

政策手段としての（消極的）確率予報

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「想定外」って何？

Cf. 高津の富（上方落語）

富くじ当って腰抜かすのは何故？

- (1) 当る可能性が無けりゃ初めから買わない。
- (2) 可能性が低いのに簡単に当ってびっくり。

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~~The untouchable~~ ^{expected} in microeconomic theory

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“Crisis” / “emergency” in economics :

- ⟨a⟩ off the **equilibrium path**
- ⟨b⟩ unexpected, unknown, uninformed
- ⟨c⟩ low-probability events

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⟨a⟩ Microeconomic theory 101

Probably the only major research field where 95% of stats theory used is Bayesian.

Question :

Is “zero probability” synonymous to “no chance”?

Hint : Which implies the other ?

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(Counter)examples :

“Randomly” pick a real number ’twixt 0 and 1.

Exact location of an electron at a given moment.

“Irreversibility” in physics.

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Off equilibrium actions are irrelevant unless someone has made a mistake.

~~The~~ An interpretation :

Off equilibrium subgames = emergencies.

Fire exits, evacuation drills, data backup, etc., etc... are not supposed to be actually used.

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E.g., **risk dominance** :

Which equilibrium would you and your mate opt for ?

	Brute	Prude
Brute	101	-1000000
Prude	99	100

What if one of you ~~goes nuts~~ ^{makes an error} ?

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More accurately, which **expectation** is safer ?

[B] You expect your mate to ~~be a~~ ^{play} Brute, hence you follow ~~it~~ ^{it}.

[P] You expect your mate to ~~be a~~ ^{play} Prude, ditto.

What if your expectation turns out wrong ?

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⟨b⟩ When game theory fails ~~you~~

Risk = payoffs and probabilities known,
game can be well-defined.

Uncertainty = payoffs and probabilities unknown,
game can be ill-defined (= cannot be well-defined).

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⟨b⟩-1. **Unforeseen contingencies /
incomplete contracts.**

How far should the contract detail unlikely
contingencies and how much/many o’em should
be left up to renegotiation/lawsuit.

(Part of the game tree is missing / amputated.)

Legal risks, enforceability of contracts.

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E.g., **Harsanyi uncertainty** :

	Brute	Prude
Brute	101	99
Prude	100	101

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⟨b⟩-2. **Knightian uncertainty.**

Prior probabilities are not commonly known.
(Drawing of the game tree cannot even commence.)

Which is more important :

- to predict the probability accurately, or
- to share common beliefs? (← Markets can help the latter through, e.g., asset pricing.)

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⟨b⟩-3. Utility nonlinear in probabilities.

E.g., counterexample by Allais (1953).

Certainty effect.

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Probability dependent utility :

Even between two goods/services which *per se* bring the same utility level when consumed with certainty, once their probabilities fall (strictly) below 1, their “expected utilities” may no longer be equal, depending upon how much “preparation” their consumption requires.

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⟨c⟩ How “rational” players (re)act to small probability even when game theory is up-&-running?

- Catering for rare events \approx small (sub)markets.

When the market is segmented, some segments are sizeable whilst some others are tiny.

Large segments \leftarrow excess entry.

Small segments \leftarrow natural monopoly.

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Principal-agents model :

One principle + two agents/products A & B.

Two states A (prob. $1 - \phi$) and B ($\phi \ll 1/2$).

Principal’s misperceiving A as if B (with a small probability, in the 1st order) may elicit incentives for at least one agent to prepare for B, to enhance efficiency.

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- Preparing for rare events \approx minority opinions.

By definition, rare events hit only very small minorities of people, who might not be treated fairly if left up to “democracy.”

E.g., the Swiss have recently voted against basic income.

We tend to discriminate against those few who suffer rare fates.

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- Small probabilities are generally difficult to prove empirically.

E.g., Rain 15 days out of 30

\implies approx 95% conf interval $1/3 \leq \rho \leq 2/3$.

\therefore If $\rho = 1/3$, then

mean $n\rho = 10$, std $\sqrt{n\rho(1 - \rho)} \approx 2.58$,

hence mean + 1.956 std ≈ 15 days.

Analogously if $\rho = 2/3$, mean - 1.956 std ≈ 15 .

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E.g., Three mega-quakes in 150 years

\implies 95% conf interval $1/150 \leq \omega \leq 1/17$.

\therefore If $\omega = 1/150$, then mean = 1, std ≈ 1 ,
mean + 1.956 std ≈ 3 .

If $\omega = 1/17$, then mean ≈ 8.8 , std ≈ 2.9 ,
mean - 1.956 std ≈ 3 .

Can’t predict if once a century, or a decade.

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- Vacuum of evidence leaves room for policy.

Biased forecast \implies rational public will know.

(Deliberately) coarse forecast \implies uninformative even to the rational public.

Induce accurate levels of crisis control, or moderate levels regardless?

Depends upon whether marginal returns from crisis control in- or de-crease.

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E.g., Fire-resistant buildings protect less resistant neighbouring buildings.

\implies Returns “decrease,” i.e., high (low) when neighbouring buildings are less (more) fire-resistant.

Lack of informative hazard assessment gravitates the public toward moderation, whereby the benefit from overinvestment when low investment is apt, outweighs the harm from underinvestment when high investment is called for.

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