

Social Transmission Bias in Economics and Finance

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Social economics and finance

- Missing chapter in finance theory:
 - The **social processes** that shape economic thinking, behavior
- **Social economics and finance:**
 - The study of how social interaction affects economic outcomes
 - Recognizes that people observe each other, “talk” to each other
- A key intellectual building block:

Social transmission bias

Some recent intellectual revolutions

- Information economics
 - Recognized that some people know things that others do not
- Behavioral economics, finance
 - Recognized that people make systematic mistakes

Do we already know?

- Practitioners, scholars “knew” these facts before each revolution
 - But considered informally, sporadically
 - Not **systematically, explicitly, routinely** incorporated in theories, tests
- Same now for social economics and finance

Behavioral finance: Path from assumptions to conclusions often very direct

- Beliefs
 - Investors trade too aggressively?
 - ➔ Overconfident
 - Expectations rise after price run-ups?
 - ➔ Overextrapolate

Preferences

- Investors:
 - Buy lottery stocks?
 - Sell winners more than losers?
 - Save too little?
- ➔ Taste for: skewness, realizing gains not losses, immediate consumption
- Yes, but...

Attraction to a behavior \neq A preference for it

- Moths **attracted** to flame
- Moths not flame-loving
- Navigations systems designed by natural selection to work with distant light sources
 - Nearby light sources fool navigation systems





Social emergence

- Purely individual-level navigation errors (moths)
 - One kind of indirect effect
- Another: **social emergence**
 - Aggregate outcomes not just sum of individual propensities

Example of a socially emergent effect

- **Death spirals**
- Rotative instinct?
 - A heuristic or bias for circular motion?
 - Vs. instincts for random search, following others
- Aggregate outcome looks nothing like individual propensities







Implication of emergence

- Unwarranted:
 - Observed behavior → Direct psychological bias “for” that behavior
- Finance field
 - Emergent social effects usually neglected
 - Transmission bias missing from standard toolkit
- What comes after behavioral finance?
 - Understanding of transmission bias, social emergence

Goal of social economics and finance

- Social economics & finance
 - **Build on standard ingredients**
 - Preferences, optimization, psychological bias, equilibrium
 - As in behavioral economics:
 - Well-motivated assumptions
 - Psychological evidence
 - Evolutionary plausibility
 - Capture systematically, tractably:
 - **Socially emergent, as well as direct, effects**

What is social transmission bias?

Social transmission

- Signals, ideas pass from person to person
- Social transmission **bias**:
 - Systematic modification in transfer from a **sender** to a **receiver**
 - Sender could just be observation target
 - Comes from both sender, receiver
 - Incentives
 - Psychological biases
- Underexplored foundation of behavior

Social transmission bias as signal distortion

1. Signal distortion

- Shifts in **sign, intensity** of what is transmitted
 - Example:
 - Owner of a stock talks up the firm
 - Listener fails to discount

Social transmission bias as selection bias

2. Selection bias

- Bias in **whether** something is transmitted
 - Example: Self-enhancing transmission bias
 - Investors discuss their trades if high returns
 - Silent about low returns
 - Much evidence
 - Listeners fail to adjust

Four fables of social transmission bias in economics and finance

Fable 1:

Bandwidth constraints and simplistic thinking

Bandwidth constraints and simplistic thinking

Hirshleifer & Tamuz (in progress)

- Suppose loss of nuance as ideas communicated
 - TV “Sound bites”
- Bandwidth constraints
 - Twitter character limits
 - Time, cognitive constraints



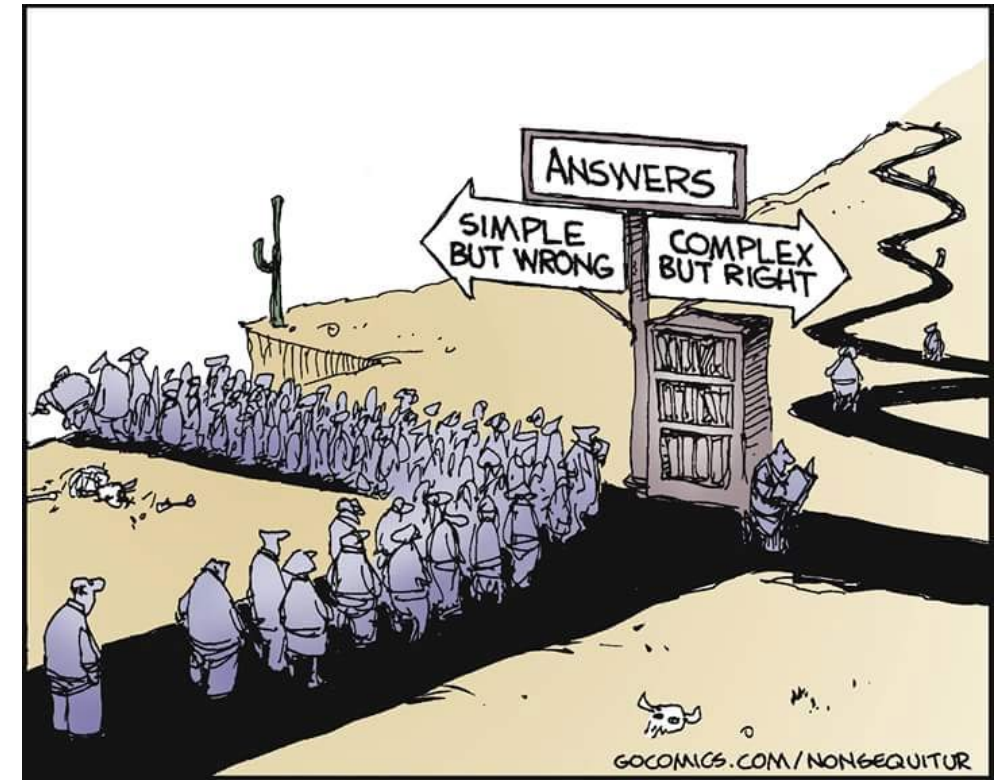
Failure to adjust

- Suppose receivers do not adjust for loss of nuance
 - Consistent with standard limited attention effects

Outcome

Then:

- Infer senders have simple or extreme belief
- Adopt actually-simplistic beliefs
- Sequential
 - Iterated loss of nuance
- Society → Extreme simplistic thinking
 - Worse than judgements made in isolation



Fable 2:

Self-enhancing transmission bias

Self-enhancing transmission bias

Han, Hirshleifer & Walden (2020)

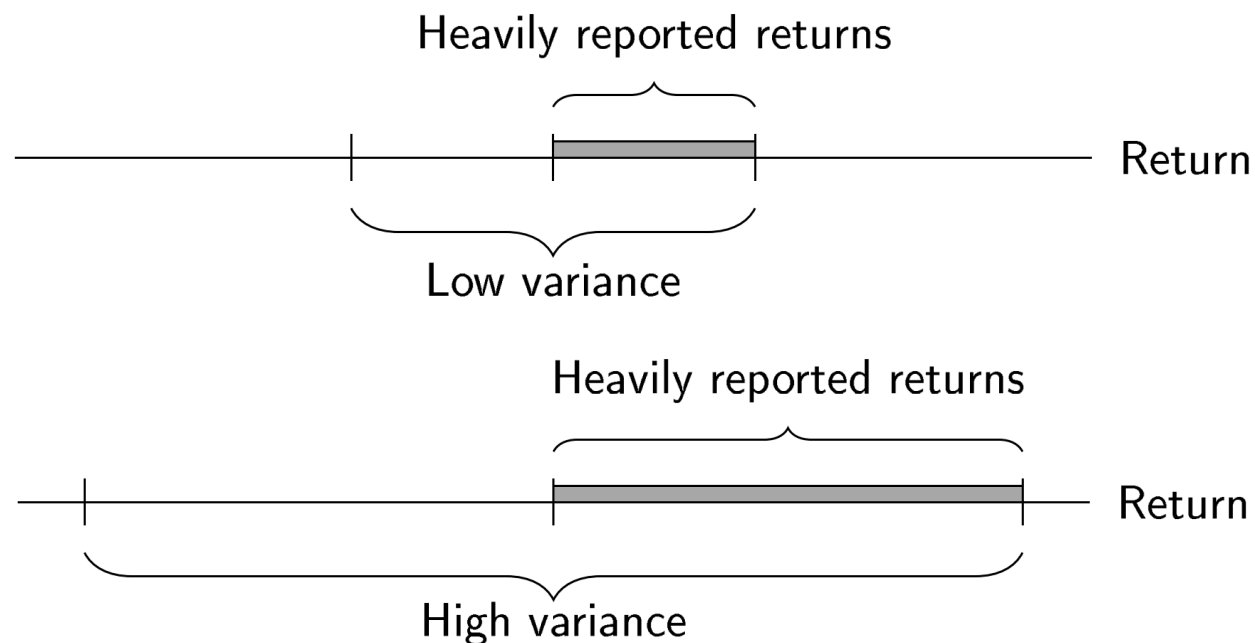
- 2 Strategies
 - **A** – Active
 - Higher variance, or higher skewness
 - **P** – Passive
- Investors of type **A** or **P** randomly selected to meet
- Sender may report profit to Receiver
 - High more than low returns



Receivers

- Standard behavioral biases
 - Don't adjust for selection bias
 - Think past performance predicts future performance

Result



- Upward selection bias in return reports
 - Stronger effect for high-variance strategy
- High-variance, underperforming **A** can spread through population
 - ➔ Nondiversification, price anomalies...
- Empirical support for SET
 - Heimer & Simon (2015), Ammann & Schaub (2016), Escobar & Pedraza (2019), Lim, Ng & Uzzi (2020)

A variation

- High salience of extremes:
 - Positive **skewness** strategies spread
 - Consistent with lottery stock return anomalies

Lessons

Attraction to variance, skewness:

- In the model, investors don't **like** variance, skewness
- Don't have **belief**
 - “High variance, skewness → Good opportunity”
- May be **unaware** of variance, skewness
- Attraction **socially emergent**
 - Distinctive empirical implications:
 - Personality traits (e.g., self-enhancing transmission bias)
 - Social network position
 - Overall network connectivity

Fable 3:

Biased information percolation
and bubbles

Biased information percolation, action booms, and price bubbles

- “Beyond all reason” flavor of booms, bubbles
 - Religious awakenings, Bitcoin...



Assumptions

- Each investor i takes an action with some intensity at each date s over time
 - E.g.
 - Engage in political activity
 - Adopt an innovation
 - **Trade a stock**
- Random dividend X per share realized at terminal date T

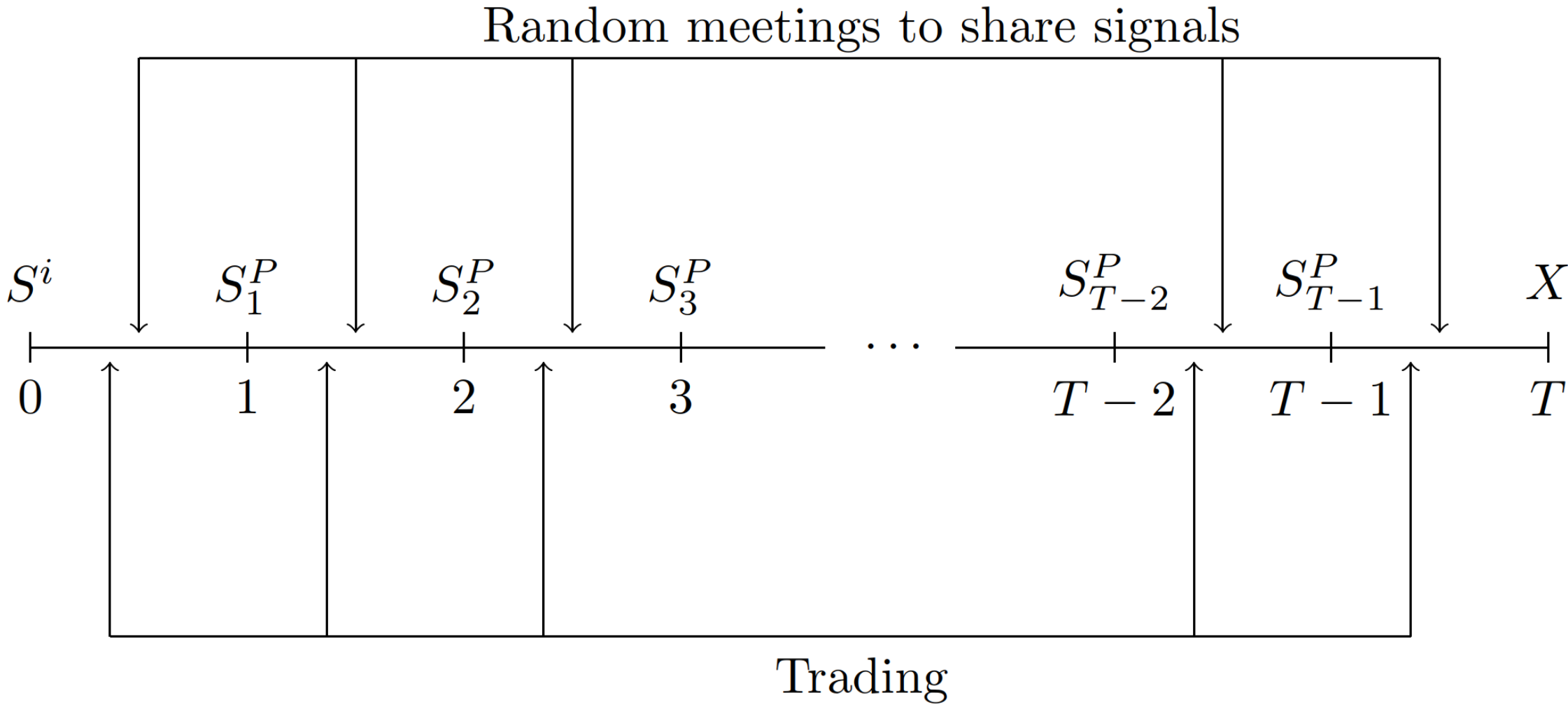
Signals

- Each investor starts with one private signal about fundamental **X**
- Public signals arrive at **discrete** dates
 - E.g., quarterly earnings announcements

Meetings and signal sharing

- Information percolation
 - Duffie, Malamud & Manso (2009)
- Investors meet randomly in pairs in continuous time
- Share accumulated signals
 - Or, bloggers...
- Per capita number of private signals grows exponentially with time
 - Andrei & Cujean (2017)

Timeline



Transmission bias

- b -bias
 - In each meeting, a bias of b added to average signal

Small bias, big mispricing

- b added to average signal each meeting



b -bias **recursively amplified**



Even if $b \approx 0$, big effects

- But if $b \approx 0$, people may mistakenly use a “ $b = 0$ ” heuristic.

Trading decisions

- Investors update beliefs at each date s based on
 - Private signals
 - Public signals
 - Market price
- Trade a single risky security accordingly
- Price determined by market clearing
 - Aggregate Demand = Aggregate Supply \ominus
at each date

Expected price path

- Multiplicative growth in:
 - Per capita signal count
 - Exponential
 - Per-signal bias
- ➔ Convex expected price growth
 - Initially
 - Expected price starts growing slowly, accelerates
 - Evidence of Greenwood, Shleifer & You (2019)

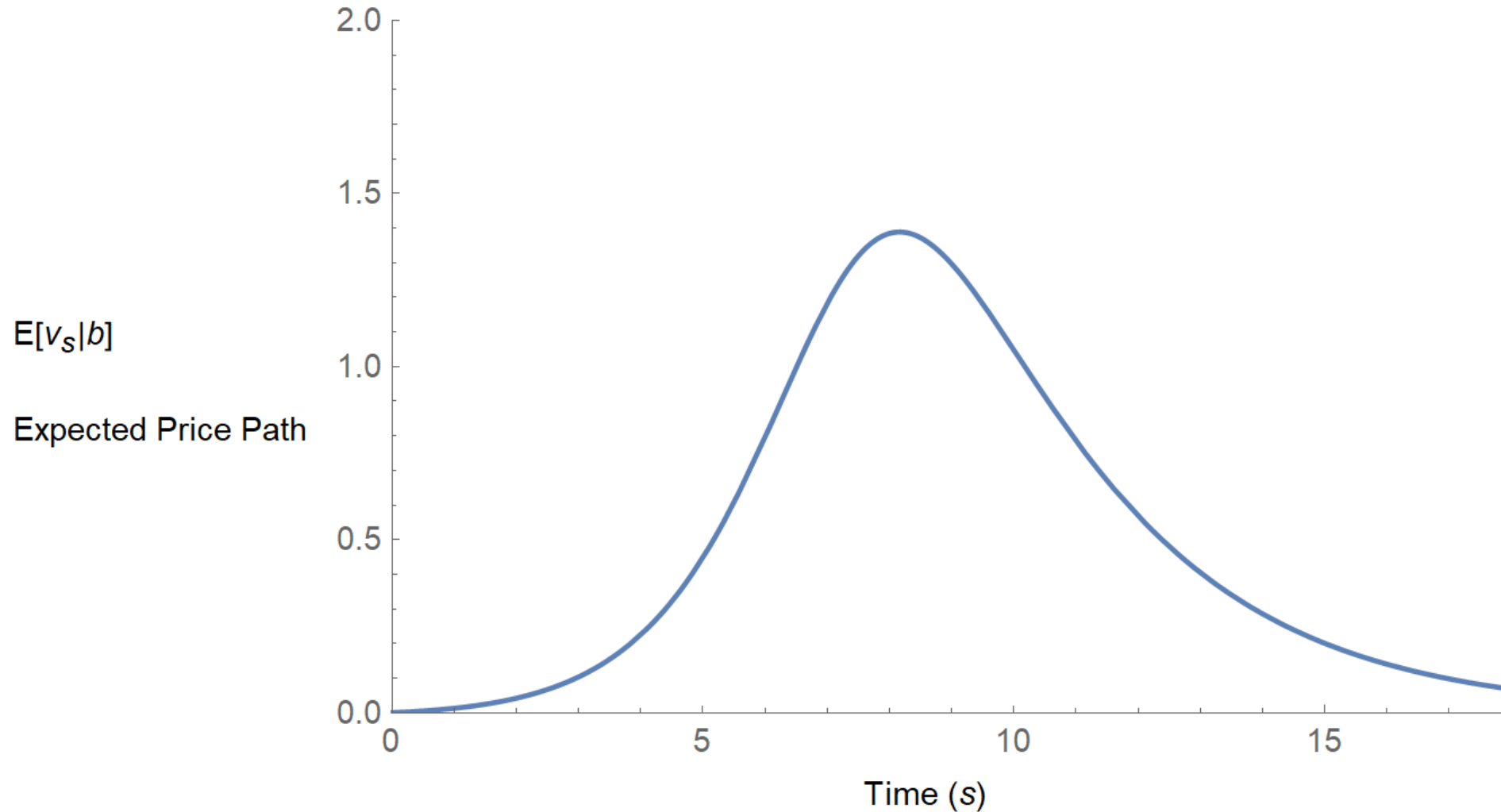
Comparison

- Price bubble
 - Without usual ingredients
 - Overconfidence, overextrapolation
 - Emergent effect
 - Accumulation of *b*-bias
 - High returns do not **cause** overoptimism
 - No extrapolation

Correction

- Public news arrival of increasing precision
 - ➔ Bubble eventually corrects
- Hump-shaped expected price path
 - Or U-shaped when $b < 0$

Expected price path in Price Bubbles Model: Smoothed



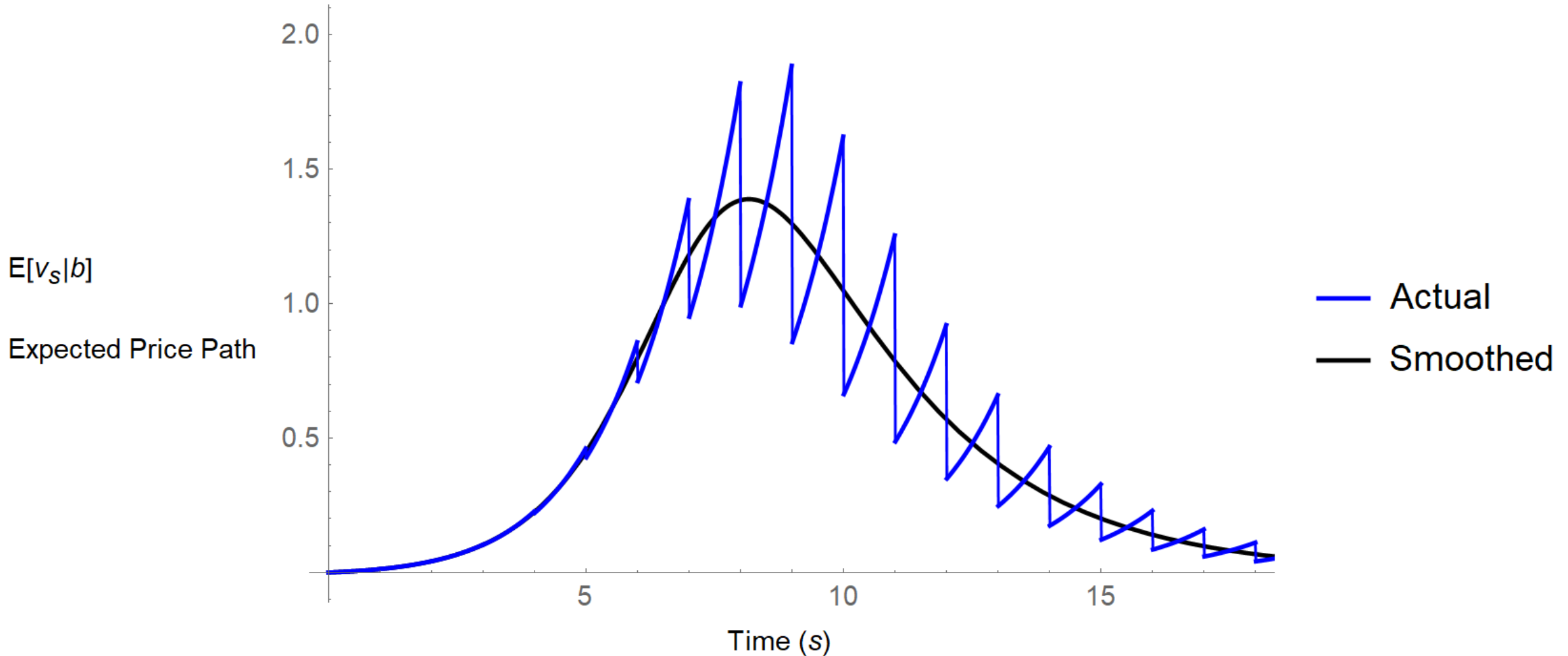
Predictability of expectations and returns

- Smoothed expected price path
 - Similar to behavioral models that generate **momentum, reversal**
- After price run-ups, beliefs more optimistic
 - Supporting evidence
 - Greenwood & Shleifer (2014)
- Disagreement, trading rises, falls with bubble

Event-based return predictability

- Corrective public information (earnings) arrives at discrete dates
 - News-date returns predictable
- Post-news-event return predictability
- Other return predictability patterns

Actual Expected Price Path—Stegosaurus



Oscillation and unifying anomalies

- Oscillations in expected price path
 - Short-term reversal too—unifying anomalies?
 - If high frequency public news arrival

Peak oscillation

- Tug-of-war
 - Biased percolation
 - Public news arrival
 - Before the peak, percolation wins
- So oscillation intensifies near the peak
 - ***Peak oscillation***
 - Empirically testable
- **Damped oscillations** as bubble subsides
 - “Dead cat bounce”



Illustration: Robert Neubecker

Fable 4:

Biased transmission of folk
models

Biased transmission of folk models (work-in-progress)

Folk model:

- An understanding of how the world works
 - E.g.,
 - Belief in Heaven and Hell
 - Return continuation
 - “The trend is your friend”
 - Reversal
 - “buy on the dips”
- Spread from person to person
- May or may not be attached to narratives



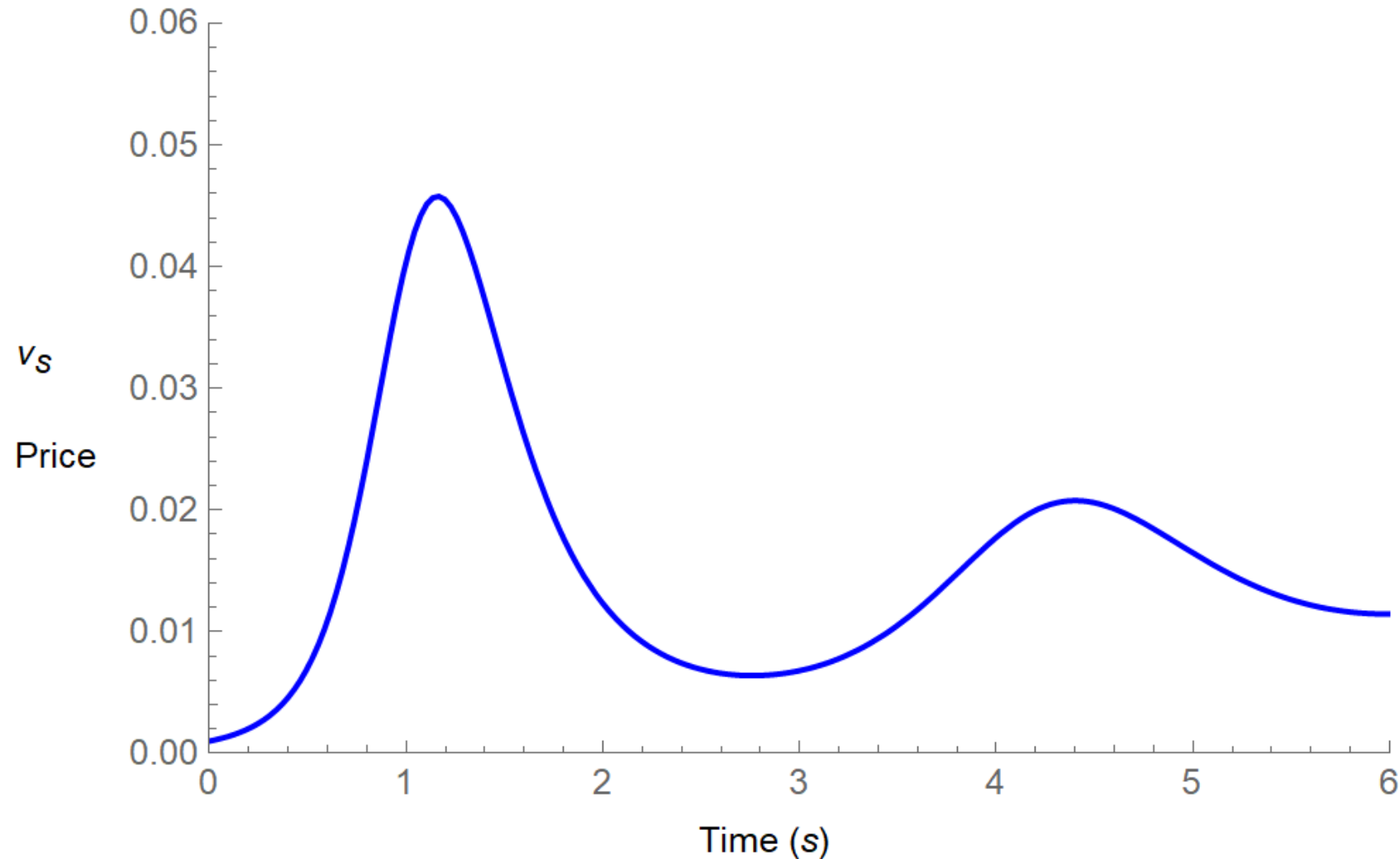
Compartmental models from epidemiology

- Infection spreads through population via random contacts
 - E.g., the “SIR” model
- Helps explain spread of folk models, behavior?
 - Epidemic rise-and-fall time path?

Adapting compartmental approach

- Introduce an asset market
- “Infected”
 - Folk model → Overoptimism about an asset
- Introduce “buzz” effects:
 - Growing excitement makes folk model more contagious
 - Exaggerates booms, collapse
- Damped oscillations
 - Rich return predictability patterns

Price Path: Modified SIRS model with Buzz



Emergent themes

Emergent theme 1: Compounding

1. Social transmission bias compounds recursively.
 - Small bias can have large effects.

Emergent theme 2: Idiosyncrasy

2. Social transmission makes aggregate outcomes **idiosyncratic**.

- Error-prone, unpredictable
- Sensitive to small biases, shocks

Emergent theme 3:

Dynamics

3. Social transmission bias can explain price bubbles and swings in investor sentiment.

- Without “standard” ingredients for bubbles

Emergent theme 4:

Emergence

4. Socially emergent behavior often look completely different from individual propensities.

- Self-enhancing transmission and attraction to volatility, skewness
- Tiny b -bias and stegosaurus graph

Emergent theme 5:

Mimicry

5. Social outcomes easily create the **illusion** of a propensity “**for**” a behavior when none exists.

- Apparent lottery preferences
 - Self-enhancing transmission model
- Apparent extrapolative beliefs
 - Biased percolation model
- We often overstate inferences from empirical tests.

Emergent theme 6:

Proxies

6. The social transmission bias approach suggests **new test variables**.

General social:

- Sociability
- Communication technologies, media
- Individual social network position
- Overall social network connectivity

Sources of transmission bias:

- Psychological traits
- Environmental cues
- Incentives
- Content of folk models
- Textual characteristics

In closing

Social economics and finance as a lens for understanding markets

- We sometimes caught in closed mental loops
- Outline of a new paradigm now discernable:
 - Social economics and finance
 - Networks, folk models, **social transmission bias**