

EXPERIMENTAL FINANCE

THE EXPERIMENTAL STUDY OF ASSET PRICING THEORY

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Overview

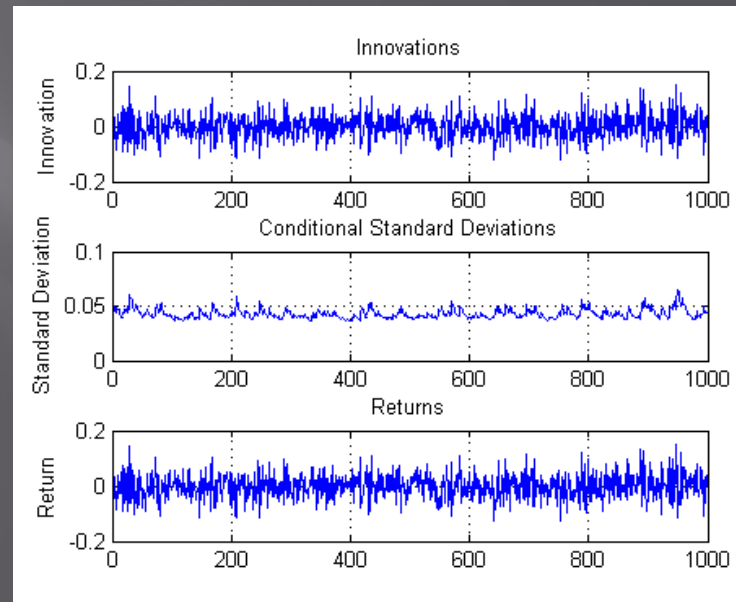
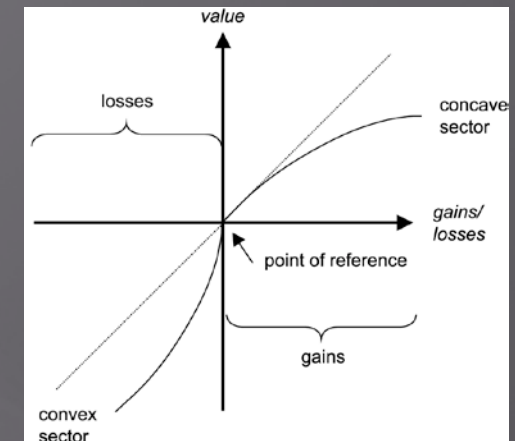
1. What we do
2. Why experiments in finance?
3. How do you run markets in a controlled setting?

1. What we do

- ▣ We study financial decision making, all the way from the level of markets (“asset pricing”) down to the individual (“behavioral finance”).
- ▣ We don’t just want to describe (GARCH, Prospect Theory,...); we want to **understand!**
 - E.g., Why are humans able to track risk – but confused about outliers (black swans)?
- ▣ We’re not satisfied with the *natural philosophy* attitude in economics (using formal arguments to rationalize historical data)
 - We want to apply the *scientific method*
- ▣ ... which inevitably means: the use of experiments
 - Observe humans make (financial) decisions and interact in a controlled setting

(Details)

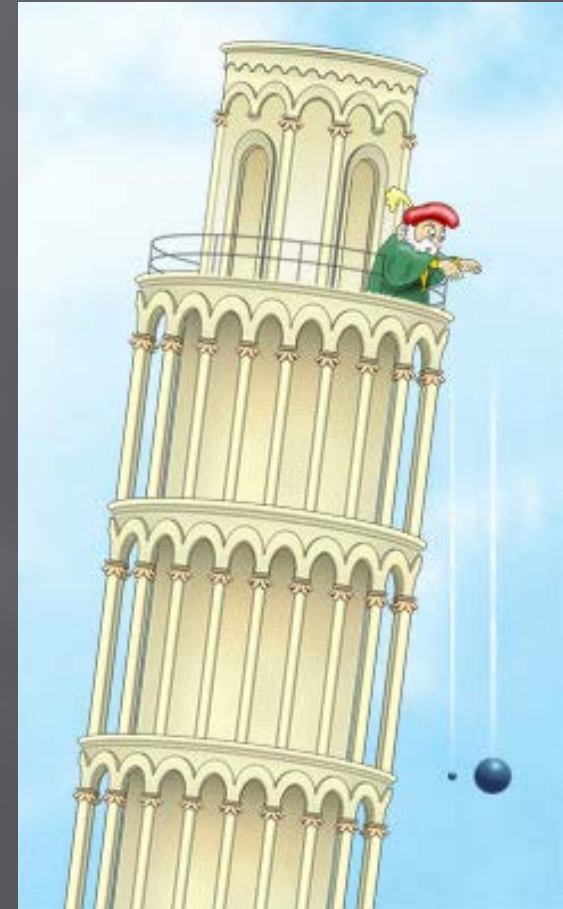
- Prospect theory rationalizes observed choice as maximization of a utility function involving beliefs and values of outcomes
- GARCH describes the evolution of stock market volatility in terms of the size of prior shocks: big past price changes induce further volatility
- Natural philosophy was the precursor of modern physics (and medicine)



(natural philosophy)

"The really bad thing about Aristotelianism was that it was based on the notion that the truth about the world could be determined by pure thought – philosophy – without actually carrying out tests (what we would now call experiments) to see if the theories and hypotheses were right. Thus, for example, according to the Peripatetics (but translating into modern units), not only did a heavier object fall faster than a lighter object, but, specifically, an object weighing 100 kilos would fall 100 metres in the same time that it takes for an object weighing 1 kilo to fall 1 metre, both of them starting from rest. The blindingly obvious fact that this could be tested by dropping two objects with different weights at the same time simply did not come into it."

Gribbin, John (2006-06-29). *The Fellowship: The Story of a Revolution* (Penguin Press Science) (pp. 23-24). Penguin. Kindle Edition.



Attacking Experiments



- ▣ But isn't the proposition (that two objects of different weights fall at same speed) obviously *wrong*?
 - Leaves and branches do not fall at the same speed
 - So, what does the lab experiment really mean?
- ▣ We will see this in economics/finance/psychology
 - “The CAPM has been rejected in the real world, so why test it in the lab?!”

(THE CAPM)

- ▣ ... is the “canonical” model of asset pricing
- ▣ Explains how and why average (expected) returns on risky securities differ
- ▣ Or equivalently, why two securities with the same expected payoffs or even the same payoff distribution may sell for different prices

2. Why experiments in finance?

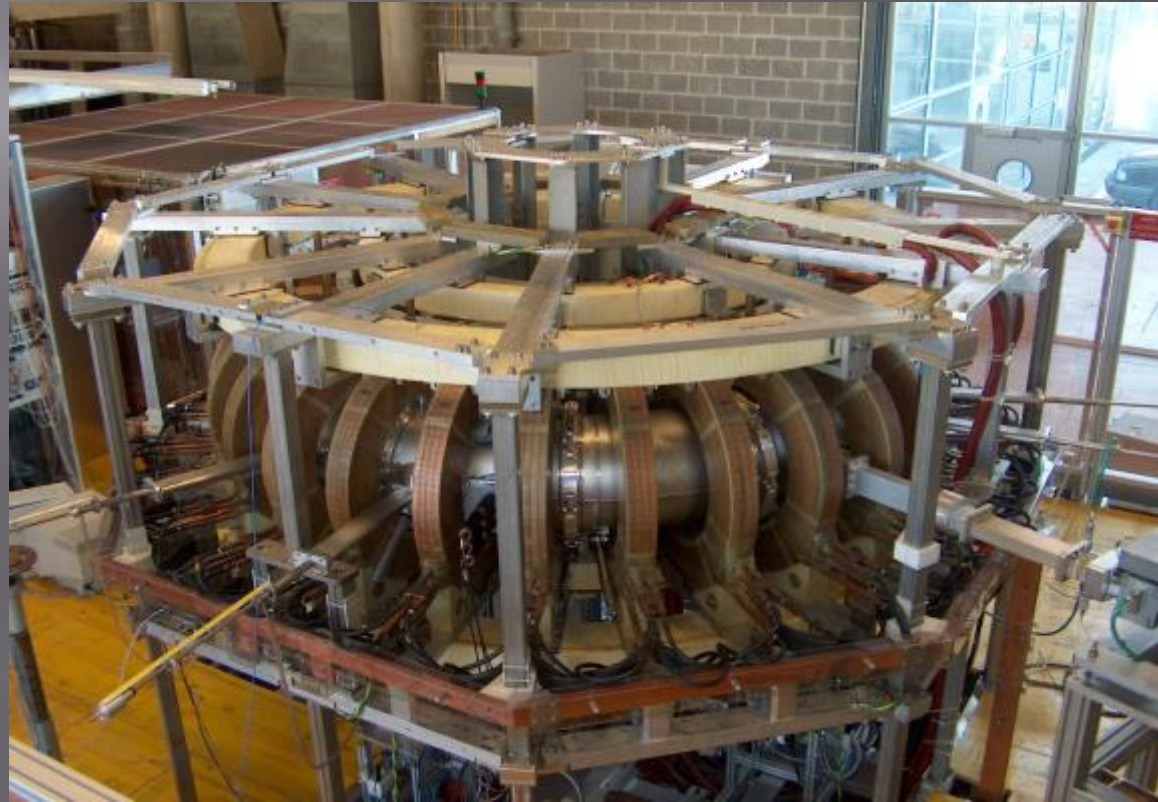
“Finance is in no need of experiments. We have lots of data.” Editor, *Econometrica*

- ▣ ‘Real-world markets (and their inhabitants) are “bigger” and “more complex” than anything one can study in the laboratory’
 - *Too complex?* That is precisely their problem... They cannot be described in terms of simple equations; so you need control, i.e., laboratory study
 - *Too big!* Sure, but we have to start somewhere. Without experimentation, we are “likely to go completely astray into imaginary conjecture” [Hannes Alfven, Nobel (Astro)Physics]
 - ▣ And whether “real” traders are “bigger” than our subjects remains to be proven (besides, we DO use “real” traders at times)

Analogy with astrophysics

The TORPEX at EPFL, a tiny vacuum-*like* space where physicists generate “plasma” using a microwave “oven” in order to study physical processes inside stars (that float in a *real* vacuum).

It’s small relative to the real stars, but the only way to be sure that we correctly interpret the “signals” that the stars send to us!

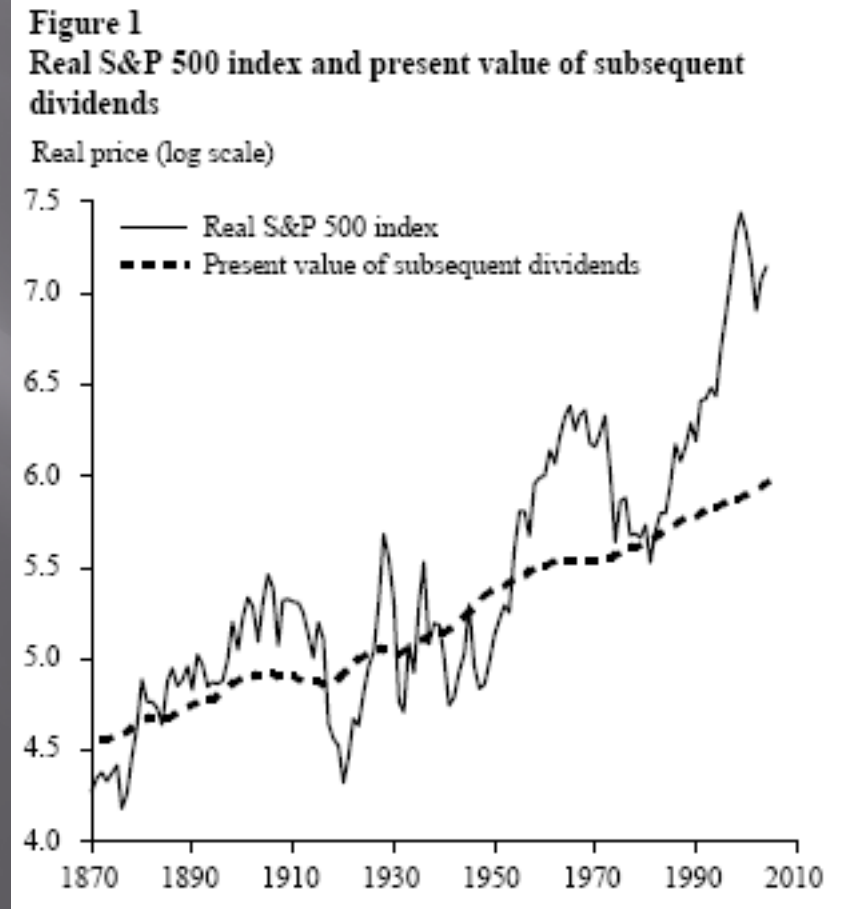


What experiments could teach us

- ▣ (Many) economists argue that the way to understand financial markets is to extrapolate from the individual (decision making). Really?
- ▣ Economists argue that excess volatility in stock markets is caused by institutions (e.g., leverage), policy ambiguity (i.e., government), potential for catastrophic events, etc. Why can't it be the effect of human market interaction itself? Do we need governments (so we can blame them)?
- ▣ Why do we outlaw over-the-counter (“dark”) markets (Dodd-Frank, MiFID 2)? Because they seem to make no sense? Or because the “First Welfare Theorem” requires everyone to be trading at the same price?
 - Why is policy and regulation in finance not based on controlled experimentation (wind tunnels, clinical trials, field experiments)?

(Details)

- ▣ Excess volatility: the fact that fundamentals (dividends, aggregate consumption, etc.) explain only a small fraction of changes in prices
- ▣ First welfare theorem: The walrasian (competitive) equilibrium leads ensures optimal allocations



In fact...

- ▣ Finance theory in general and asset pricing in particular is highly stylized
- ▣ It ignores many aspects of the “real world”
- ▣ So, it *controls for confounding factors*
 - And that is precisely what experiments are about

Asset pricing theory is ready for the lab!

In addition

- ▣ You learn A LOT about the theory when trying to design an experiment!
- ▣ E.g.:
 - CAPM: Do investors need to know the market portfolio?
 - Recent asset pricing theory with disagreeing investors: Do investors need to know what other investors think?
 - Lucas: How do we generate a representative agent?
 - Insurance/loan markets (Rothschild-Stiglitz): what does it mean when “equilibrium does not exist”?

Feynman: “What I cannot create I do not understand”

3. How do you run markets in a controlled setting?

- ▣ Need software... flex-e-markets
 - Keeps track of negotiation and trading
 - (People used to do things manually!)
- ▣ Allocate purposely designed securities
- ▣ Let people trade
- ▣ See what happens
 - At the market level
 - At the individual level

An Example

- ▣ Go to <http://uleef.business.utah.edu/flexemarkets>
- ▣ Log on as:
 - Any ID between 1 and 30
 - Password = “password”
 - Marketplace = Melbourne2014-Intro