You Learn the Most When You Find Your beliefs to Be False: Three Examples from Experimental Economics.

Bernoulli Lecture for the Behavioral Sciences

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Theme:
Widely held beliefs can be wrong, but experiments may gradually enable false beliefs to be changed.

Why resistance to change?

- **Resistance is a defensible consequence of confirmation bias in science.**
- **Bias favors tradition, accumulated know-how; a source of stability in beliefs.**
- **But if you overcome false beliefs & thinking, you enter entirely new space of questions.**

Classic experiments in science have helped to change false beliefs:

Michelson-Morley experiment failed to support the concept of absolute space and time. (1887), N=2.

Eddington's solar eclipse experiment (1919), N=3, supported Einstein's GT (1916), rejected Newton.

Here are three widely held and taught beliefs (theories) in economics that were unexpectedly falsified by experiments:

1. Efficient competitive market outcomes require all participants to have complete knowledge of supply and demand; also large numbers; price-taking behavior. (1950s-60s)

2. If asset value is known (transparent), price bubbles will not occur. (1980s)

3. People will not cooperate in single play trust games. (1990s)

Case 1. False beliefs about participant knowledge requirements in markets.

The claim that market equilibrium was unattainable unless people had perfect (or complete) knowledge of supply and demand had its origins in Jevons:

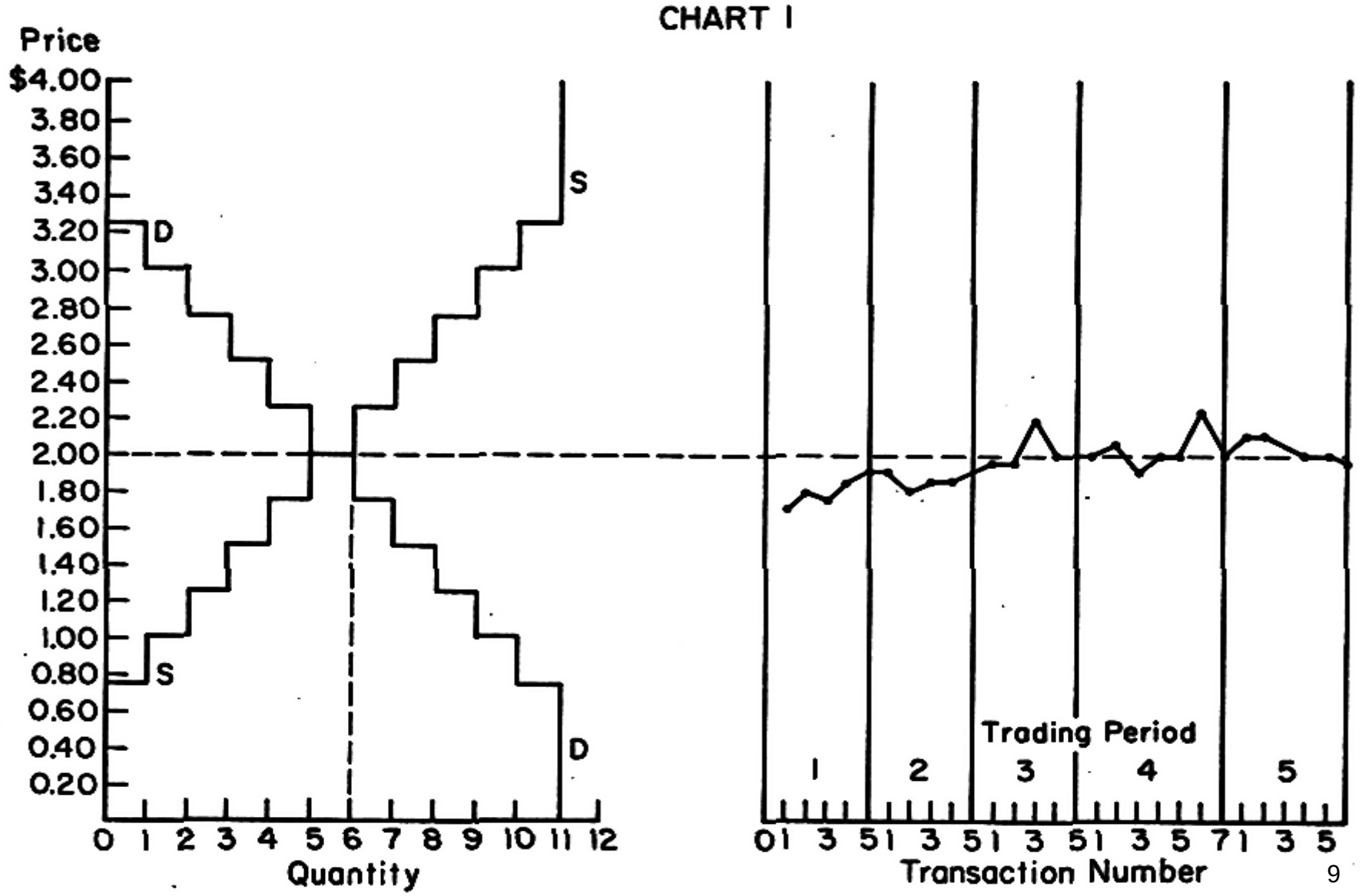
> **"A market…is theoretically perfect only when all traders have perfect knowledge of the conditions of supply and demand, and the consequent ratio of exchange (price)…" (W.S. Jevons, 1871/1888, pp 86-87; he needed it!)**

Supply and Demand Experiments Using Bid/Ask Double Auction Trading Rules

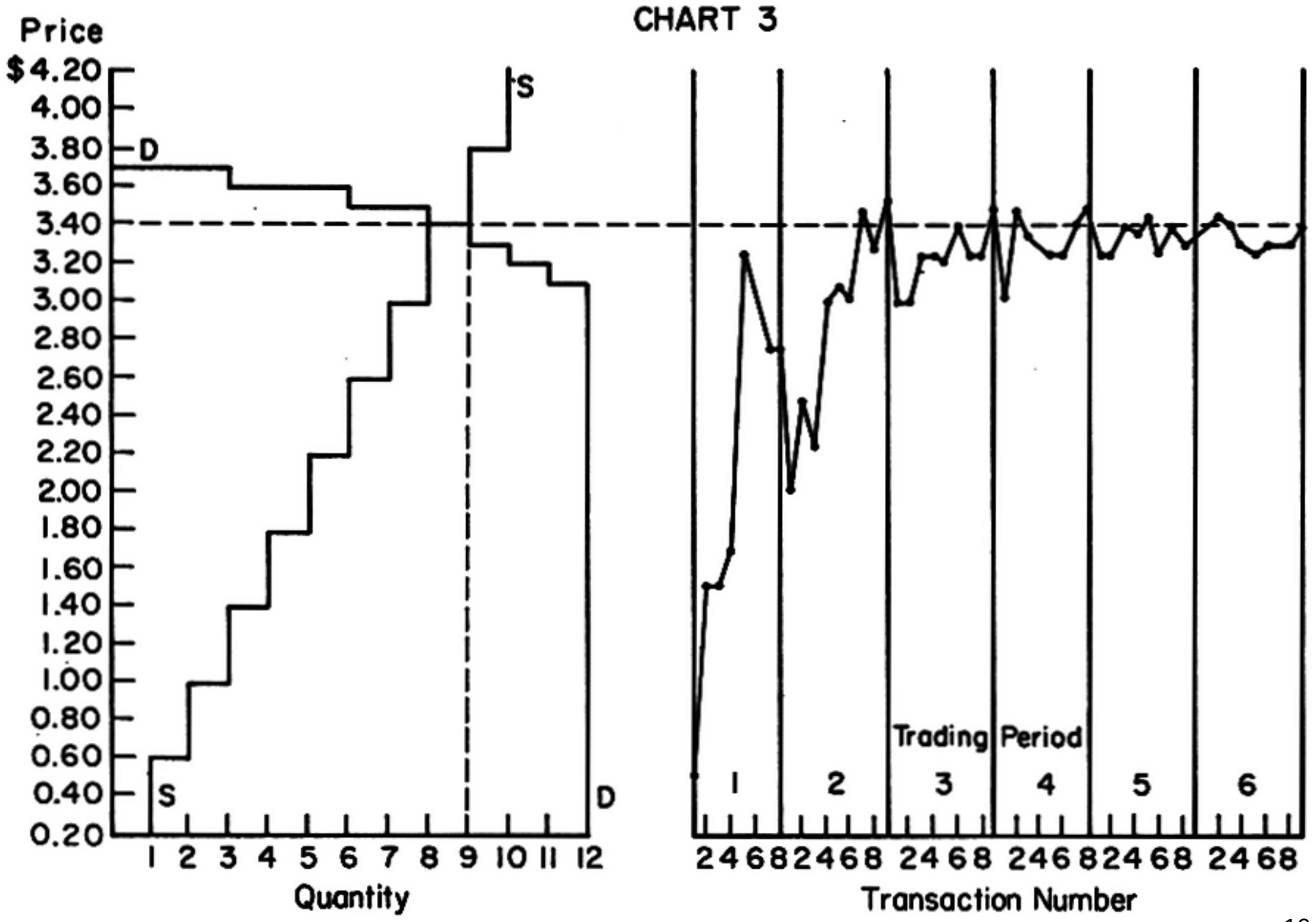
- Information on Buyer Values and Seller Costs is strictly private (decentralized) in experiment.
- Buyers announce bids, sellers announce asks.
- Contract prices converge quickly to near competitive equilibria.
- Results falsified the belief that full information is necessary.

Here are two early experiments:

FIRST EXPERIMENT: JANUARY, 1956; a flawed accident of symmetry?



Asymmetric case; not an accident



The observed convergence was inexplicable by the microeconomic (& why trade? game) theory of the 1950s and 60s. Equilibrium was defined, given demand values and supply costs, but economists (starting with Jevons in 1870) had not satisfactorily articulated message-contract trading processes for how people might explore trading opportunities and discover prices. Trade still a mystery for the rational actor economic model!
Contrasts with Adam Smith; first axiom: "Propensity to truck barter and exchange…"; leads to prices, learning and specialization—an evolutionary discovery process!

Experiments enlarged the space of exploration; helped us to relearn process ways of thinking, but now in context of equilibrium theory; economics becomes experimental.

New experiments varied information, message-contract procedures, numbers, firm sizes, etc.

Also applications to the design and testing of new markets e.g., Electric Power, 1980s-90s.

NOTE: All these experimental markets were for special case of NON-DURABLES; i.e., a trader:
***knew in advance he/she was either a buyer or a seller;**
***could not resell a purchased unit;**
***and could not switch buyer/seller role depending on price.**
Essentially it's like hamburgers, hotel rooms, haircuts-HHH,…Non-durable goods make up 75% of final private product, (GDP—G).
So, how are markets for durables different?

Case 2. False Belief that Transparency in asset value will prevent price bubbles. (1980s)

We decided to study asset trading in environments with complete information on asset fundamental value.

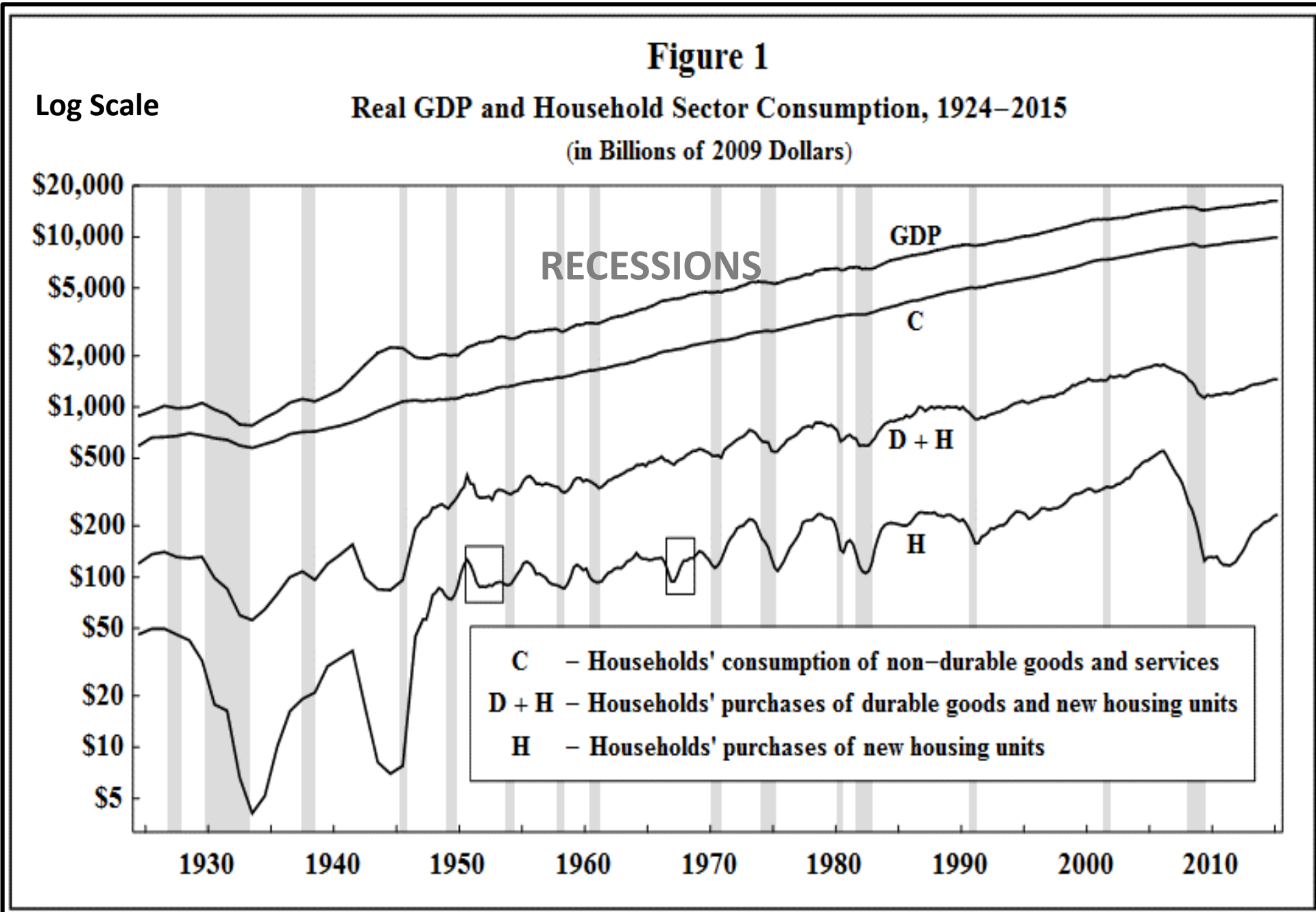
Idea was to create a baseline with no bubbles, and then explore conditions that would yield bubbles.

But we did not know what we did not know: the baseline experiments bubbled!

How do these two kinds of market experiments relate to the economy, and its sources of instability? The learning:

- **Markets tend strongly to be stable, if items can't be re-traded.**
- **With re-trade arises tension between mkt value & consumption/yield value. Re-trade a necessary condition for bubbly deviations of market price from sustainable value.**
- **Explains transport deregulation success, &**
- **Failed finance/mortgage mkt deregulation**

Non-durables C account for GDP stability; ALL INSTABILITY ARISES FROM RE-TRADABLE GOODS



Case 3. False belief that people will not cooperate in single play trust games. (1990s)

To understand why, I return to the Scottish Enlightenment

David Hume (1740) distinguished disinterested from interested commerce.

Disinterested commerce refers to our other-regarding sociability toward others in our close-knit family, extended family, neighbor/friend groupings. Interested commerce concerns our own-regarding market transactions with others.

Adam Smith wrote a book on each of these defining elements of "humanomics":
Social psychology; *The Theory of Moral Sentim*ents (1759) TMS
Economics; *The Wealth of Nations* (1776) WN

Why study Adam Smith?

1. *Sentiments* provides a model of human conduct that seamlessly connects action in social groupings with that in markets. We are not made of two selves—selfish here, unselfish there.

2. *Sentiments* offers propositions that predict action where standard self-interested maximization models failed decisively in the 1990s. These propositions apply naturally to trust (and ultimatum?) games.

3. *Sentiments* offers propositions that suggest and predict action in unique new experiment designs (as in Lakatos; novel tests).

4. *Sentiments* connects human conduct in experimental games to broad socio-economic themes of property, beneficence and justice in stable societies, countering parochial mis-perceptions of experimental economics.

Sentiments is NOT about:

- **Max-U (own outcome), as in traditional neo-classical economics. The process is not one in which: Action--> Outcome--> Utility.**
- **Altruism (Hutcheson's 'benevolent sense')**
- **Social preferences [U (own, other); as in behavioral & experimental economics] Preference is about outcomes; social is about relationships, mutual fellow-feeling.**

Sentiments IS about:

- Human sociality as other-regarding conduct
- The propriety and fitness of rule-following conduct
- Rules that emerge by consent & become conventions
- Accounting for social order in pre-civil society
- Both sympathy & mutual sympathetic "fellow-feeling" (empathy)
- Equilibrium if it exists is in rule space, not outcome space
- "Fair" means fair-play, rules; "unfair" means foul
- Actions are signals conveying intentions in conduct
- And their meaning is read imperfectly from context
- Propriety evolved into property in the civil order.

Smith's Axioms & Principles of Conduct

I. **Fundamental axiom: Self-love/non-satiation is common knowledge; for each more is beneficial, less is hurtful. But in our maturation process, in becoming social, "we humble the arrogance of our self-love to bring it down to what others will go along with." ("go along with" appears 41 times). You cannot look your neighbor in the face and avow that ALL your decisions are driven by self-love. This principle was lost on neo-classical economics**

II. **Human desire (i.e., motivation for conduct) is inseparable from our sociality.**

III. **Desire is expressed as a fundamental asymmetry between gains & losses**

    A. Gain Domain: Desire for praise and praise-worthiness

    B. Loss Domain: Desire to avoid blame and blame-worthiness

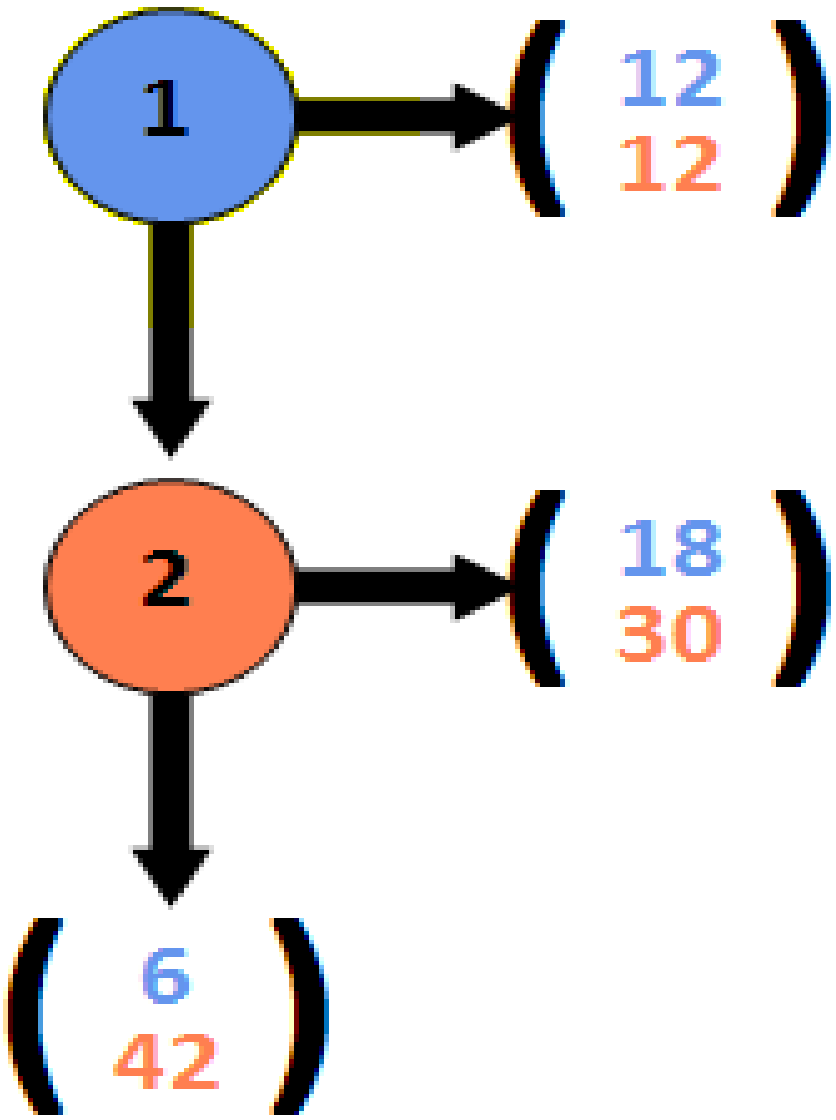
Gain/Loss asymmetry derives from an underlying human joy/sorrow asymmetry.

Smith's Model of Human Conduct:

- **Each knows that all are self-interested; each judges the beneficial or hurtful intent of actions in the shared context of interaction (game).**
- **Rules (as conventions) map these contextual judgements into actions depending on their propriety.**
- **Actions can be read & responded to as signals, and such exchanges are rule-governed; disciplined by propriety; and based on mutual fellow-feeling.**
- **"Equilibrium" is harmony or resonance in rule space; discord motivates rule adjustment. (Experience with homeless man illustrates rule error, discordance, and correction in rule space.)**

Consider the following recent Trust Game between anonymously paired individuals, similar to many such well-known two-person games studied in the 1990s with baffling results at the time.

The Context: Extensive Form Trust game



Traditional Extensive Form Analysis of Trust game:

1. Common knowledge that all Players are strictly self-interested and non-satiated.
2. Only own payoff outcomes matter in choosing action.
3. Apply backward induction to the game tree.
4. Determine each player's choice in reverse sequence of play.
5. If Player 1 passes to Player 2, the latter is motivated to move down.
6. Player 1's best strategy is to move right, the equilibrium of the game.

In *Sentiments:*

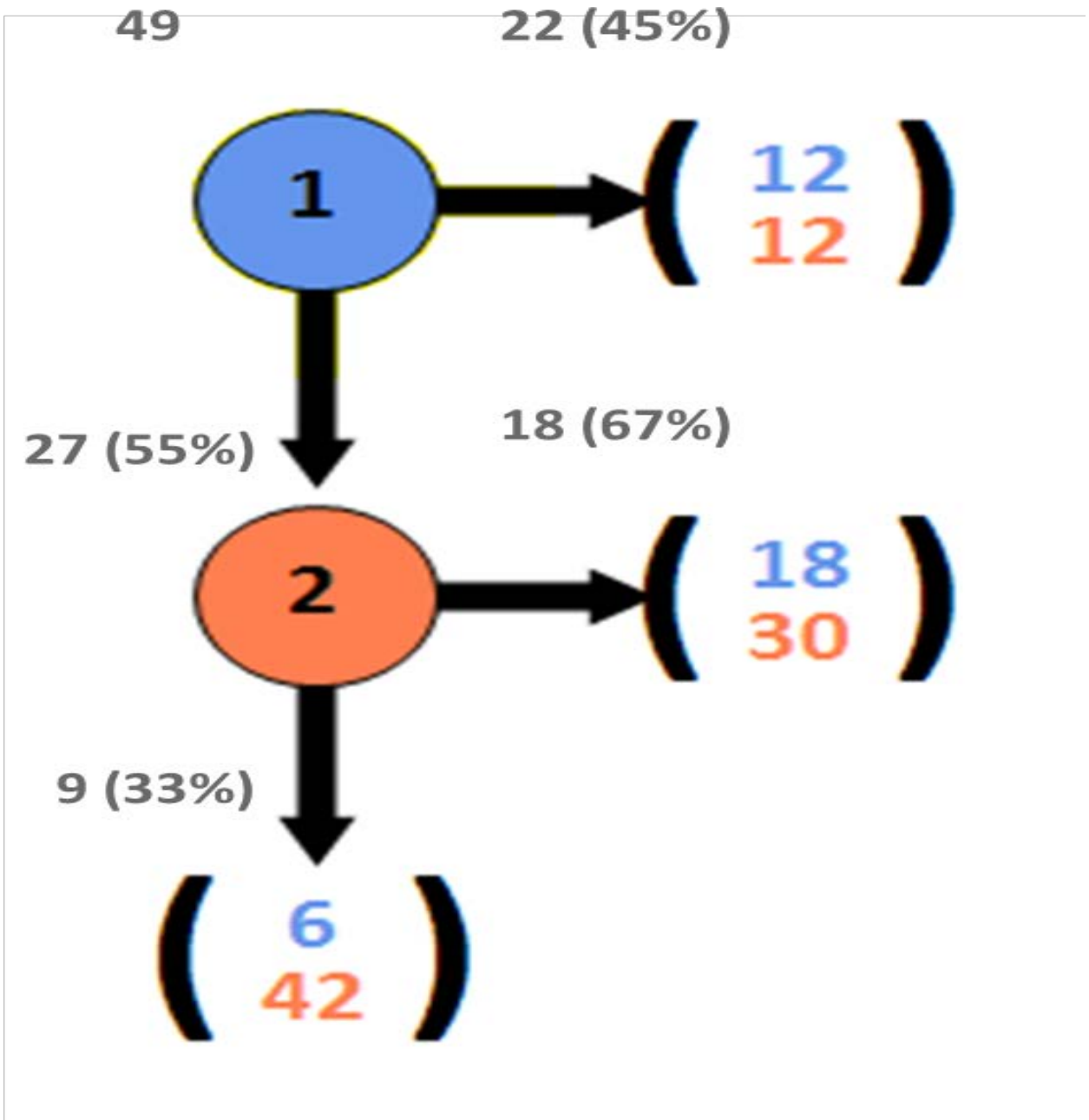
Beneficence is about encouraging/rewarding actions that increase human social well-being. (societal gain)

Justice is about discouraging/punishing actions that hurt and reduce social well-being. (societal loss avoidance)

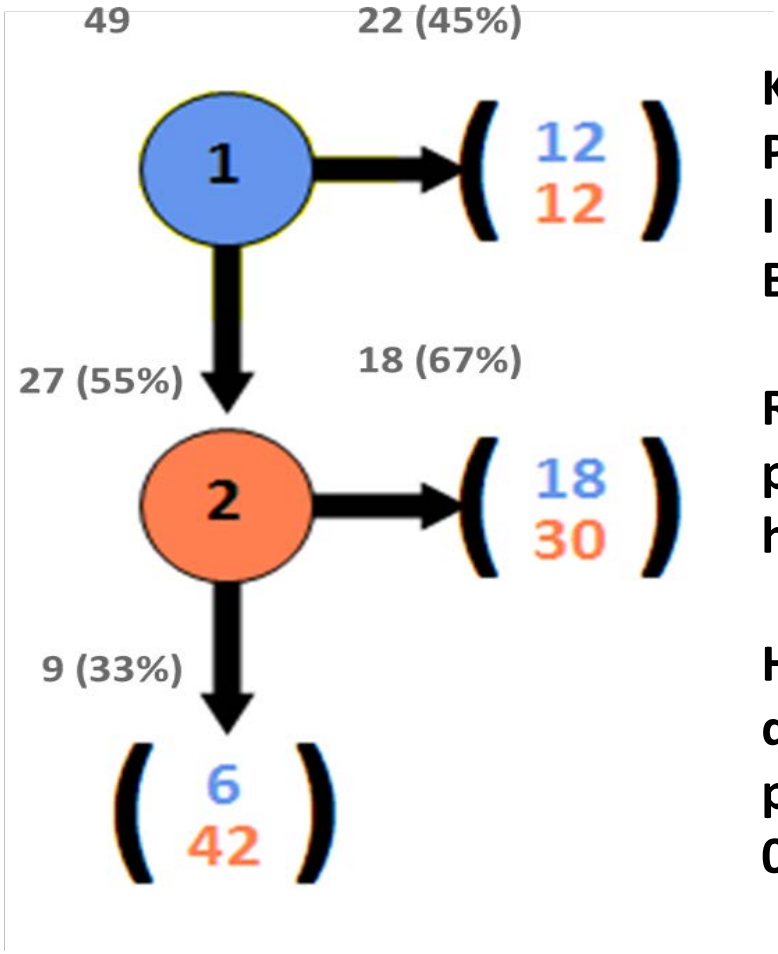
EFG analysis in *Sentiments* Involves: Inferred intentions, imagining other's role, and "self-command."

1. **Common knowledge that all Players are strictly self-interested and non-satiated.**
2. **But action is determined by who is hurt or benefits from an action, and an inference of intent.**
3. **Hurt, benefit and intentions are inferred from opportunity cost of action taken.**
4. **Intentional Beneficence →Gratitude→Impulse to Reward;**
   Intentional Hurt→Resentment→Impulse to Punish;
5. **Apply backward induction to the game tree to determine who is hurt or benefits from an action at each node and to judge intent.**
6. **Each Player's "impartial spectator" imagines herself in the role of the other in judging intent and probable responses.**
7. **Forward play is then a signaling game—a conversation—that conveys intent.**
8. **If Player 1 would cooperate if in the Player 2 role, will Player 2 see it in the same way if given opportunity to act?**
9. **Will Player 2 cooperate, given unambiguous signal of Player 1's beneficial intentions?**

No Punish Trust game



Results are consistent with *Beneficence Proposition 1:* "Actions of a beneficent tendency, which proceed from proper motives, seem alone to require reward; because such alone are the approved objects of gratitude, …" (*TMS,* 1759, p 78)



Knowing the action taken by Player 1, 18 of 27 Player 2s reveal gratitude and self-command. In the population sampled, 2/3 conform to Beneficence Proposition 1.

Random assignment implies that the same proportion of Player 1s would play right if they had been assigned position 2.

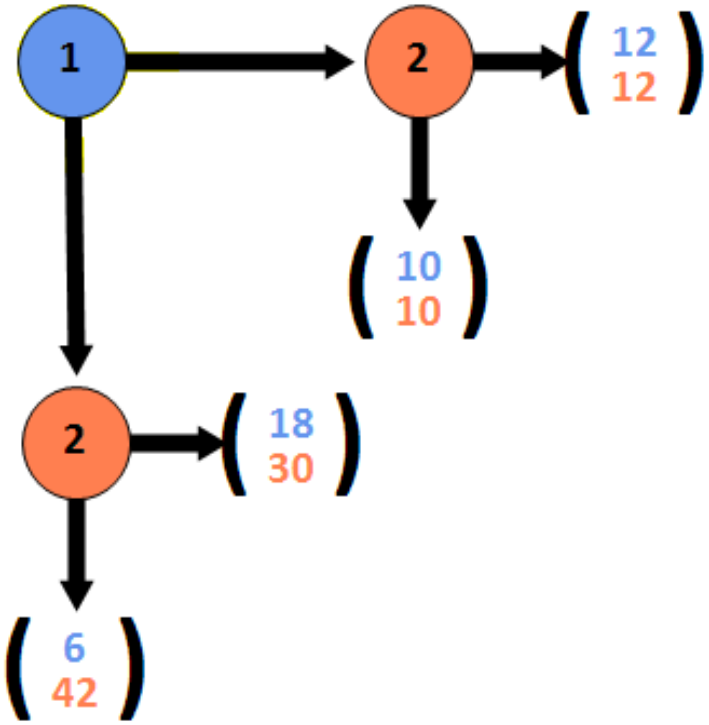
Hence, proportion of Player 1s deterred from down move by uncertainty that Player 2 is a person like them (my "type") = 0.67 – 0.55 – 0.12

Sentiments offers **other conditional predictions**

Beneficence Proposition 2: "Beneficence is always free, it cannot be extorted by force, the mere want of it exposes to no punishment; because the mere want of beneficence tends to do no real positive evil." (p 78)

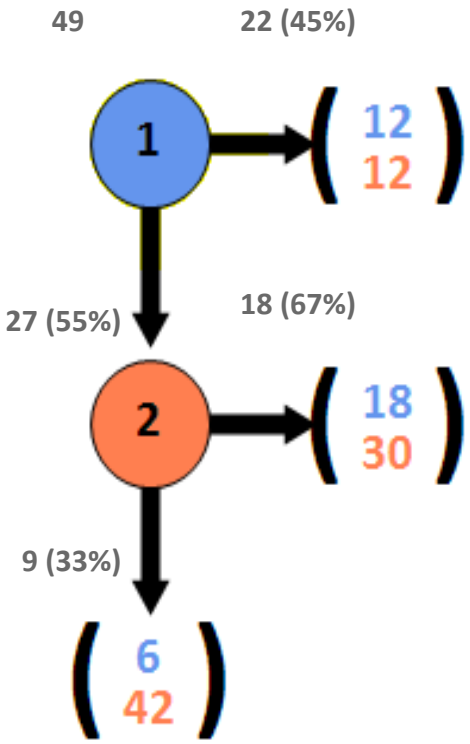
Hence, in trust games we should not expect Player 2s to feel resentment or be willing to incur cost to punish Player 1s for choosing not to be beneficent. That is their respected right.

Trust with Option to Punish Want of Beneficence (PWB) i.e. Failure to Trust

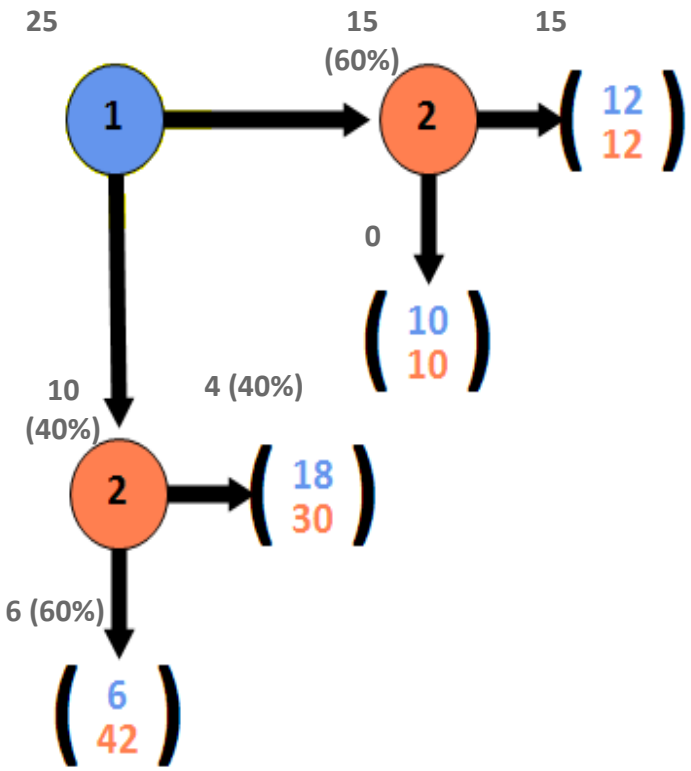


Note: We add another dominated option. In traditional analysis such options are irrelevant; in *Sentiments* they are integral to the analysis: Inference of meaning generally depends upon all options. Adding nodes (options) is like adding words to the "conversation" between the players..

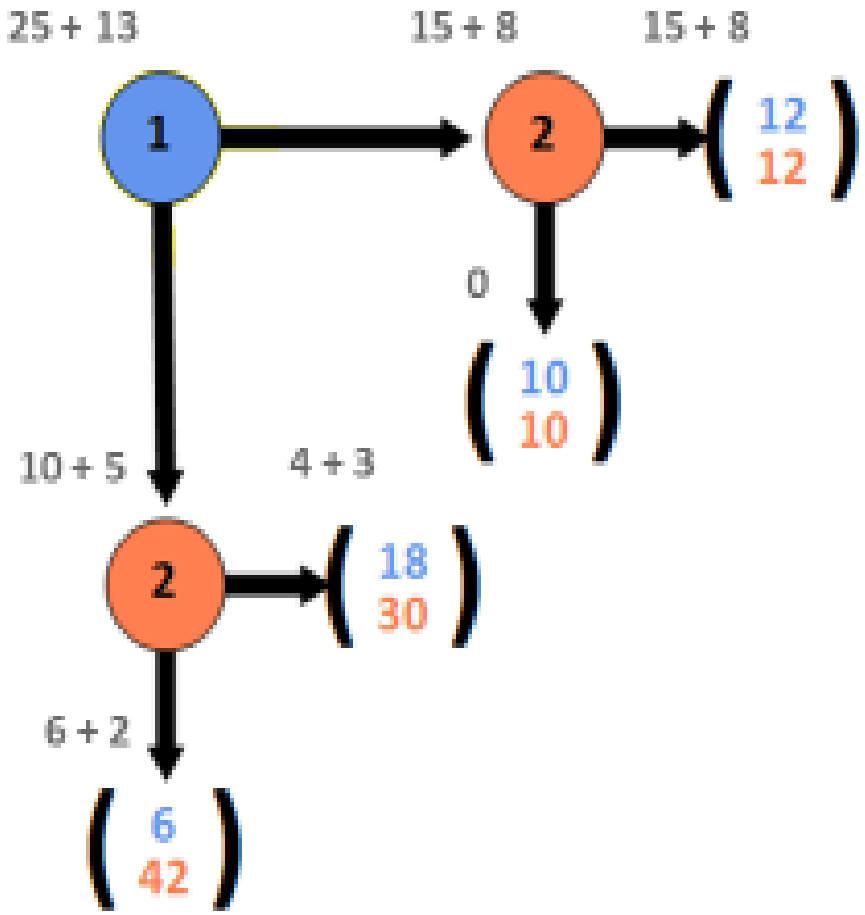
NP Trust



PWB? No, BUT Tst/Tsw reduced! Trust signal is now ambiguous, noisy. 60% Players 2s now choose defection. 15% of Player 1s correctly read Player 2s?



Being surer: More data and the defection pattern continues to hold.



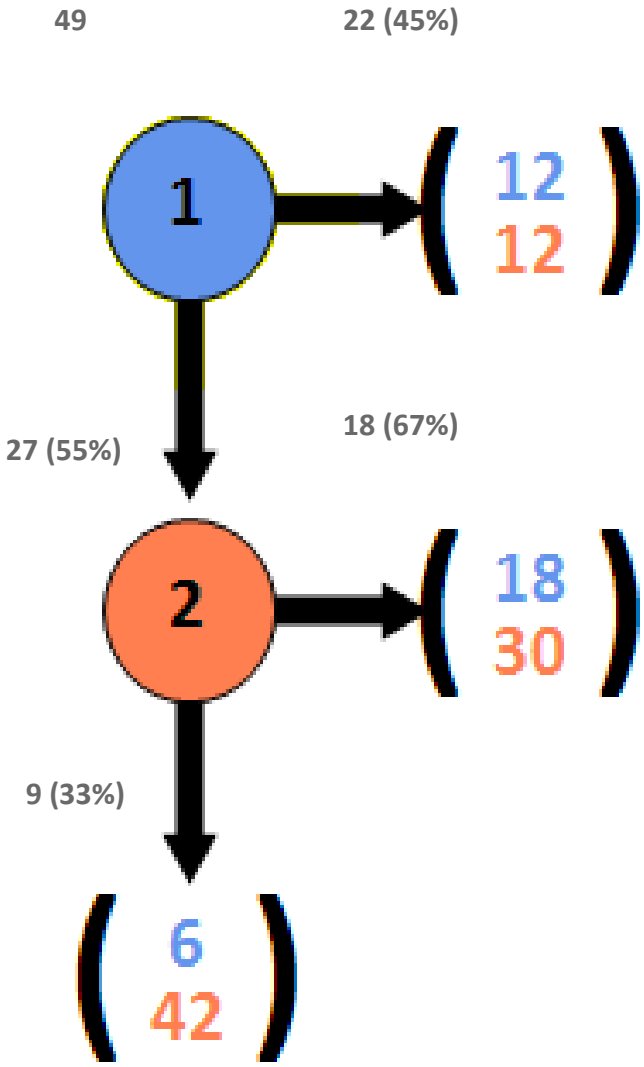
Justice Proposition 1: "Actions of a hurtful tendency, which proceed from improper motives, seem alone to deserve punishment; because such alone are the approved objects of resentment…" (p 78)

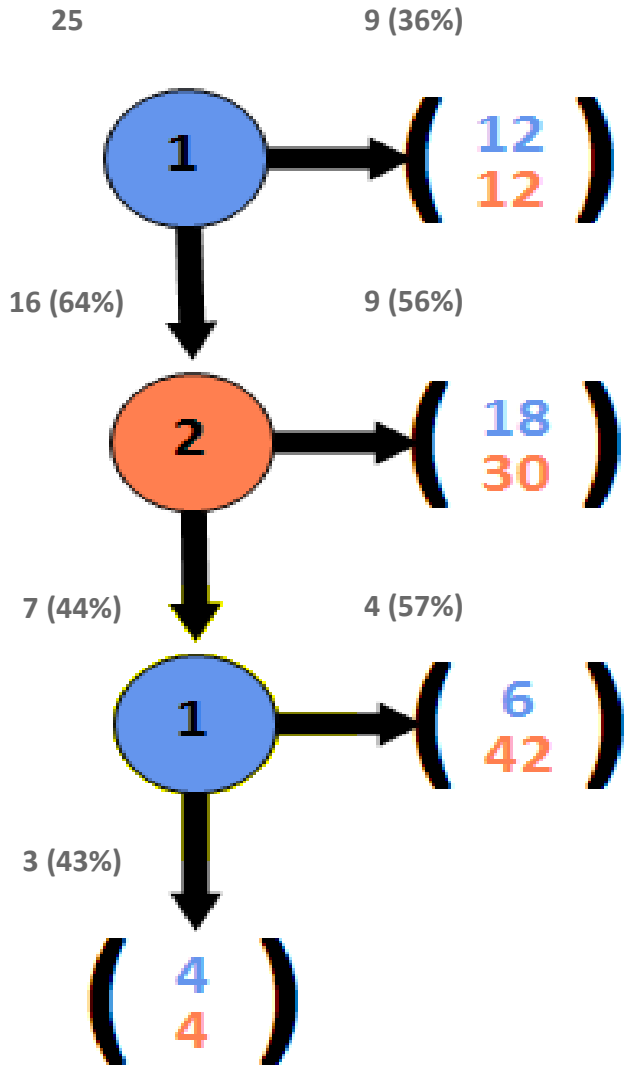
Suppose Player 2 defects on the offer of Player 1 to cooperate. JP 1 predicts that many Player 1s feel resentment, and are willing to incur cost to punish Player 2s.

(Other actions taken under threat of reprisal, such as action in ultimatum games, are subject to resentment and therefore also re-interpretation under Smith's propositions.)

NP (Trust)

Punishment threat reduces cooperation & 43% of 1s punish hurt! Beneficence must be freely offered; it cannot be extorted.





In *Sentiments* Justice Proposition 1 is central to the Origin of Property

Common feelings of resentment toward improperly motivated (intentionally) hurtful actions within close-knit communities is the origin of the civil order of law, and of punishment proportioned to resentment.

"As the greater and more irreparable the evil that is done, the resentment of the sufferer runs naturally the higher…" (TMS, p 83)

***Sentiments* combines this proposition with asymmetry of gains and losses to explain differential penalties applied to loss of property under law in nation states:**

- **“To be deprived of that which we are possessed of, is a greater evil than to be disappointed of what we have only the expectation.**
- ***Breach of property, therefore, theft and robbery, which take from us what we are possessed of, are greater crimes than breach of contract, which only disappoints us of what we expected.***
- **The most sacred laws of justice, therefore, those whose violation seems to call loudest for vengeance and punishment, are the laws which guard the life and person of our neighbour;**
- **next are those which guard his property and possessions;**
- **and last of all come those which guard what are called his personal rights, or what is due to him from the promises of others.” (TMS, p 84; italics added)**

Justice Proposition 2: **"Though the breach of justice…exposes to punishment, the observance of the rules of that virtue seems scarce to deserve any reward."**

Thus, there are no rewards for stopping at a red light or for not disturbing your neighbor. These are your duty under classical rule-of-law liberalism.

As want of beneficence is not subject to punishment, so just action (want of injustice) is not subject to reward.

Under our rule-of-law classical liberal heritage, justice is a residue; it is what is left over after introducing penalties for unjust action. Society does good by discouraging the bad.

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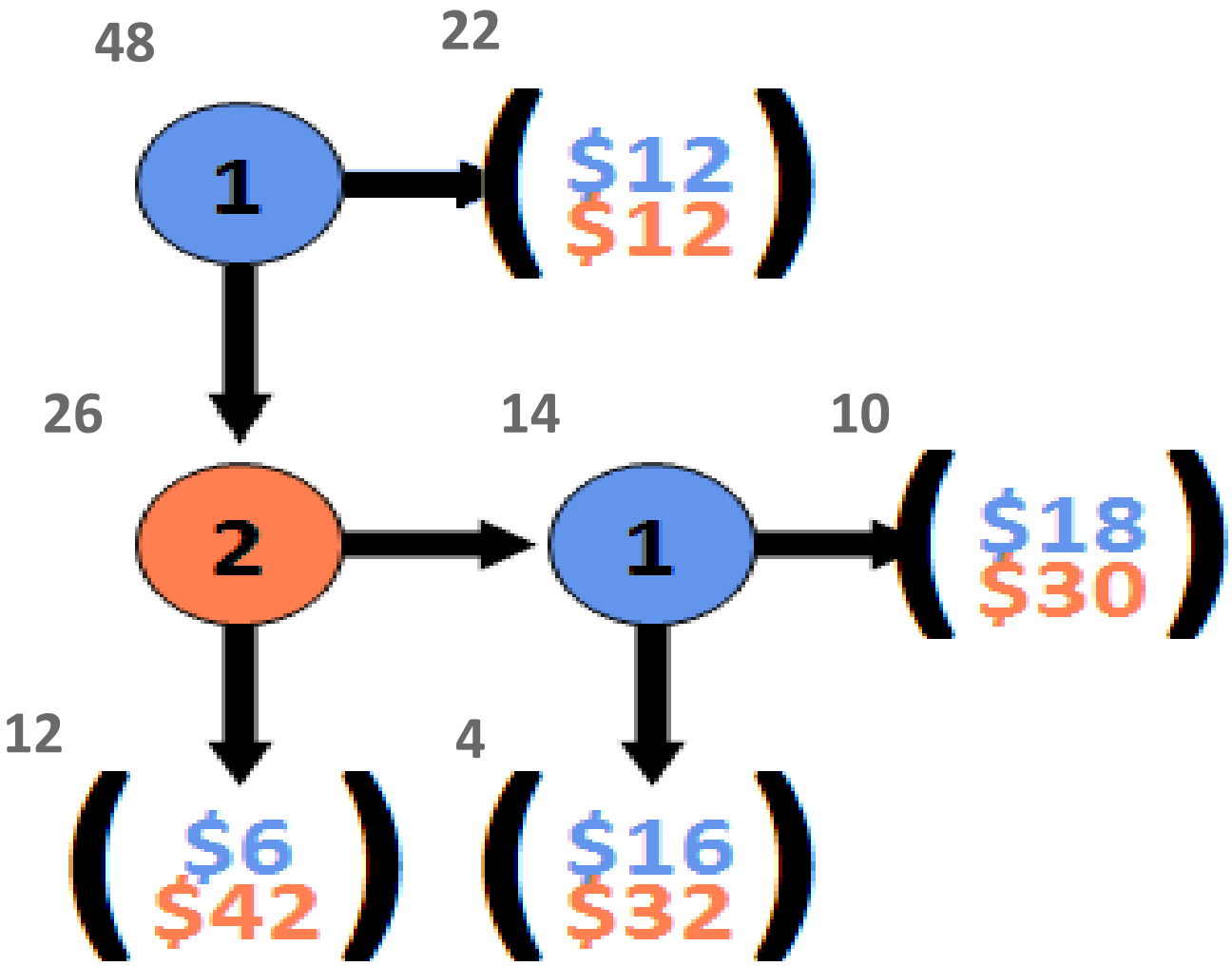
Testing Justice Prop 2: Adam Smith Bats 700+. But more defection!



Sentiments and *Wealth of Nations*

Property is necessary but not sufficient in *Wealth.*

Smith adds what I call his Axiom of Discovery: "..the propensity to truck, barter and exchange…"

Exchange is simply an expression of human sociality—Hume's interested commerce, as contrasted with dis-interested commerce. (Shopping is social & socializing.)

***Sentiments, Wealth* both emphasize process not outcomes. Outcomes may be efficient but that fails to explain why in both our communities and our economies.**

***Wealth* defines a discovery process: Exchange→ Prices→ Facilitate comparisons/calculations (grow more corn less hogs)→ The Discover Specialization process.**

Conclusions

- **Supply & Demand for non-durables with strictly private values converge to efficient equilibrium outcomes. Price discovery is a bottom-up trial-and-error process over time. In the economy non-durables are a similar and comparable rock of stability.**
- **Prices in markets for re-tradable assets show tendencies to bubble relative to fundamental value; the results helped us see how houses, bought with mortgage credit, could contribute repeatedly and routinely to economic instability.**
- **The neo-classical marginal revolution too eagerly abandoned process for equilibrium & lost its rudder.**
- **You learn the most when proving yourself wrong.**
- **Smith provides the big picture; but it badly needs our evidence, whether pro or con.**

THANK YOU

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