union — without any evidence
- He instructed the KGB to find evidence
- And the career of their agents was directly affected by their ability to find evidence of a pending nuclear attack
- And so they did

### Confirmation bias

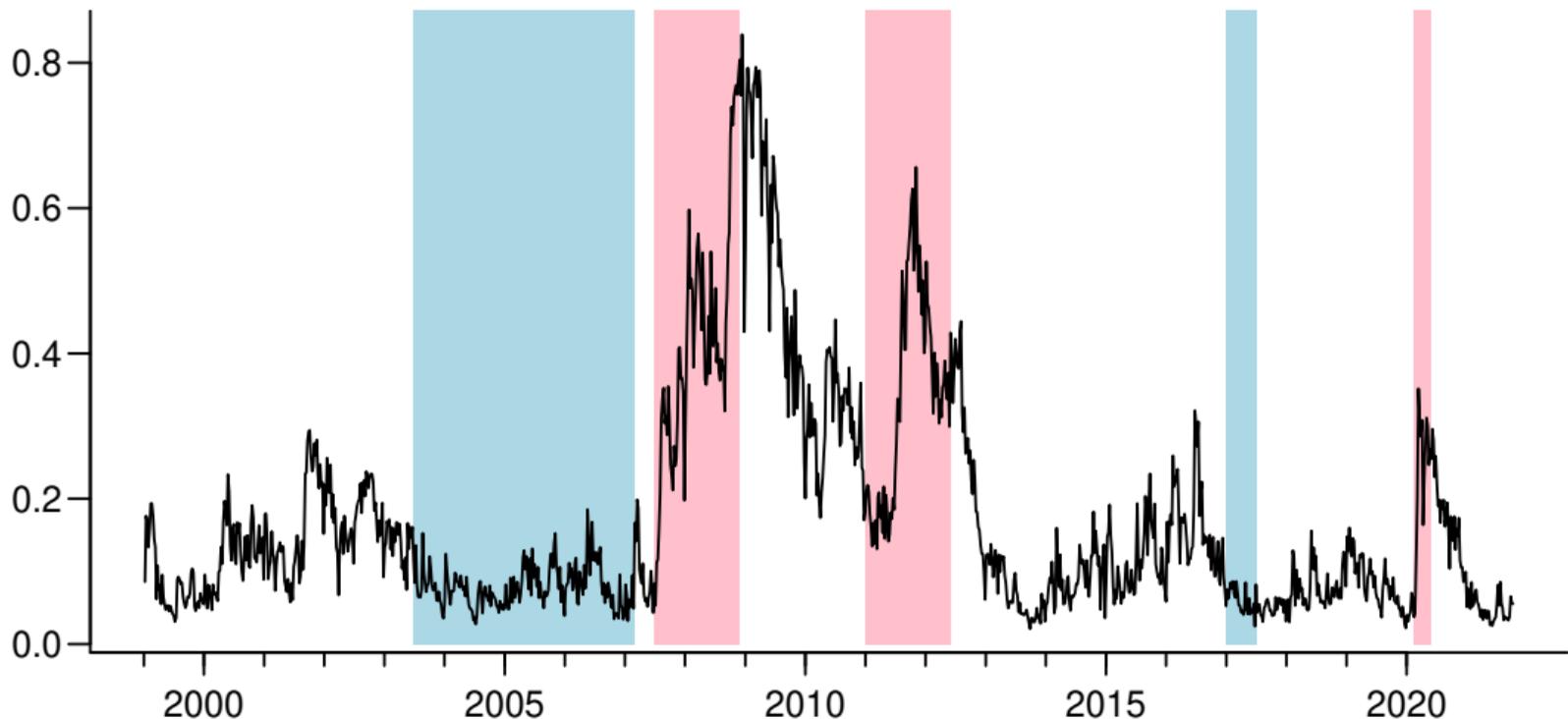
- *The man who didn't trust the models, saved the world in 1983 — Stanislav Petrov*

# The next tail event What does data say?

## Can data predict the next tail event?

- Stock prices?
- Fixed income?
- Some other data?
- Yes, but depends on how it is used
- What about standard indicators of extreme risk
- Like the European Central Bank's *systemic risk indicator*?

# European Central Bank's systemic risk indicator



## Does our predictor beat the FT?

**FINANCIAL TIMES**  
Thursday September 18 2008 | £1.50

**Global banks in crisis**  
Full coverage of market turbulence: NEWS **Pages 2-6** COMMENT **Pages 15-17**  
LEX **Page 20** MARKETS **Pages 42-44** ONLINE [www.ft.com/crisis](http://www.ft.com/crisis)

**Panic grips credit markets**  
**HBOS takeover** Government brokers £12bn deal for Lloyds TSB to buy lender  
**Turmoil worsens** Volatility sparks biggest flight to safety since second world war

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World Business News

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# The time dimension of risk

Easy to measure and control risk

Measuring and controlling risk almost impossible

Frequency	Daily	10 times a century	5 times a century	2 or 3 times a century	1 or 2 times a century
Event	Client abuse	A bank's large losses	Large banking failure	Banking crises local systemic	Global systemic crises
Drivers	Profits	Idiosyncratic risk	Systemic risk	Macro economy	Politics

## Drivers of tail risk — Politics

- Politics > macro economics and epidemics > financial risk
- Bill Clinton 1992 “it’s the economy stupid”
- Reality 2021 “it’s the politics stupid”
- Politics drives
  - Covid-19 reponses
  - Environment
  - Demographics
- The measurements of risk should take political uncertainty into account
- But it is uncertainty not risk
- So we end up measuring the measurable, ignoring the non-measurable
- Why VIX can be at record low when tail risk is at record high

## All extreme tail events are political

- Italy, China, Brexit, Trump, South China Sea, Ukraine, Hong Kong, Venezuela, Qatar, Covid-19, Evergrande, ...
- The threat of nuclear war was only political
- The inability to deal with Covid
- The inability to deal with environmental risk is entirely political
- So is the demographic challenge
- What I mean is that addressing these tail risks requires the political leadership to act on it

# How most risk models see risk



# What drives risk?

Time between decisions and tail losses/crises is many years

- 2008 happened because of decisions made years earlier
- In 2003 all the signs pointed to risk being low
- The authorities and the private sector thought we were safe
- And so it was perfectly OK to take extra risk
- But
- “*Stability is destabilizing*” (Minsky)

## The unknown unknowns

- The US stock market goes down by \$200 billion in one day and nobody cares
- Potential subprime losses of less than \$200 billion, and a global crisis happens
- The risk we know we prepare for — *known unknowns*
- The risk we don't know is the dangerous type
- The *unknown unknowns* are most damaging
- This analysis gives us a framework for thinking about Evergrande

# Risk is endogenous

Danielsson–Shin (2002)

- Risk is *exogenous* or *endogenous*
  - exogenous** Shocks to the financial system arrive from outside the system, like with an asteroid
  - endogenous** Financial risk is created by the interaction of market participants

“The received wisdom is that risk increases in recessions and falls in booms. In contrast, it may be more helpful to think of risk as increasing during upswings, as financial imbalances build up, and materialising in recessions.”  
Andrew Crockett, then head of the BIS, 2000

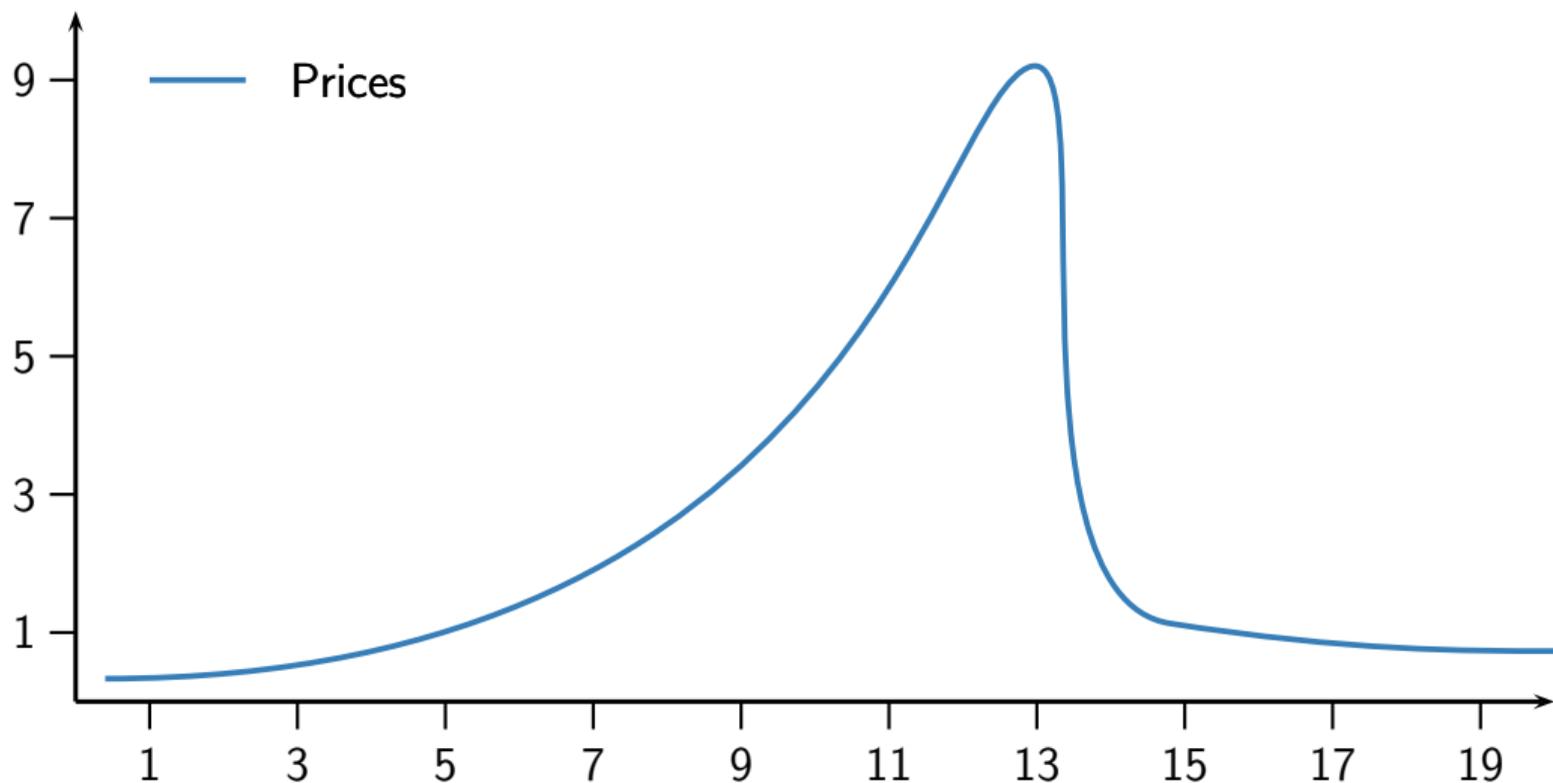
## The role of rules

- Market participants are guided by a myriad of models and rules, many dictate myopia
  - Capital, mark-to-market, margins, leverage constraints, etc.
- Prices don't follow random walks in adverse states of nature
- Because that is when the constraints bind
- So these well meaning rules make us short-term in times of extreme turmoil
- Endogenous risk is created by the interaction of human beings
- All with their own objectives, abilities, resources, biases
- *All large market outcomes are endogenous*

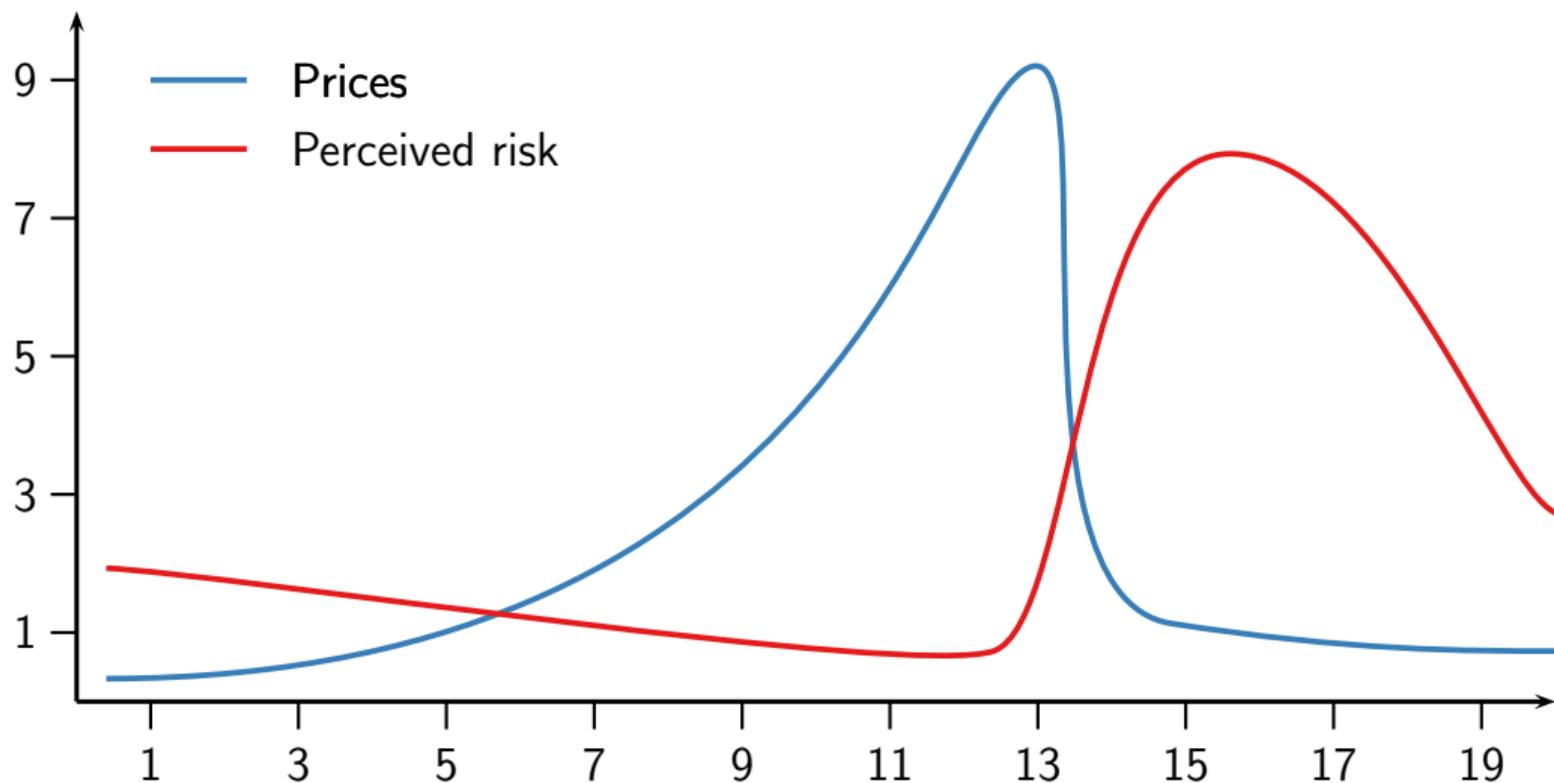
## Two faces of risk

- Endogenous risk matters when
- Individuals observe *and* react — affecting their operating environment
- Financial system is not invariant under observation
- We cycle between virtuous and vicious feedbacks
  - *perceived risk* — as reported by risk models
  - *actual risk* — hidden but ever present

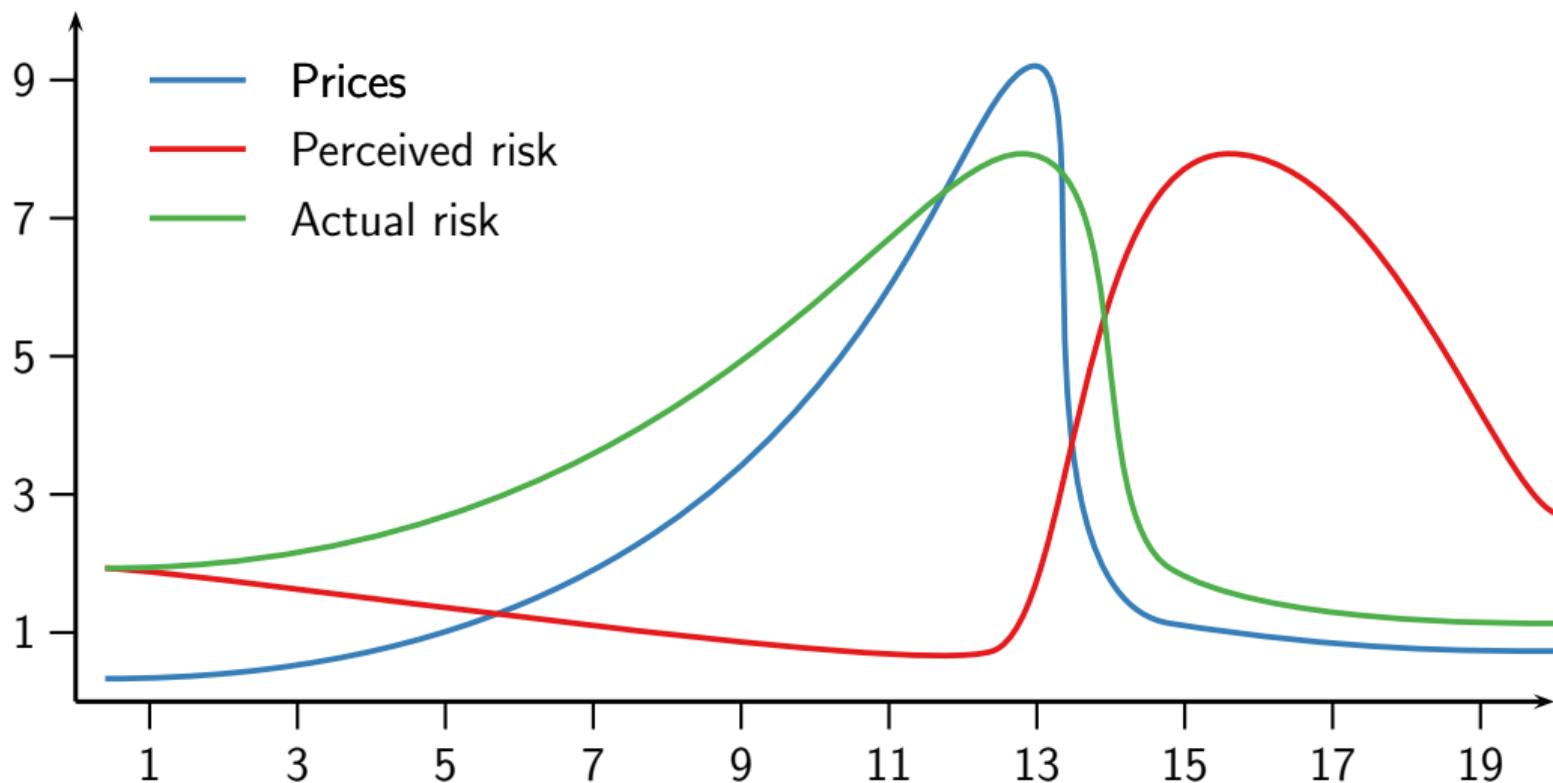
# Endogenous bubble — Money for nothing



# Endogenous bubble — Money for nothing



# Endogenous bubble — Money for nothing



## How can market data predict tail events?

- Are we measuring the state of the system today or tomorrow?

“Volatility in markets is at low levels, both actual and expected, ... to the extent that low levels of volatility may induce risk-taking behavior ... is a concern to me and to the Committee.”

Former Federal Reserve Chair Janet Yellen, 2014

# Volatility

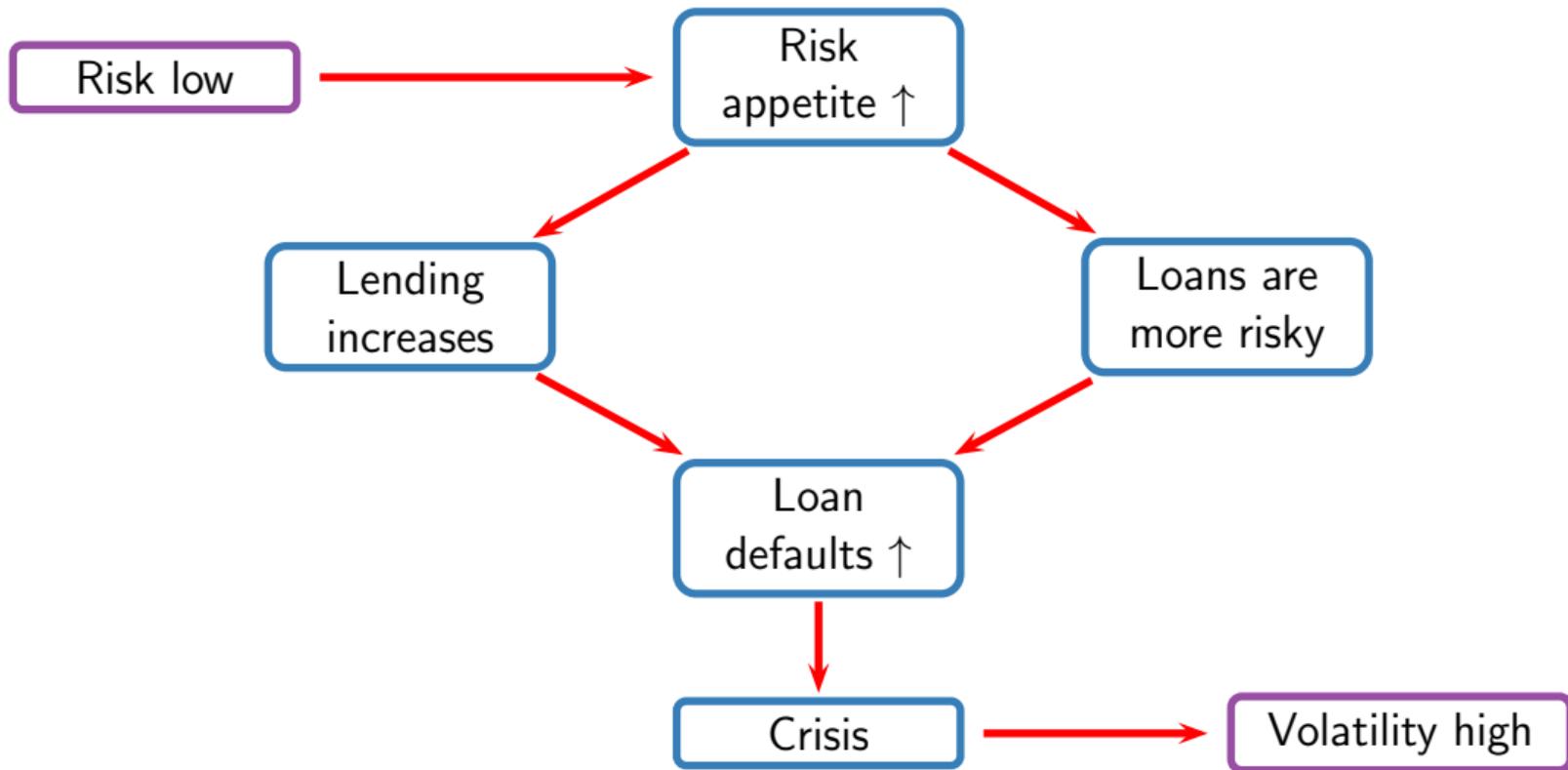
- Volatility captures the likelihood of a short term movement in markets
- Volatility can be low and extreme risk very high
  - suppose the market goes down by 0.1% every day in the year
  - volatility is approximately 0.1
  - market falls by  $22\% = 1 - (1 - 0.001)^{250}$
- And volatility can be very high and extreme risk very low
  - mean reverting asset
  - expected future value same as today's expected value (no long term extreme risk)
  - but can fluctuate wildly (very high volatility)

Volatility is (usually) not risk

## What predicts tail events?

- Rapid credit growth (Schularick and Taylor/ BIS )
- Unusually low risk
  - Jon Danielsson with Marcela Valenzuela (University of Chile) and Ilknur Zer (Federal Reserve)
  - “Learning from History: Volatility and Financial Crises”, Review of Financial Studies 2018,
  - ”The Impact of Risk Cycles on Business Cycles: A Historical View” 2021

# Risk and crisis mechanism



## Macroeconomic impacts

- If we observe high risk this year
  - It causes GDP to fall in the next two years
- If we observe low risk this year
  - It causes GDP to increase over the next two years and then fall in year three, with an overall positive impact — Boom-to-bust cycle
- The longer low risk persists, the stronger the impact
- We are increasingly convinced the low risk environment is true
- It allows us to measure risk appetite
- The global low risk environment has a much stronger impact than the local (in a particular country)

## Regulations, tail risk and McNamara's fallacy

- Regulations focus on the *measurable and visible*
- With input from level playing fields and transparency and consensus
- They don't like subjectivity
- Consequently, regulations drive to the technologically the simplest methodologies and the most measurable data
- Drive us towards non-extreme short-term risk
- That is, the financial authorities have fallen for *McNamara's fallacy*
- I don't think most financial regulations, and especially macro prudential regulations, meet the objectives set by society for such regulations

## The McNamara fallacy

- McNamara, US defense secretary during the Vietnam War " Things you can count, you ought to count", including body count
- Daniel Yankelovitch in 1972
  1. " The first step is to measure whatever can be easily measured. This is OK as far as it goes.
  2. The second step is to disregard that which can't be easily measured or to give it an arbitrary quantitative value. This is artificial and misleading.
  3. The third step is to presume that what can't be measured easily really isn't important. This is blindness.
  4. The fourth step is to say that what can't be easily measured really doesn't exist. This is suicide."

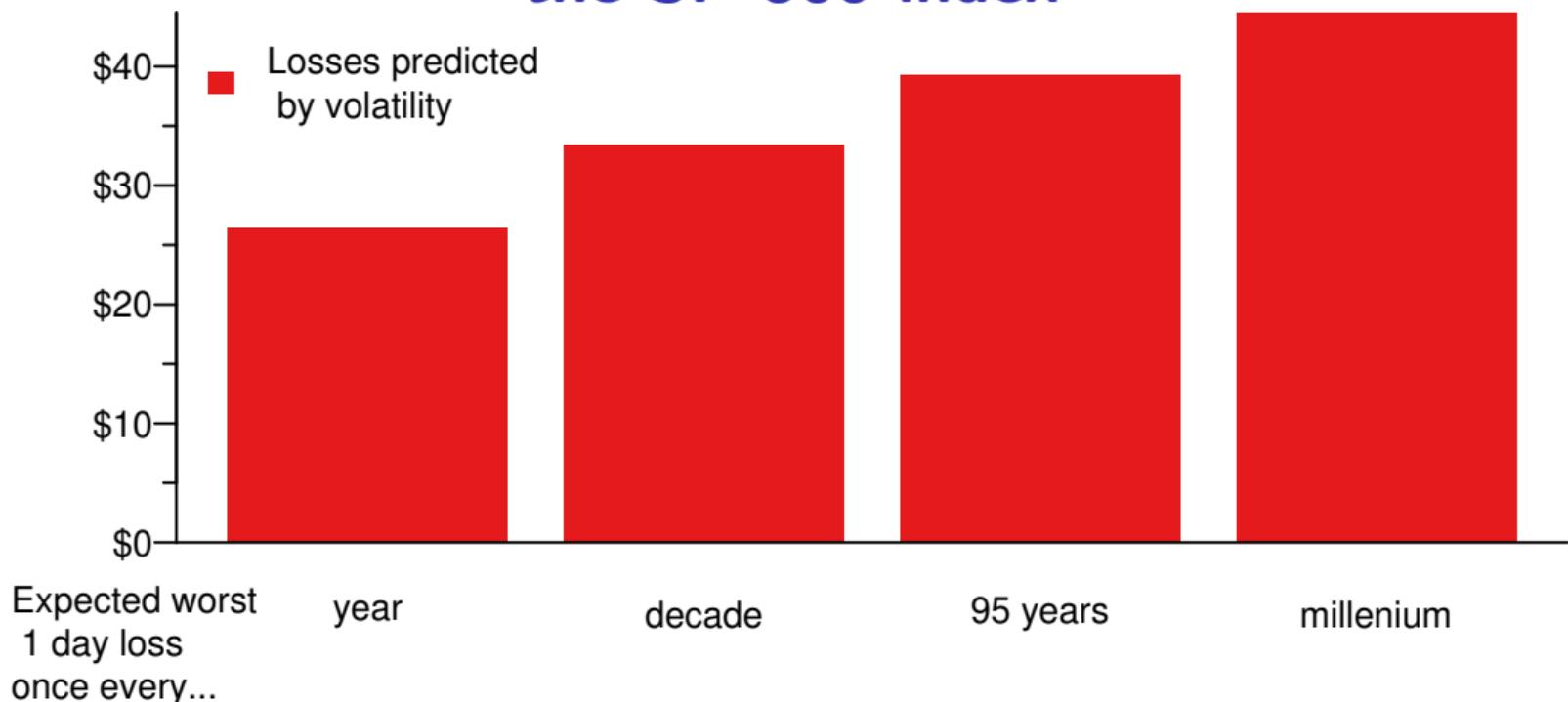
# Thinking long and short term

- We often proclaim we care about the long term
- But we usually act short term
- Why?
- Measurement, management, regulations, ...

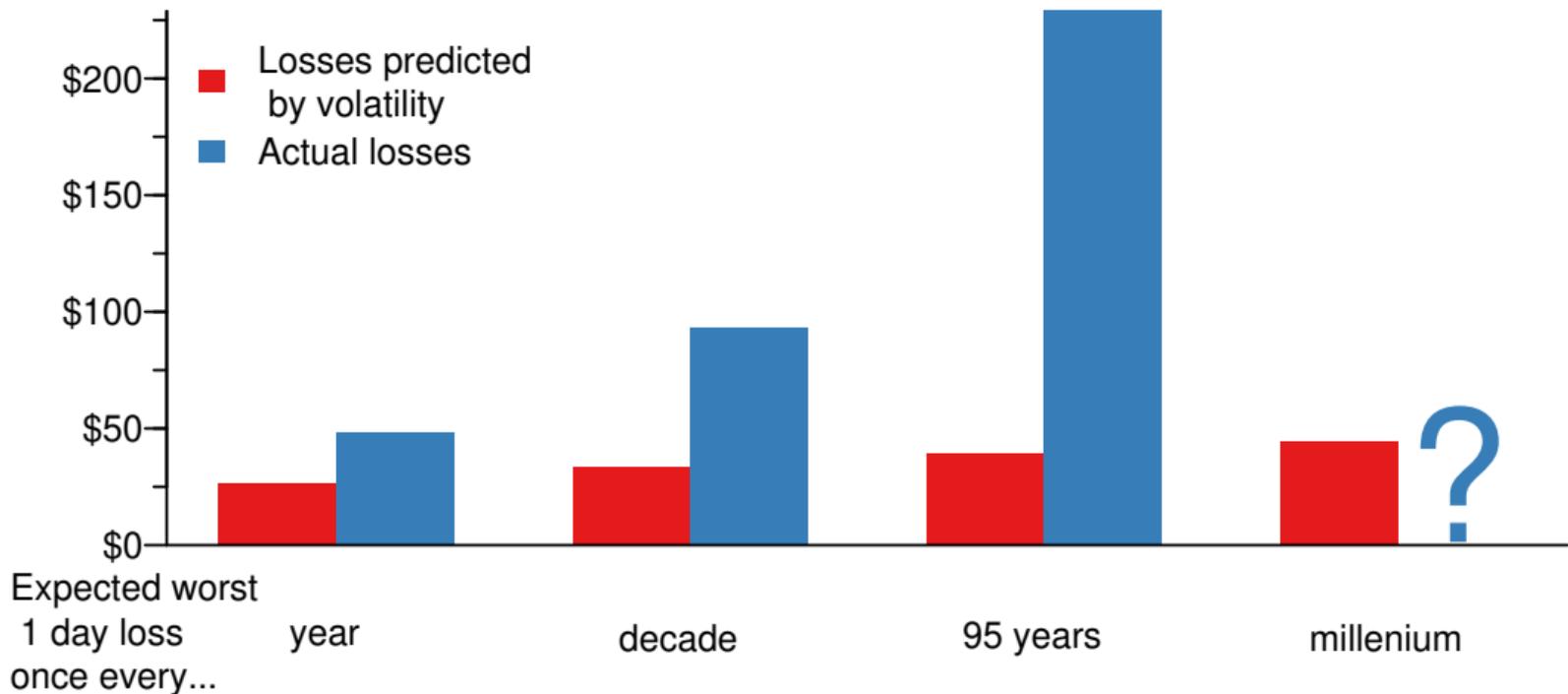
# Measurement

- Suppose we want to measure long term risk — *tail risk*
- But tail events are very infrequent, so we don't have enough observations
- Instead, use higher frequency data to *infer* the likelihood of infrequent events
- But, most day-to-day events have almost nothing to do with the long term
- So, we end up predicting short term risk really well
- And fooling ourselves that we are measuring the long term risk
- Easy to do: Next slide

# Expected maximum daily loss on a \$1000 portfolio of the SP-500 index



# Reality bites



# Management of risk

- A pension fund or sovereign wealth fund may say it cares about risk decades into the future
- But is subject to quarterly performance reports
- Which reduce the risk horizon to a quarter
  
- Monitoring inevitably pushes towards the short term
  - Internal, stakeholders, clients, regulators, . . .

# Regulatory uncertainty

- If regulations change frequently
- Then need to hedge against regulatory uncertainty
- Also pushes towards the short term

# Risk dashboards

- Need to be populated with numbers
- More than not will be short term risk measurements
- Which then becomes all we see and care about
- Inevitably make decision making short term

## What not to do

1. Avoid using market data unless you are convinced it can reflect the long run
2. Do not use volatility, possibly use extreme value theory
3. Probability shifting (estimate model at one probability and project to another) is usually not a good idea
4. A data set with a lot of observations does not mean a sample with a lot of information
5. You can buy options with 30 year maturity, useful for hedging, but not as a guide to the future (and will the bank selling the option be solvent in 30 years?)

# How to think about long run risk analysis

1. Ask yourself how the controls you operate under affect how important long run risk is really to you
2. And if it is, incentive contracts need to reflect that
3. After all, most employees will have a much shorter risk horizon than the organization

## Global scenarios

- Climate, demographics, epidemics, regulations, geopolitics, global openness
- Can get reasonable outcomes and probabilities by combining historical data with expert opinion
- All the scenarios are both correlated and causal with each other
- All are affected by politics and affect politics
  1. Some countries are more sensible than others
  2. Global agreements that actually work are very hard to put in place
  3. Very difficult politically to hedge against hypothetical scenarios
- Ask how your business model is affected by the various eventualities
- And how to build resilience and benefit from the scenarios

# Implications of the Illusion of Control

# The streetlight

A drunk man is looking for his keys under a streetlight and a policeman passes by:

**Police** “What are you doing?”

**Drunk** “Looking for my keys”

**Police** “Why there?”

**Drunk** “That’s where the light is”

# Illusion of Control

- What we care about the most — The long-term
- Is not compatible with what we measure and manage
- So we get really good at dealing with what we care about the least
- And because we have rigorous measurement processes and state-of-the-art dashboards
- Providing reassurance
- We don't worry about ignoring the long term
- And since collective failure covers individual failure there is little incentive to do anything about this

## Practical implications

- The performance of long term investments, like pension/sovereign wealth/insurance funds, will suffer
  - False diversification?
  - Buy private equity funds with low short term volatility even though they are long term cointegrated with equity markets?
- If the short term risk dashboards are reassuring, as in 2003-2006
- We create conditions for a crisis, like 2008
- Minsky — “Stability is destabilizing”

## What to do?

- There are steps we can take to mitigate the dissonance of the short and long term, like:
  1. be weary of risk dashboards
  2. focus on resilience
  3. avoid inferring long-run risk from short-run
  4. do scenario planning — e.g. how does climate/demographics affect performance
  5. understand politics and how that affects performance
  6. be cognizant of false confidence