The Current State of Experimental Finance – Challenges and Opportunities

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Agenda

- Why experiments in Finance?
- What could we learn from simple markets?
- What have we learned?
- What next? What are „hot“ issues and fields?
- Two current projects

Why more data?

- Of all branches of business and economics, finance probably has the most detailed and up-to-date observational data.
- Consequently, characterized by a very strong empirical tradition.
- Why, then, spend time and money to conduct experiments with artificial financial markets and gather yet more data?

Transactions v. expectations

- Data from the stock exchanges include bids, asks, transaction prices, volume, etc.
- Data from information services (e.g. Bloomberg) on actions and events that may influence markets.
- But neither does or can report on expectations or beliefs.
- Theory of financial markets (and economics of uncertainty), however, is built on expectations.
- Need data on expectations to empirically distinguish among competing theories and develop new models.
- Financial crisis exposed serious flaws in current models and theories! That is an opportunity for us!

Experiments: Relating market actions to beliefs and expectations

- In experimental markets, the researcher knows expectations, and underlying parameters.
- With this knowledge, we know the equilibrium price and other predictions of alternative theories.
- We can therefore conduct powerful tests of theories which are not possible with field data (because little is known about the parameters and expectations that generate the field data).
- Examples to follow.

What can simple experiments tell us about complex markets?

- Experiments are typically conducted in very simple settings.
- Student subjects of typical laboratory experiments have little experience and low stakes.
- By contrast real financial markets are complex, and usually populated by experienced professionals with high stakes.
- What could we possibly learn from simple experiments about “real” markets?

Simplicity is science

- All sciences aim at finding simple (basic) principles that explain or predict a large part (rarely all) of the phenomenon of interest.
- Simple models: we make core- as well as convenience assumptions.
- The power of a theory depends on the robustness of its predictions as the data environments deviate from the assumptions of convenience.

Simple experiments help discover/verify basic principles

- How do we learn to count? Starting with 1+1.
- How do we learn to swim? Starting in shallow water.
- Similarly we learn basic principles from simple experiments.
- Noise generated by countless factors in complex real-world environments makes it difficult to detect the fundamental principles.
- Simple laboratory models help us learn better, before we immerse ourselves in the complexity of the real phenomena.
- If the principle is general, it better be applicable to the simple environments, otherwise it is not general!

What have we learned from experiments?

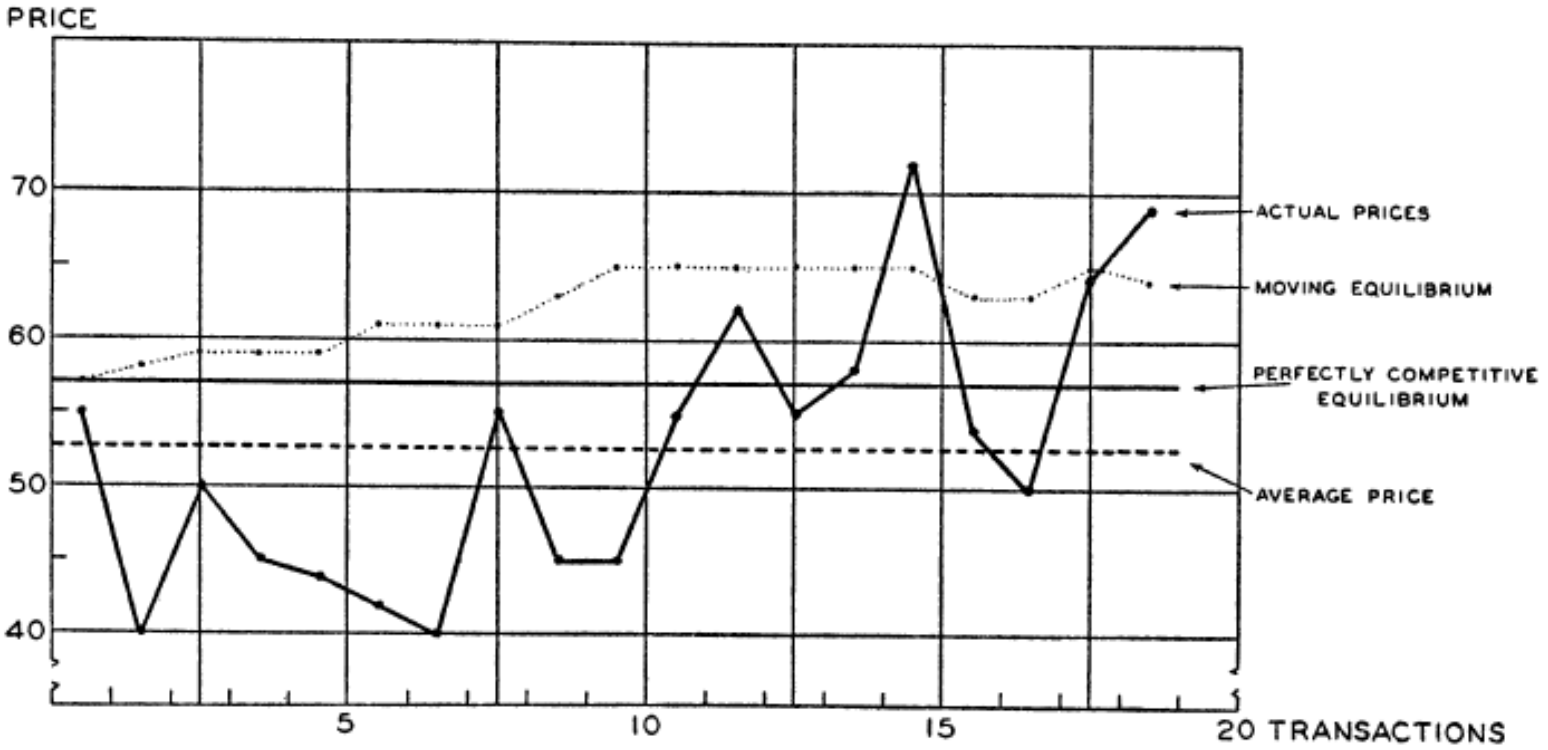
- Within the past three decades, experiments have revealed some important findings by making use of their advantages outlined above.
- These findings were not, and could not have been, reached from the field data alone.
- I will summarize a few key findings:

Key Findings

- Security markets *can* aggregate and disseminate information (efficient markets, Smith 1962).
- But they do not *always* do so (inefficiency, Smith/Suchanek/Williams 1988).
- Information dissemination, when it occurs, is rarely instantaneous or perfect (learning takes time, Plott/Sunder 1982, 1988).
- Markets permit costly research to persist in equilibrium (Sunder 1992, Huber et al. 2007, 2008).
- Price, as well as bids, offers, timing, etc., transmit information (many channels for information flow).
- S-shaped utility function of Prospect Theory (Kahneman/Tversky 1979)

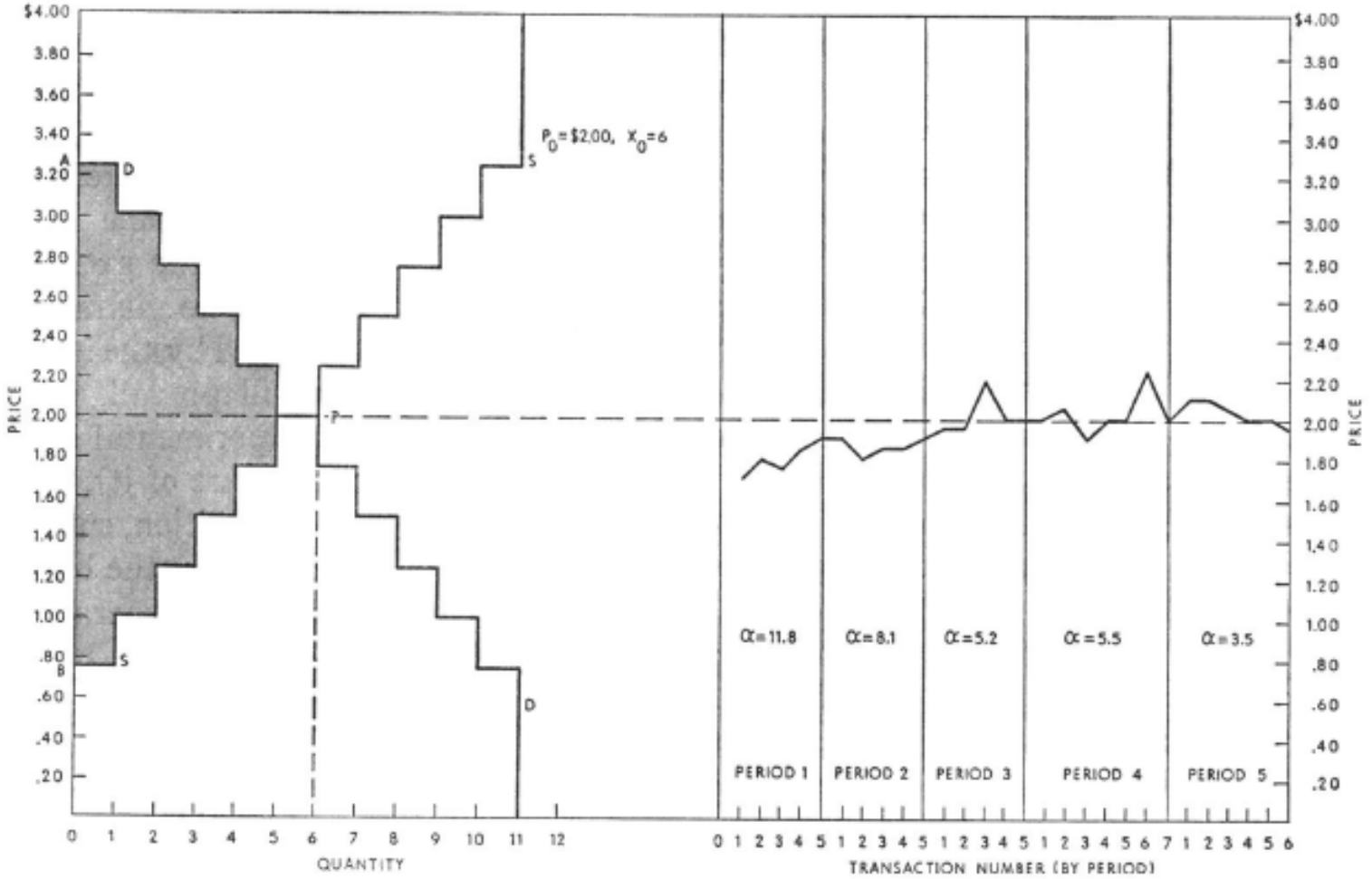
How it all began…

- 1948 Chamberlin
  - Induced supply and demand by giving a reservation price, buyers and sellers meet.
  - Study of market institutions in bilateral trade -> no convergence to competitive equilibrium.



How it all began…

1962: Vernon Smith (who sat in Chamberlin‘s class) repeated the setup, but with <u>oral double auction</u> … dramatically different result with almost 100% efficiency.



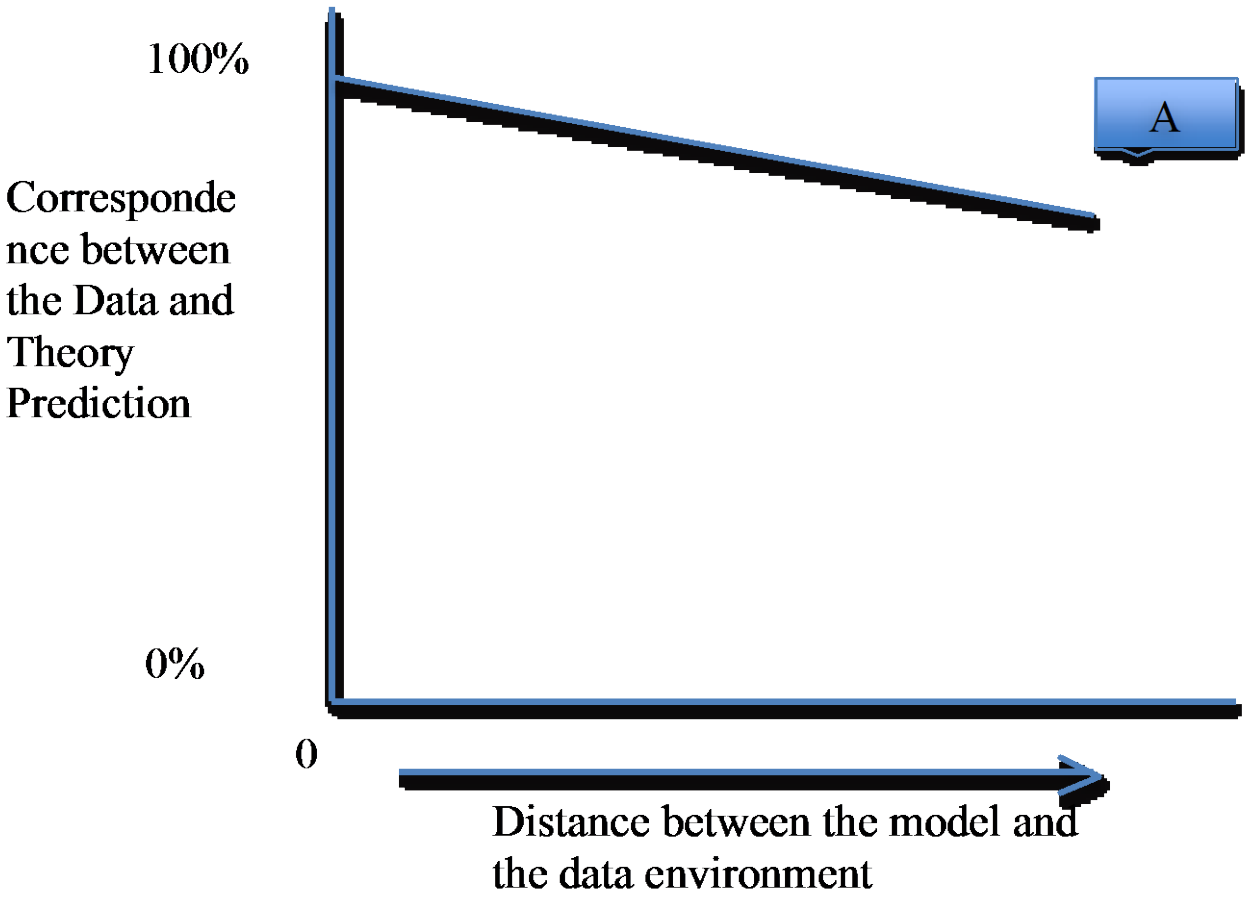
Why was the Smith (1962) experiment so powerful?

- It dropped a whole basketful of assumptions which had been thought to be at the core, but turned out to be mere convenience in the basic supply-demand equilibrium model:
  - No perfect competition
  - Only private information
  - Profit motivated, but hardly optimizers
  - No tatonnement
- Showed the model to be far more robust than even the most ardent supporters had claimed (or even imagined).

Robustness

- „Good“ models, theories and experiments need to be robust to minor changes in their setup / variable composition.
- If minor changes, e.g. different formulation in the instructions of an experiment or different software used, changes the results substantially then the model is not robust.
- We should strive for robust models!
- Crucial role of replication studies (which unfortunately are often considered unglorious).

Robustness of Experiments



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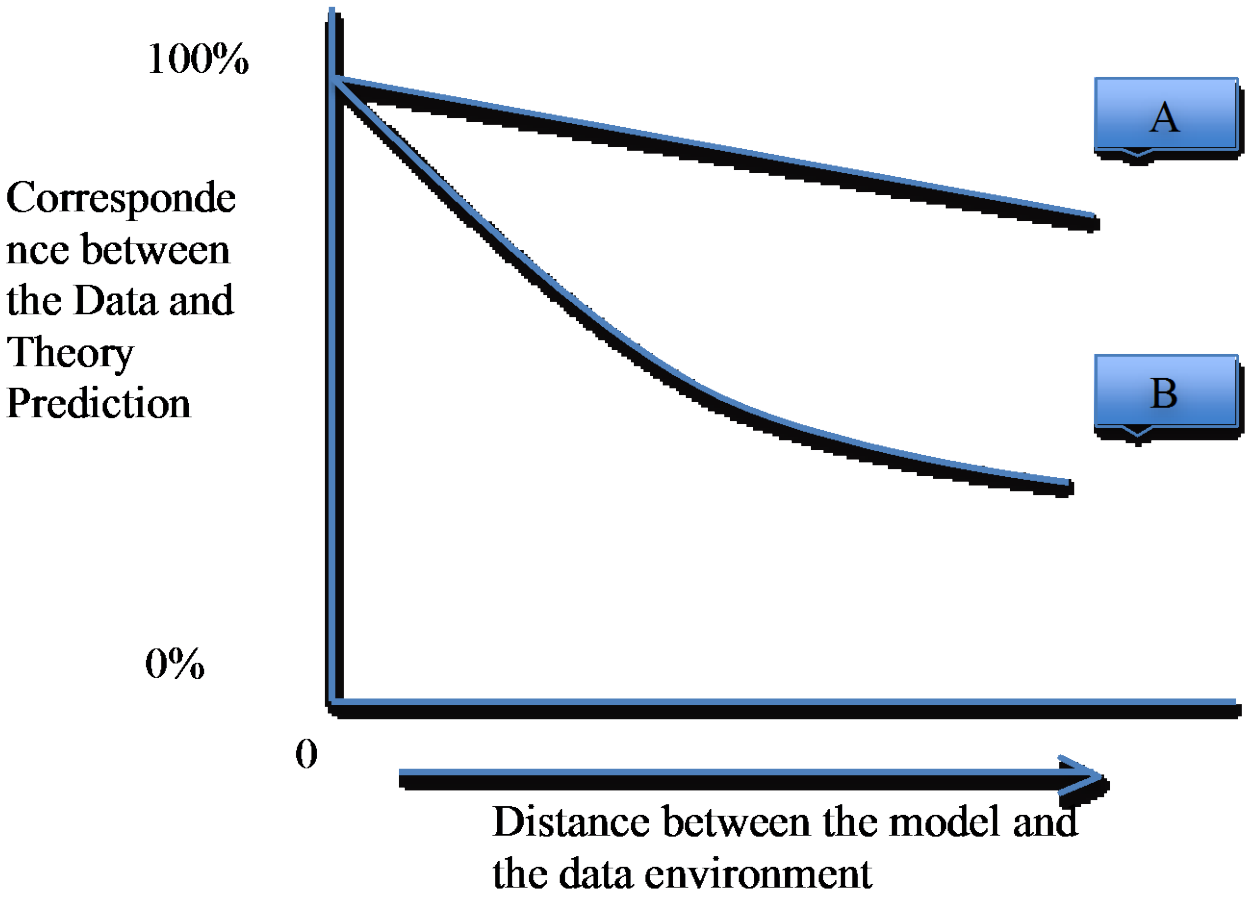

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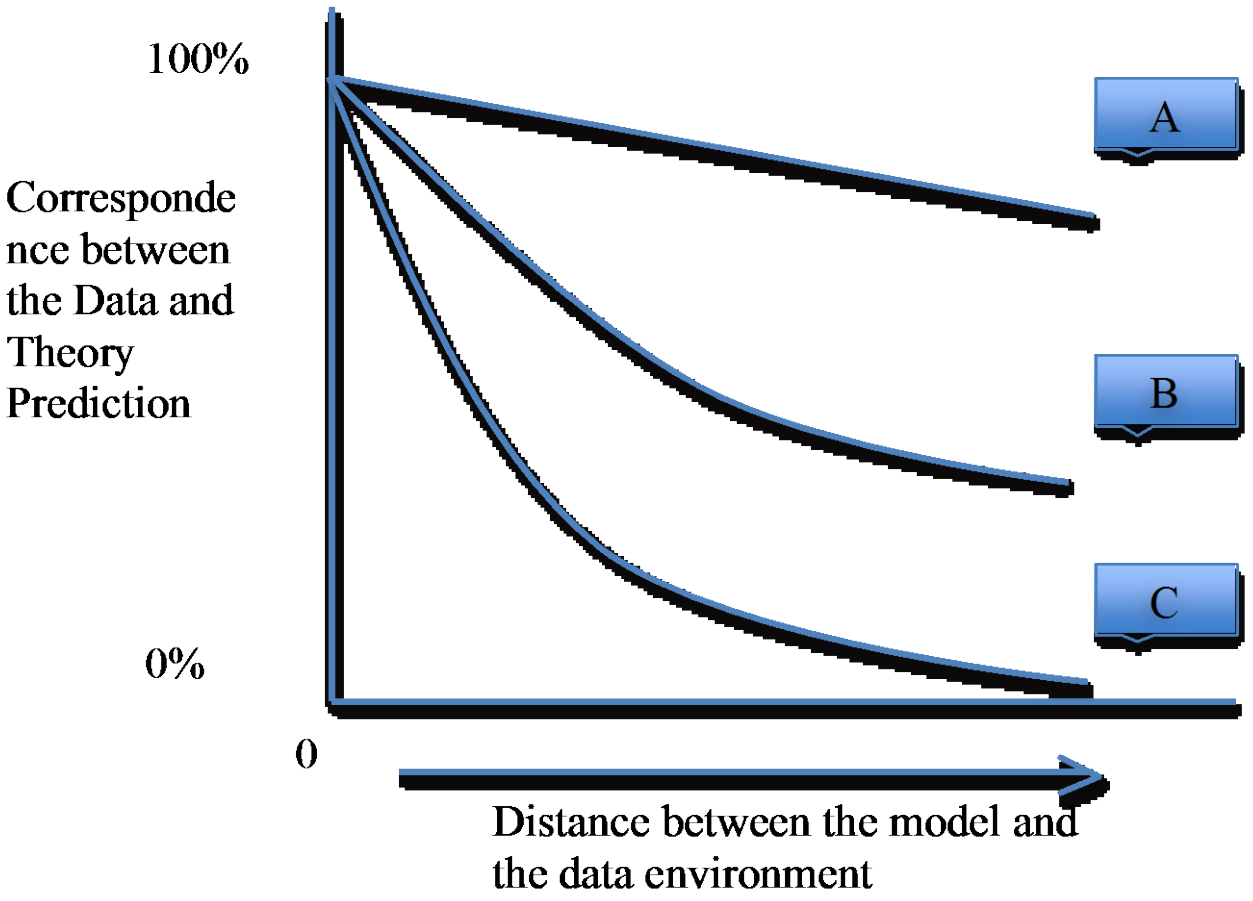


Examples

- Smith (1962) proved robust to all kinds of twists of the supply- and demand-functions, but is susceptible to changing the market form (e.g. Call market vs. DAM).
- „Bubble-markets“ of Smith, Suchanek, and Williams (1988): proved somewhat robust to different dividend payouts, cash endowments and short-selling, but suceptible to changes in instructions and subject experience (Kirchler et al. 2013, AER „Gold mine“)
- Plott and Sunder (1988) model on information aggregation: three possible dividends (X, Y, Z); half of traders know „not X“, other half know „not Y“ – does market „get“ „Z“?

Plott/Sunder 1988: Oral Double Auction Markets

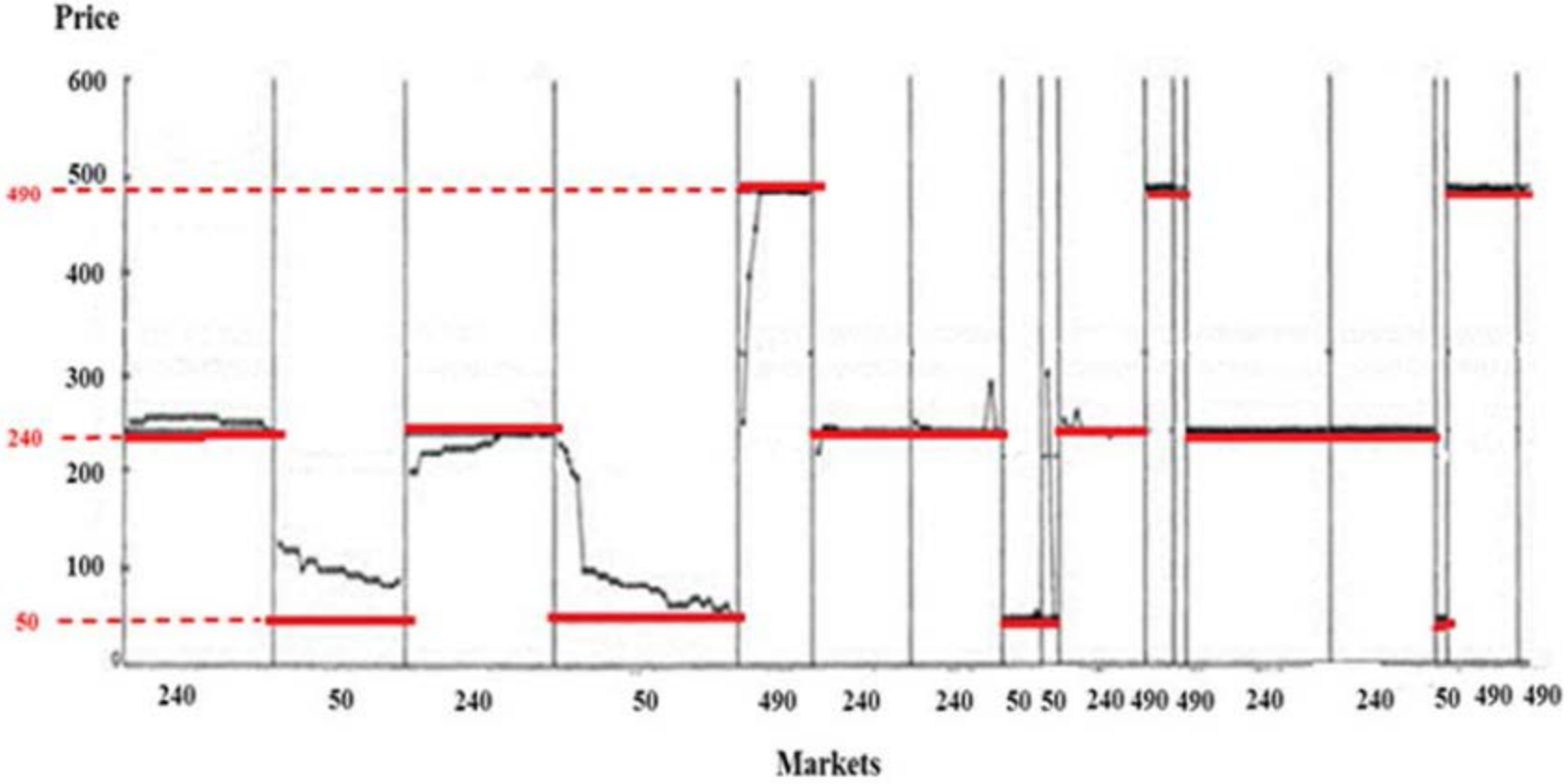
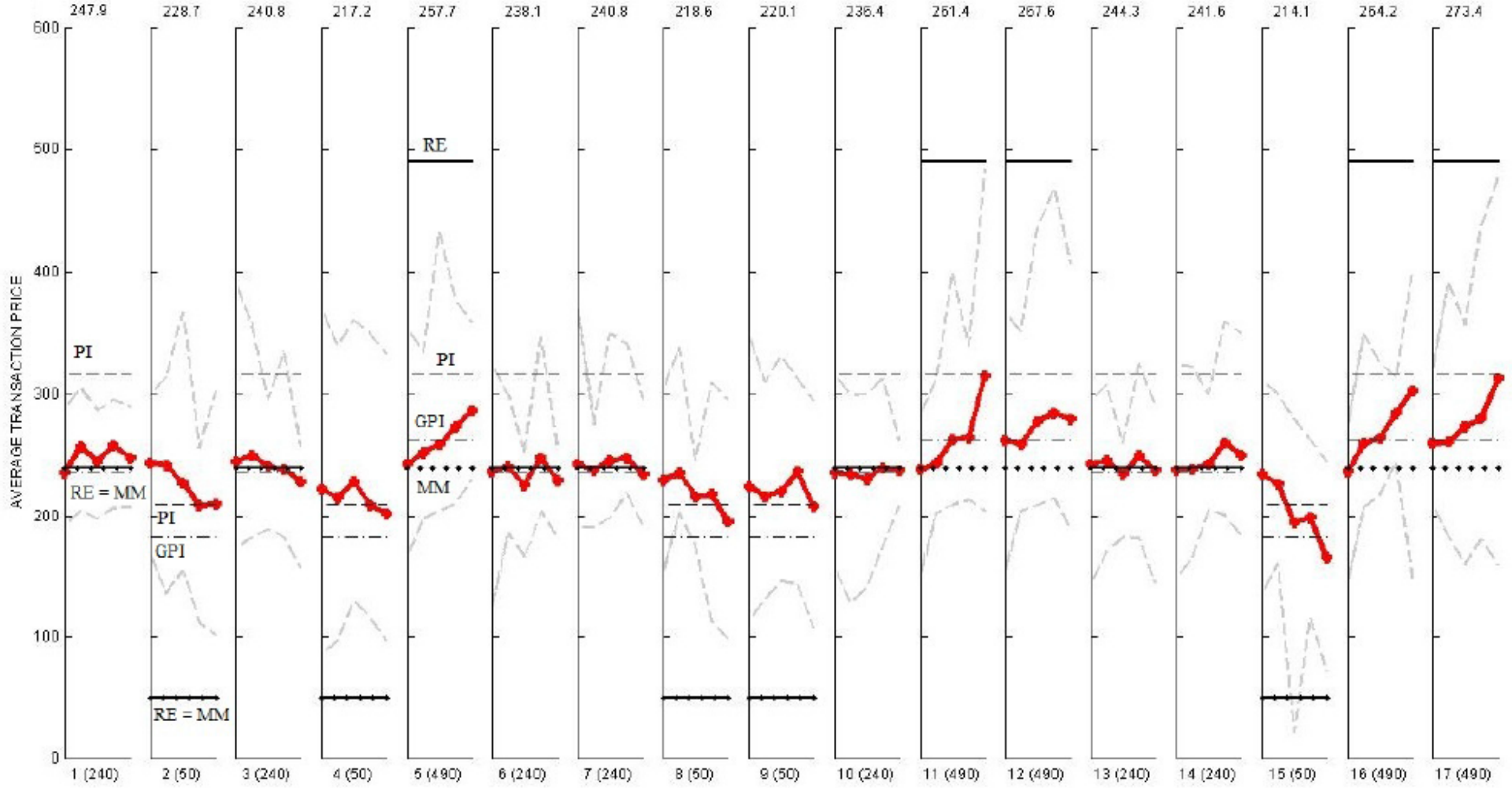


Chart of transaction prices per period (*Market 9*). Each transaction is denoted by a black dot. The value predicted by the rational expectations model (=the true value of the asset) is indicatedby a horizontal red line. The true value of the asset (50, 240 or 490) is also displayed below each of the 17 markets.

Corgnet et al. (2015): exactly the same setting, but with a computerized DAM



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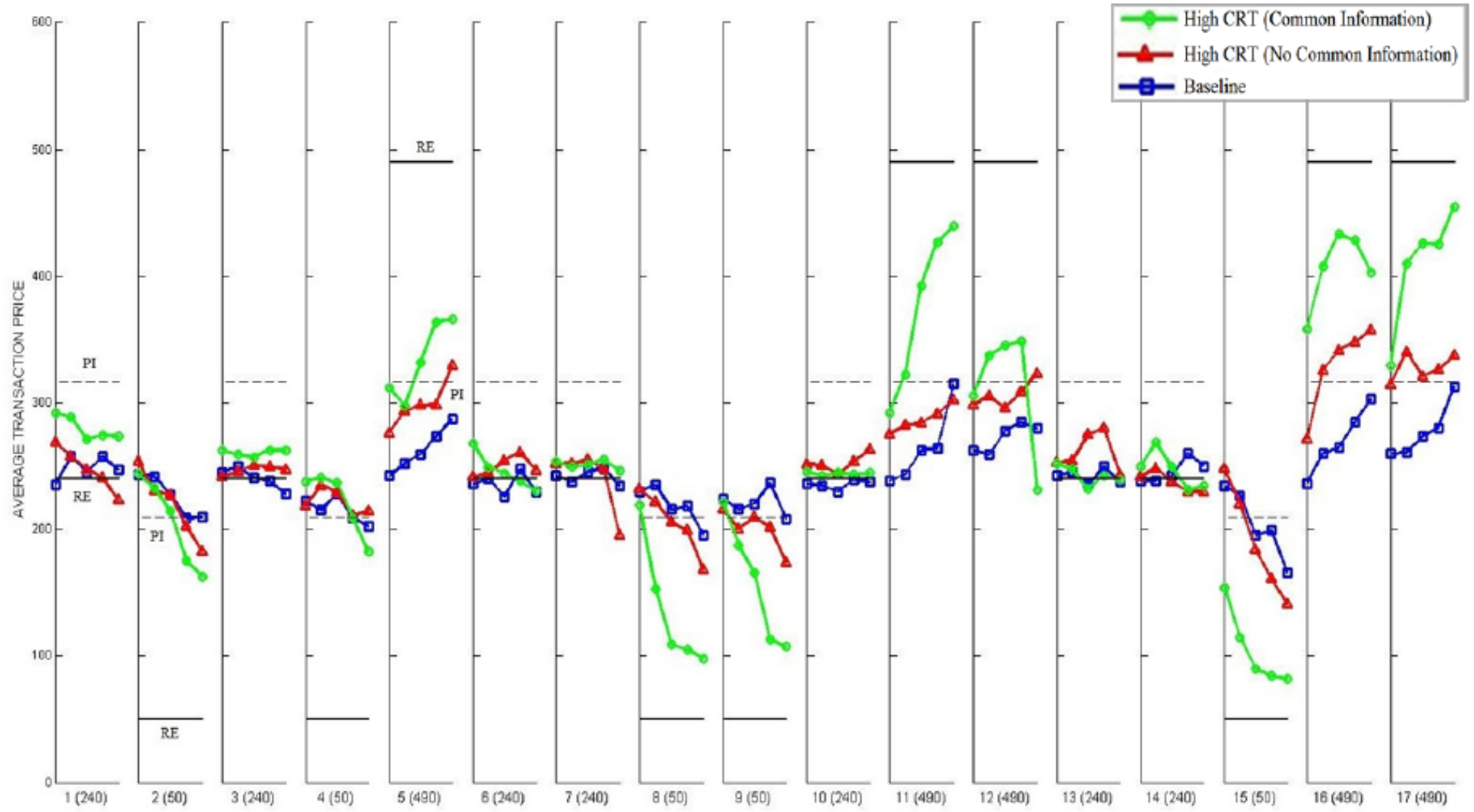
Corgnet et al. (2015): computerized DAM and differently reflective subjects



Experimental Finance has grown up

- Over the past few years the acceptability, recognition, role, and methods of this sub-discipline have evolved.
- Unlike 1970s and 80s, when editors of economics and finance journals routinely rejected experimental papers as a deviant curiosity, a recent issue of AER had more papers using experimental method than any other.
- Although its acceptability in finance lags economics, it is clear that the experimental method has grown beyond its “childhood” phase, is no longer “outside the tent.”

Where next?

- What are likely future fields of expansion/major breakthroughs?
  - New subject pools: financial professionals, children, people in poorer countries, etc.
  - More practical advice to policy makers: wind-tunnel for new regulation and institutions; field experiments
  - Risk: Very different understanding in sciences and real life (dispersion vs. possibility of loss); influence on many macro phenomena (insurance, gambling, credit, equity, medicine, sports, drugs, labor, monetary, real estate)

  - Likely dead road: connection between simulations and experiments (not a single influential paper so far)

Other subject pools: Financial Professionals

- Subjects in most experiments so far were university students in WEIRD (Western, Educated, Industrialized, Rich, Developed) countries.
- Real decision makers or addressee of policies are often very different:
  - Traders on financial markets are 95% male.
  - Decision makers in banks, central banks or governments usually not represented accurately by young students.
  - Addressees of development programs are often poor rural populations e.g. in Africa.

Experiment with financial professionals

- Setting: Investment game: subjects choose which fraction of their wealth (0 to 200%) to invest in a risky asset (paying 3.6% on average with STD of 16%), with the remainder invested at risk-free rate of 1.5%.
- Subjects:
  - 204 **financial professionals** from major financial institutions in several OECD-countries: traders, fund managers, private bankers, etc. 89.7% male; 35 years on average with 11 years in the industry.
  - 432 **students** of the university of Innsbruck as control group; 80% male, 24 years on average.

Treatments and Incentives

- Treatment **BASELINE**: payout according to subject's end wealth. Initial endowment: 90 Euro (30 for students).
- Treatment **RANKING**: identical to **BASELINE** BUT a **non-incentivized and anonymous ranking** is displayed after each period (in a group of 6).
- Treatment **TOURNAMENT** (serves as robustness check): identical to **RANKING** BUT payout is according to anonymous ranking. Rank 1: 50% of the cake, Rank 2: 33.3%, Rank 3: 16.7%, Ranks 4-6: zero.

Replicability in Experimental Sciences

- The deepest trust in scientific knowledge comes from the ability to directly and independently replicate empirical findings, by using the same methods to create new data and getting the same results as others have.
- As a team spanning three continents (Caltech, Innsbruck, Stockholm, Singapore) we conducted the first large-scale systematic replication effort in Exp.Econ. recently and replicated 18 studies recently published in AER and QJE. Total number of subjects was >5000.

Outlook

- New/other subject pools, e.g. financial professionals and children as a main field of expansion.
- Experiments will likely grow in importance as a „wind tunnel“ for new regulation.
- More replications to ensure robustness of results.

- Be brave with new ideas – there is plenty worth exploring out there!
- Be smart and build a portfolio of papers – some brave and new, some less ambitious but ensuring publication in a decent journal.

Links:

-Experimental Finance Conference 2016: Mannheim, Germany June 8-10.
http://www.experimentalfinance.org/conferences/ef2016-university-of-mannheim

- Society for Experimental Finance: http://www.experimentalfinance.org/home

- Journal of Behavioral and Experimental Finance:
http://www.journals.elsevier.com/journal-of-behavioral-and-experimental-finance/

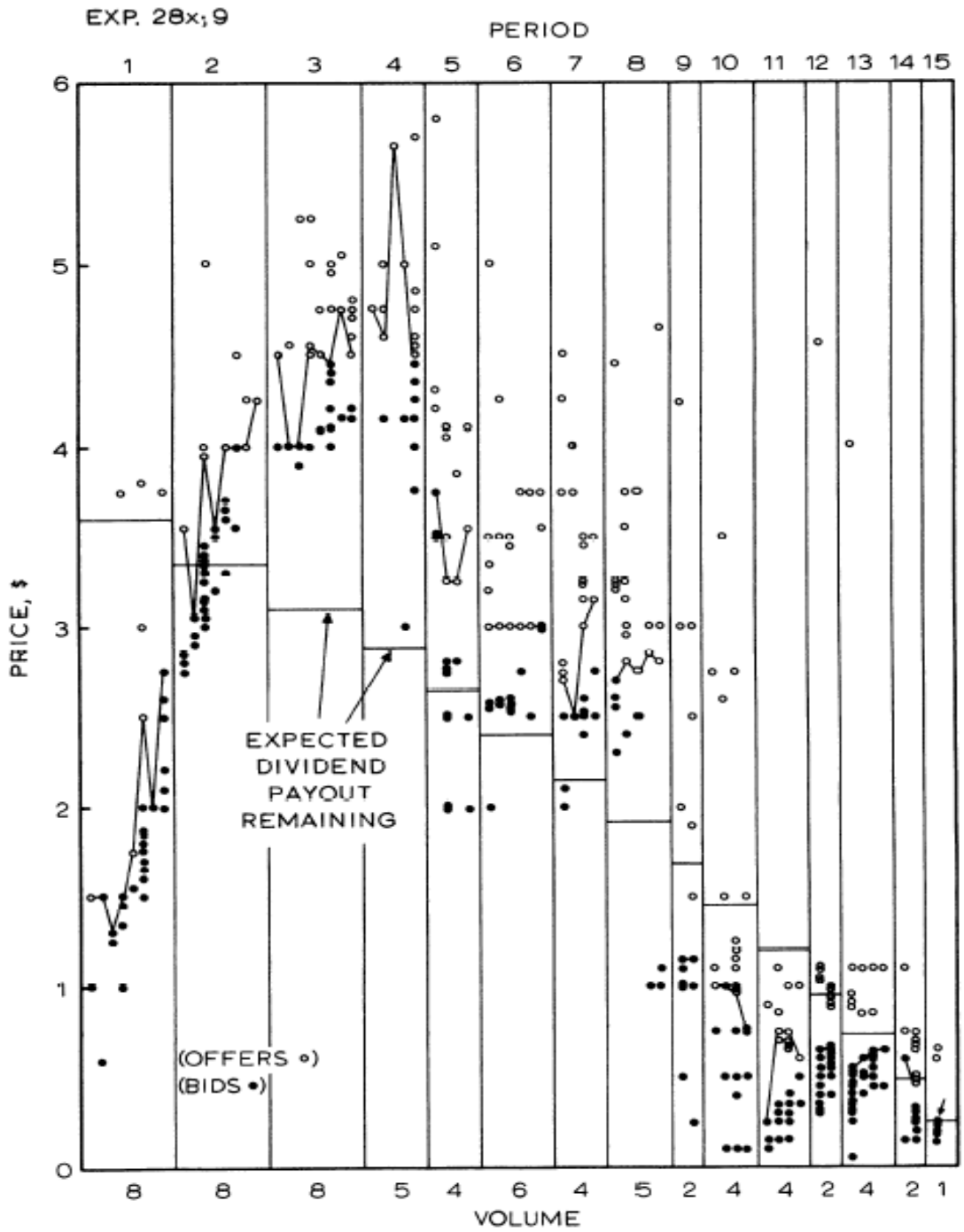

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FIGURE 9