

Why social sciences are useful for actuaries? A case study

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Humanities for actuaries

- New research program in France
 - “History and epistemology of finance”, FMSH, 1997
 - With EHESS and university Paris 1 Pantheon-Sorbonne
- Chair ‘Ethics and Finance’
 - “College of global studies”, FMSH, 2013
 - Two fields :
 - Philosophy of language: linguistic approach
 - Philosophy of science and techniques: epistemological approach
- New course taught in France
 - Course (master 2 level) in Sciences Po (2005-2008)
 - Research seminar (M2) in EHESS (2009-2013)
 - Teaching seminar (M2) in university Paris 1 Panthéon-Sorbonne, faculty of economics and faculty of philosophy (2013-)

Need for critical thinking: workers of thinkers ?

INTRODUCTION

Pierre Duhem's warning for actuaries

- « To industrialists [**actuaries**] who do not care about the correctness of a formula provided it is convenient, we recall that the **simple, but false equation**, it is sooner or later, by an unexpected contrast of logic, the company that fails, the dam that bursts, the bridge that collapses, it's **financial ruin**, when this is not the disaster that mowing lives »
- « Aux industriels [**actuaires**] qui n'ont cure de la justesse d'une formule pourvu qu'elle soit commode, nous rappellerons que l'équation **simple, mais fausse**, c'est tôt ou tard, par une revanche inattendue de la logique, l'entreprise qui échoue, la digue qui crève, le pont qui s'écroule ; c'est la **ruine financière**, lorsque ce n'est pas le sinistre qui fauche des vies humaines »

Pierre Duhem, *Revue des questions scientifiques*, 1893

The warning applies in 2008 : example from *Margin Call*

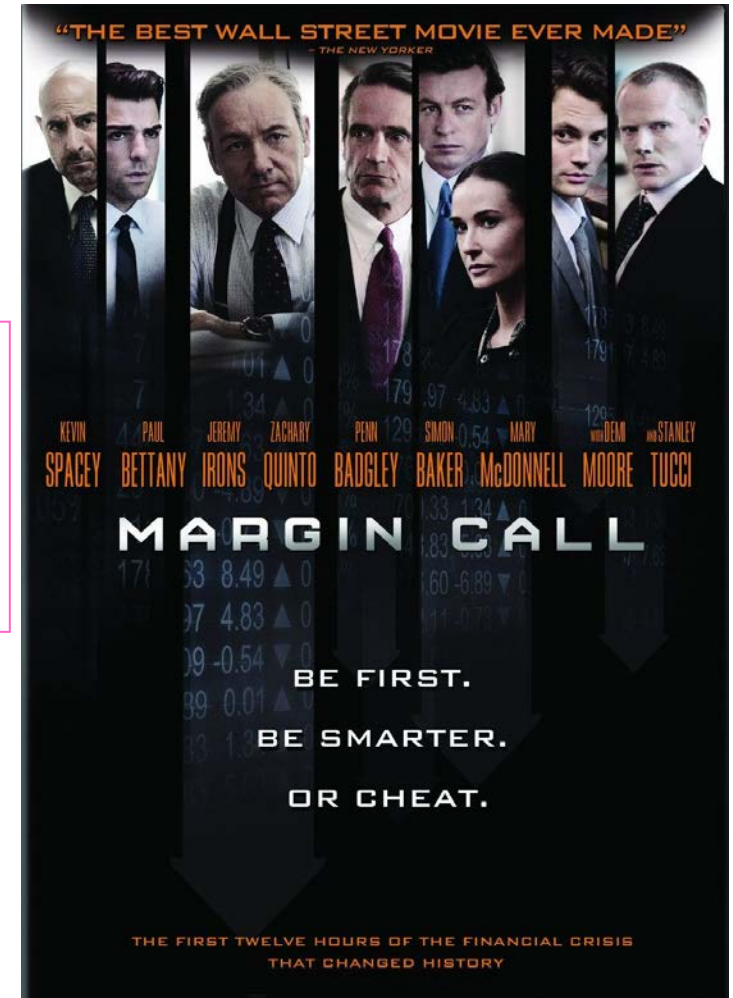
Sarah Robertson
Risk manager



- **Calculations are right but the formula is worthless**
- What does that means ?
- **The equation was simple but false**
- There are 8 trillions dollars of papers around the world are managed with this equation.
- **We are all wrong**



Jared Cohen
Head of Investment Bank



Outline

- Introduction
- The Financial *Logos*
 - *“We are all wrong”*
- The Brownian Virus
 - *“The equation is simple but false”*

Part 1: “We are all wrong”: meeting the needs” is not sufficient

THE FINANCIAL LOGOS

Necessity to improve the judgment

- **Motivations :**
 - **Completing** the actuary's professional judgment (ISAP 1 # 1.5)
- **Objectives :**
 - **Paving the way** for a new ability to foster **critical thinking**
- **Results :**
 - **Strengthening** the actuarial practice
 - Achieving **trustworthiness** (ISAP 1 # 1.1)

Fostering trustworthiness

- Trustworthiness depends on two things :
 - Motivation
 - Competence
 - Example : trustworthy physicians
 - Capable to make an accurate diagnosis
 - Capable to know the side effect of the drugs they prescribe
 - Capable to recognize the boundaries of their own capacities
 - Capable to see how their knowledge is up to date
- The actuary's competences
 - High skills in mathematical / actuarial sciences
 - **Dearth of competence in philosophy and social sciences (scientific humanities)**
- Philosophy and social sciences ?
 - Capable to detect “the **appropriateness of assumptions**” (ISAP 1 # 2.7)
 - Toolbox : philosophy of science, sociology of science
- **Warning : do not outsource epistemic responsibility**
- Advance the body of knowledge

Achieving trustworthiness

- **Completing the actuary's professional judgment**
 - The mainstream view about mathematical models: ethics of action
 - “The 2008 crisis only results from human actions”
 - Professional consequences of the mainstream view
 - Duty ethics: deontological (rule-based) or consequentialist (result-based)
 - Rule-based version : “Know the objective of the models”
 - Result-based version : “Know the limitations of the models”
 - Only the users are responsible for bad consequences of the misuse of models
 - Professional puzzle
 - “the actuary should consider the appropriateness of the assumptions underlying each component of the methodology” (ISAP 1, #2.7.1)
 - Solving the professional puzzle
 - Possible problem with the mainstream view
 - Human actions are equipped with technical and mental sets of tools
 - The mainstream view: these sets of tools are ethically neutral
 - Epistemology embedded in the mainstream view
 - Positivist philosophy of science
 - » From positivist view, model designers are not responsible for misuses of the models
 - » Risks result from **human errors, bad data** etc.

Distinguish the forest and the trees

- **Paving the way for a new perspective for actuaries**
 - To contrast the mainstream view
 - The **performativity of finance theory** : moving beyond positivism
 - The ethical impact of the sets of tools : moving beyond duty ethics
 - To complete the technical skills by taking into account the performativity aspects of the models
 - **Evidencing the framing effect of mathematical models**
 - Any preference in mathematics is also preference in ethics
 - What sort of world do we want to see performed ?
- *Multidisciplinary education and training*

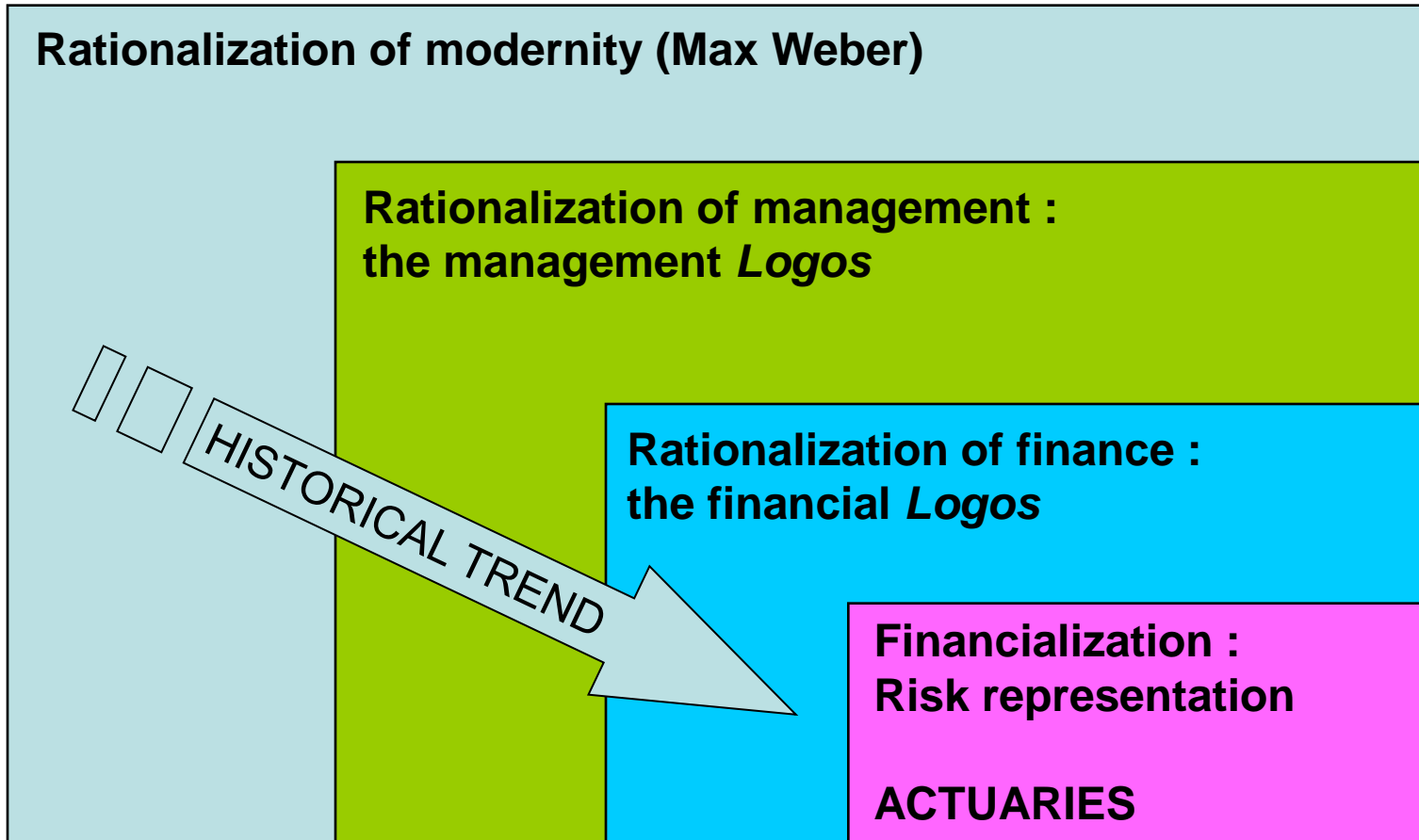
What is “Performativity” : linguistic approach

- Relationship between two stories :
 - Financial practices
 - That of **changing financial markets**
 - Financial theory
 - That of the emergence of **mathematical finance theory**
- The language shapes “reality”
 - John Austin : *How to do things with words* (1962)
- The financial theory shapes the financial practices
 - **Beliefs** : visible (self-fulfilling prophecies, procyclical effects etc.)
 - **Tools** : invisible (hence dangerous) technology
 - Framing of financial decisions by mathematical models

The financial *Logos*

- The « *Logos* » in financial industry
 - Logos (Heraclitus) : principle of order and knowledge
 - A rational and technical project : « Management *Logos* »
 - Three dimensions of this project
 - Control, performance, rationality
 - The financial *Logos* (Walter, 2011)
 - Conceptual principle organizing professional practices
 - Structural discourse vindicating professional practices
 - Machine generating products for professional practices
 - Written : e.g. investment rules
 - Oral : e.g. professionals skills of asset managers
 - Technical : e.g. risk numbers for solvency capital requirement
 - Conveys a representation of **risk**

From rationalization to financialization



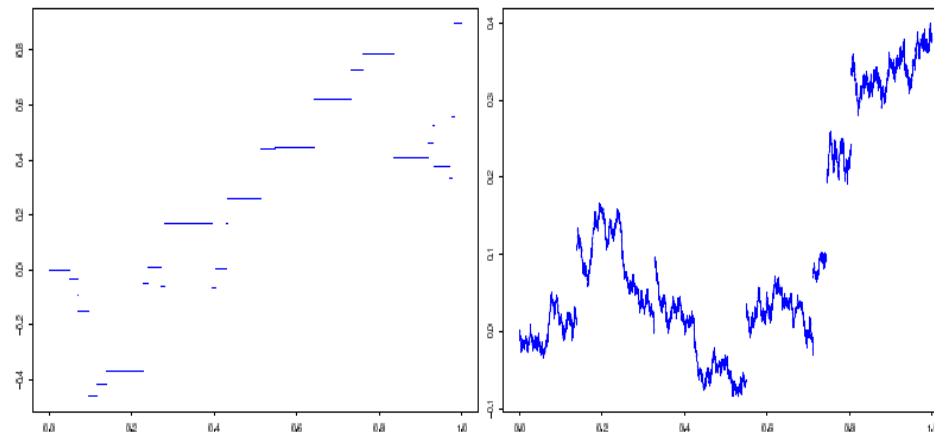
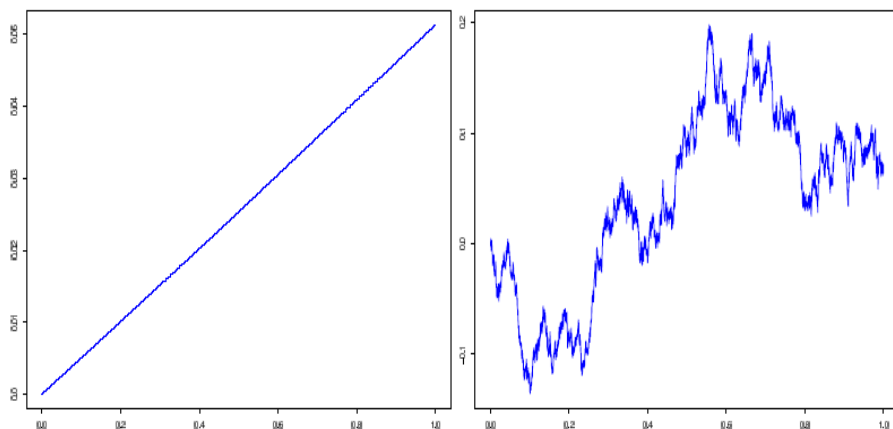
Part 2: “The equation was simple but false”

THE BROWNIAN VIRUS

Representations of Risk : a mindset framework

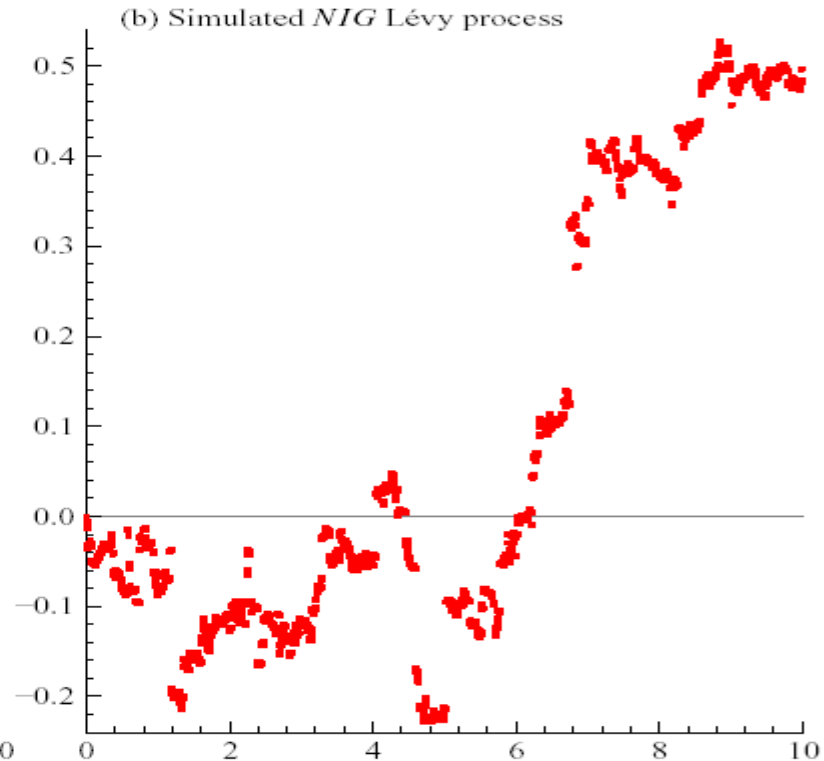
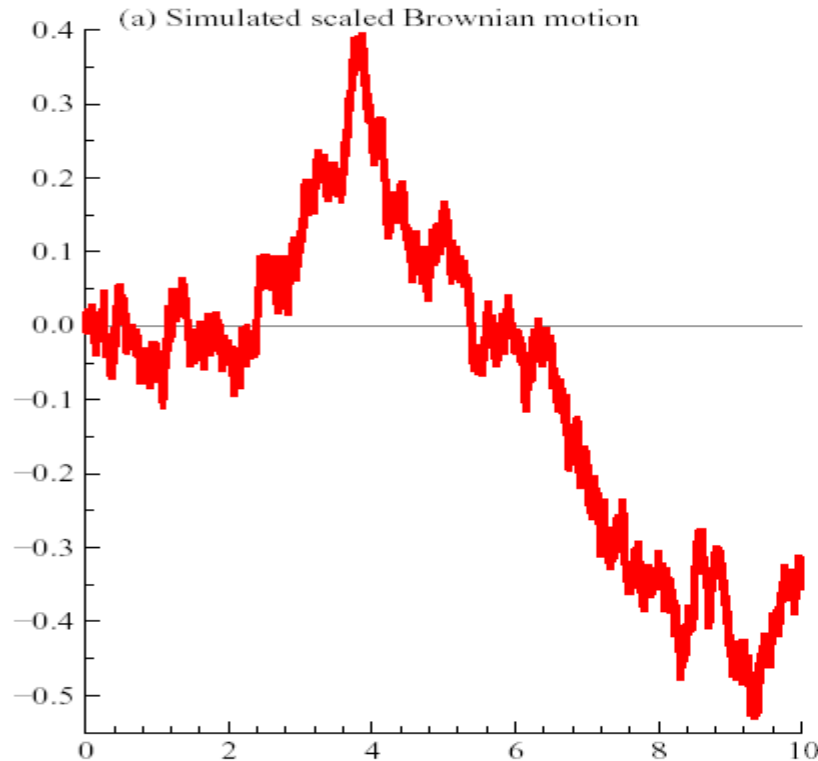
- In the continuous (Brownian-based) belief framework
 - Risk is reduced to a one dimensional aspect : **size** (amplitude, volatility)
 - One can easily reduce or even remove risk
 - Brownian belief-based risk management is like a speed limit by ignoring the shape of the road (Black-Scholes method)
 - Small variations can be compensated step by step : **continuity axiom**

- In the discontinuous (non-Brownian) belief framework
 - Risk is characterized by a second dimension : shape (asymmetry, regularity).
 - More complex but more accurate measure
 - Supervisory task becomes more efficient



Two risk perceptions: smooth and rough

What representation financial actors should adopt ?



Mild Chance

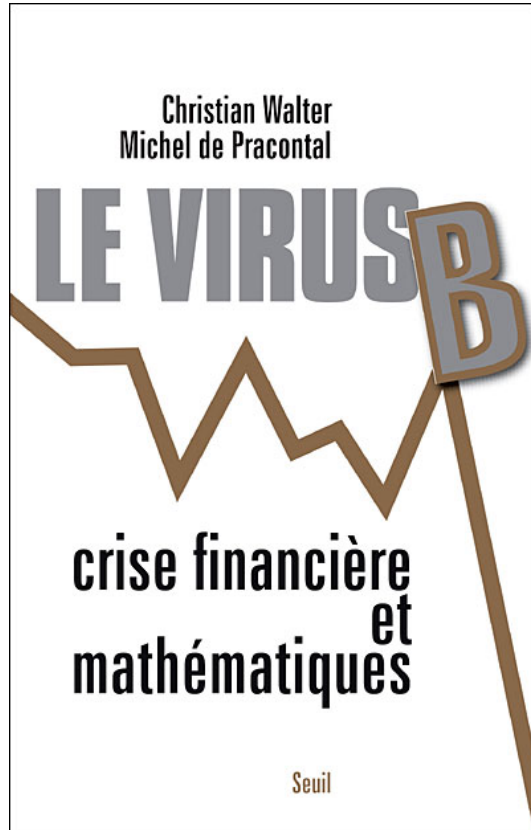
or

Wild Chance

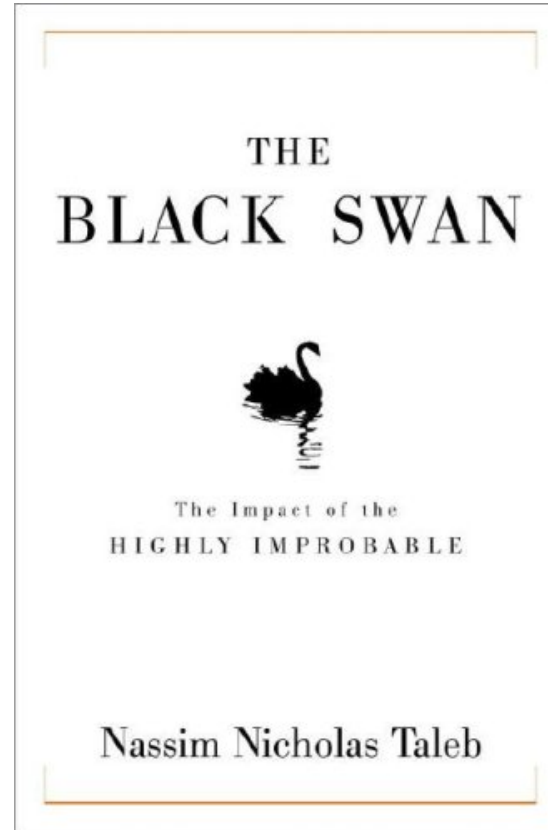
Facing the wild chance : three cases

- **To deny (Finance Nobel Prizes' case)**
 - Simplistic answer : “discontinuity is just impossible”
 - Rejection of wild chance : “**don't tell me about jumps**”
 - *Character trait* : *to deny the world as it is*
- **To renounce (Taleb's case)**
 - Sceptical answer : “discontinuity is unpredictable”
 - Renouncement to wild chance : “**we can't do anything**”
 - *Character trait* : *to resign facing Fortuna*
- **To manage (Condorcet's case)**
 - Realistic answer : “**discontinuity is tractable**”
 - Acceptance of wild chance : existence of large-scale large-impact rare events (LSLIREs) : SOA report in *The Actuary Magazine* (2013) : “Black Swans Aren't : holistically training management to better recognize assess and respond to emerging extreme events”
 - *Character trait* : « *to face chance with chance* » (Condorcet)
 - Don't see the world like a naïve turkey !

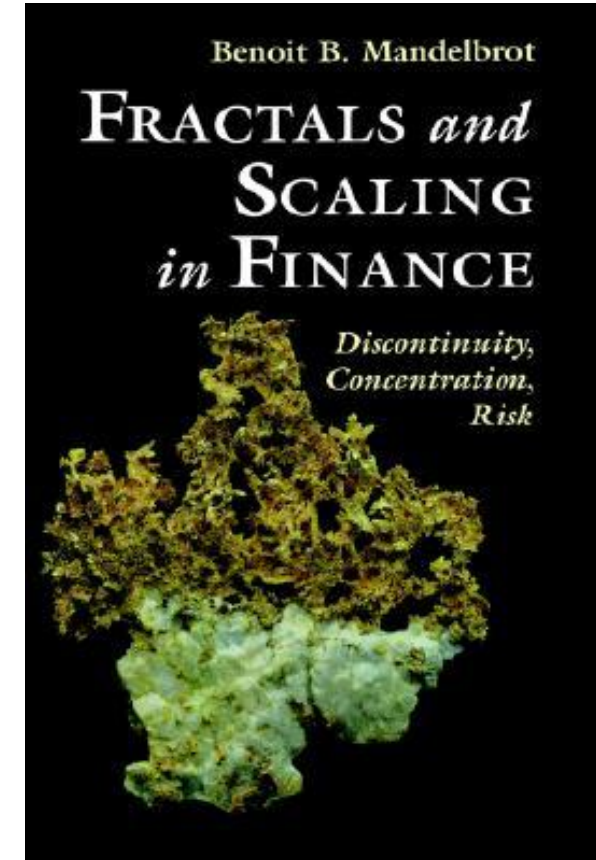
Brownian virus and black swans



To deny =
Disastrous results
(Duhem's warning)

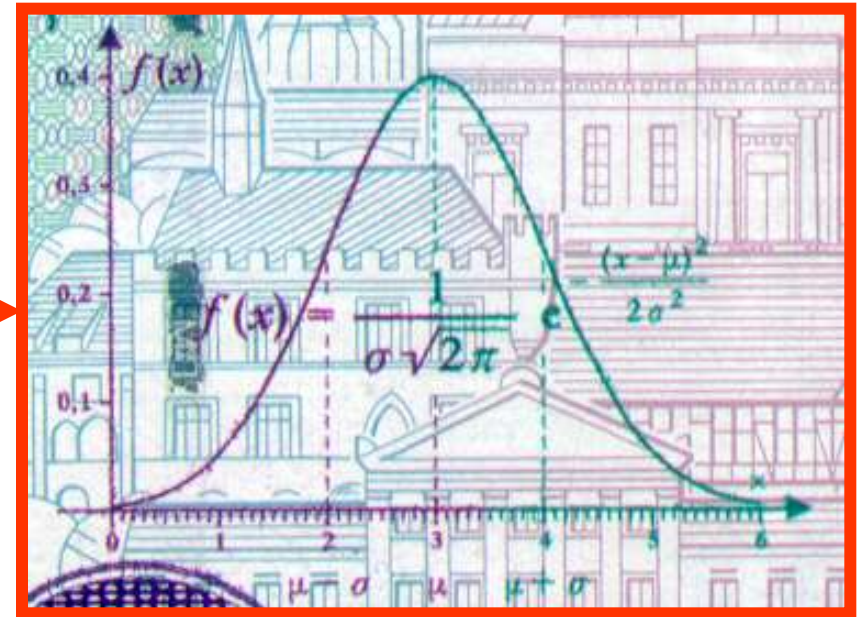


To renounce =
scepticism



To manage

The risk perception of the regulators ?



- The representation of economic uncertainty drawn on the banknote of 10 DM is the Gaussian distribution.



Lessons from the Brownian virus



1. The 2008 financial crisis exhibited **no failure of data**, but a crisis of predictability.
 - This relates to the idea of uncertainty (wild or mild ?)
2. The 2008 financial crisis was a crisis of knowledge
 - Any diagnosis of the crisis is incomplete without consideration of the epistemological dimension
3. The choice of Brownian representation (the Brownian belief) was due to non-technical but cultural reasons (set of beliefs)
 - What people « have in mind » ?
4. Questioning the Brownian belief was possible
 - Regulators, practitioners and academics had to leave the belief of Brownian paradise. But did they ? **Regulation risk**
5. Lessons for tomorrow
 - Importance of humanities for exercising reasonable judgment: **philosophy** (of language, of science) **helps to explain concepts**

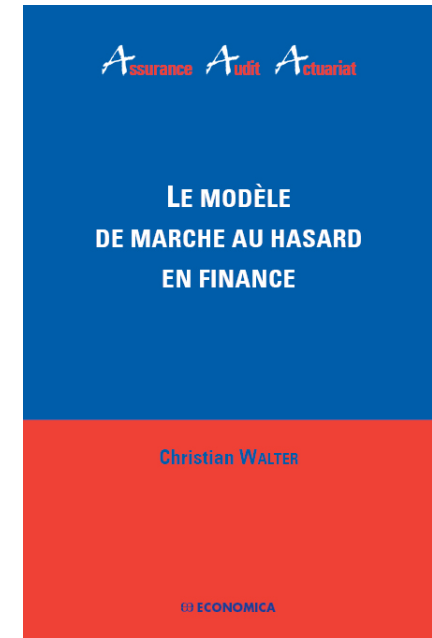
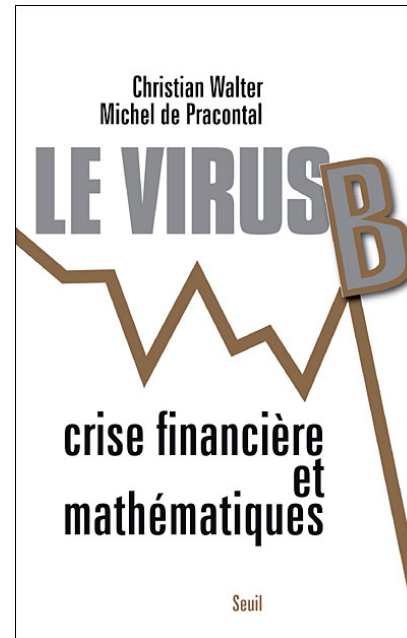
Actuaries for the future: evolution of profession



Some resources

Two books (still) in French

- *The Brownian virus. Financial crisis and mathematics*, Paris, ed. du Seuil, 2009
- *The random walk model in finance (1860-2010)*, Paris, Economica, 2013



In English

- Eve Chiapello and Christian Walter, “The three ages of financial quantification: a conventionalist approach of the financier’s metrology”, Working paper, 2015.
- More on: <http://www.fmsh.fr/en/c/6791>