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2229-3

School and Workshop on Market Microstructure: Design, Efficiency and Statistical Regularities

21 - 25 March 2011

Market Mechanisms in Real Markets: Why did markets disappear from Economic Analysis?

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School and Workshop on Market Mechanism Design. ICTP Trieste March 2011

The Absence of Markets

- "It is a peculiar fact that the literature on economics…contains so little discussion of the central institution that underlies neoclassical economics—the market." (North, 1977, p.710)
- "Although economists claim to study the market, in modern economic theory the market itself has even a more shadowy role than the firm" (Coase, 1988, p.7).
- Arrow and Hahn's *General Competitive Analysis* asserts in passing that it takes the "existence of markets…for granted" (1971, p.348).

The Nature of the Market

- The market is more properly treated as a set of rules and conventions than as a collective actor: a social agent. Scott, Institutions and Organizations 1995

Did Theorists think about real markets?

- “Even in the few instances when key thinkers in economics felt they should discuss the actual sequence of bids and asks in their models of trade – say, for instance, Walras with his *tâtonnement* and his *bons*, or Edgeworth with his recontracting process – what jumps out at the economic historian is the extent to which the sequence of activities posited therein had little or no relationship to the operation of any actual contemporary market”. Mirowski (2007)

Theorists and Markets

- Even the pioneers of modern economic theory were not interested in market institutions per se.
- Walras was interested in price adjustment mechanisms and makes allusions to La Bourse but was not interested in the functioning of the real institutions. (Walker)
- Even Marshall does not spend time on markets. His discussion of the corn market is hypothetical.
- There is a long tradition of interest in the firm as an institution but not in actual markets nor in how individuals learn to behave in markets and how institutions adapt.

A Puzzle for Many Goods

We observe different market institutions in different places

What is the explanation for this?

1. the nature of the product (McMillan associates auctions with perishable goods)
2. heterogeneous agents
3. important differences between items.

The puzzle remains :We observe different institutions for the same product, fish, auctions in Iceland, Marseille vs. Sete and Ancona

The notion of market equilibrium

- « An organism that is in equilibrium is dead » Stuart Kauffman
- Our notion is a static one from classical mechanics.
- Existence is proved under very general conditions but what does it mean?
- How realistic is it as a description of empirical facts?

Stability of Price Adjustment

- Even if we like the equilibrium notion, we cannot guarantee that a market or economy will ever get there.
- Change the adjustment process
- The problem of information: The road from Walras to Smale to Saari and Simon.
- How are we going to get out of this?
- The « representative individual »?

Market Adjustment

- Say, James Mill, and David Ricardo, all argue that markets will automatically adjust towards equilibrium
- Their explanations differ but for example Ricardo assumes full employment of resources and therefore if there is an overproduction of a good there must be an underproduction of another and the relative prices of the two will adjust accordingly.

- D. Ricardo, The Principles of Political Economy and Taxation pp.19 2-3
- James Mill. Elements pp 228-229

"THE PROBLEM OF A RATIONAL ECONOMIC ORDER IS DETERMINED PRECISELY BY THE FACT THAT THE KNOWLEDGE OF THE CIRCUMSTANCES OF WHICH WE MAKE USE NEVER EXISTS IN CONCENTRATED OR INTEGRATED FORM, BUT SOLELY AS THE DISPERSED BITS OF INCOMPLETE AND FREQUENTLY CONTRADICTORY KNOWLEDGE WHICH ALL THE SEPARATE INDIVIDUALS POSSESS.

THE PROBLEM IS THUS IN NO WAY SOLVED IF ONE CAN SHOW THAT ALL OF THE FACTS, IF THEY WERE KNOWN IN A SINGLE MIND, (AS WE HYPOTHETICALLY ASSUME THEM TO BE GIVEN TO THE OBSERVING ECONOMIST), WOULD UNIQUELY DETERMINE THE SOLUTION; INSTEAD WE MUST SHOW HOW A SOLUTION IS PRODUCED BY THE INTERACTIONS OF PEOPLE EACH OF WHOM POSSESSES ONLY PARTIAL KNOWLEDGE".

FRIEDRICH VON HAYEK, "THE USE OF KNOWLEDGE IN SOCIETY"

Networks and Markets

- *"Applications of economic theory to market or group behaviour require assumptions about the mode of interaction among agents as well as about individual behaviour"* *Lucas* (1988).
- Loyalty and the fish market.
- Graddy and Weisbuch et al.

The Nature of Markets

- « Markets are socially constructed institutions in which the behavior of traders is suspended in a web of customs, norms, and structures of control...Traders.negotiate the perpetual tension between short-term self-interest and long-term self-restraint that marks their respective communities, » *M Aboulafia (1997)*

- « Markets are not self-operating, objective mechanical objects. They are, rather, a complex set of constraints, rules, rights, regulations, and laws, guiding human participants in making their multiple, various trades, purchases, and exchanges. The motivating force that generates benign market outcomes is the willingness of all to obey the guidelines and deal openly—transparently—with each other. Invisible to the naked eye are the common social bonds of trust among all, strangers and acquaintances alike. The bonds of trust are what create and sustain truly efficient, effective markets. » *J Kuhn* (1995)

The Nature of Markets 2

- In another context Alan Greenspan, Chairman, at the time, of the Federal Reserve, has remarked that,
- « It is hard to overstate the importance of reputation in a market economy. To be sure, a market economy requires a structure of formal rules--a law of contracts, bankruptcy statutes, a code of shareholder rights--to name but a few. But rules cannot substitute for character. In virtually all transactions, whether with customers or with colleagues, we rely on the word of those with whom we do business. If we could not do so, goods and services could not be exchanged efficiently. Even when followed to the letter, rules guide only a small number of the day-to-day decisions required of corporate management. The rest are governed by whatever personal code of values corporate managers bring to the table ». *Greenspan (2003)*

Two different theoretical views of how markets work

- In the first through some given mechanism, agents acting in isolation in response to market signals, optimise and their decisions are coordinated by some central figure such as the auctioneer.
- In the second, agents, using simple rules, learn to coordinate and the result may or may not be efficient.

Cournot’s view of markets

- « economists understand by the term *market* not any particular market place in which things are bought and sold but the whole of any region in which buyers and sellers are in such free intercourse with each other that the prices of the same goods tend to equality easily and quickly »
- A. Cournot, « Recherches sur les Principes Mathématiques de la Théorie des Richesses », Chapter lV

A more recent view

Markets, to work as they should, need institutions. Defining the rules of the game, institutions consist of the constraints, formal and informal, on economic and political actors (North, 1991). Market institutions serve to limit transaction costs: the time and money spent locating trading partners, comparing their prices, evaluating the quality of the goods for sale, negotiating agreements, monitoring performance and settling disputes (McMillan, 2002).

The notion that institutions matter is as old as the study of economics. For markets to create gains from trade, as Adam Smith recognised, the state must define property rights and enforce contracts.

That institutions matter is also one of the chief insights from modern economics.

McMillan (2007)

Two views of what is important in Market Theory

- Cournot emphasises the adjustment of a market to equilibrium. McMillan emphasises the capacity of markets to transmit information and talks about the importance of institutions.
- These are aspects of themes of interest to economists, equilibrium from Pareto to Arrow and Debreu, information through Hayek and Hurwicz
- Yet the GE market model came to be concerned with the existence problem and informational efficiency at equilibrium. It has specifically NOT been interested in institutions.

The three « merits » of the GE market model

- The rationality of the individuals
- A well-defined notion of equilibrium
- The informational efficiency of the allocation mechanism

Rationality and “Sound Micro-foundations”

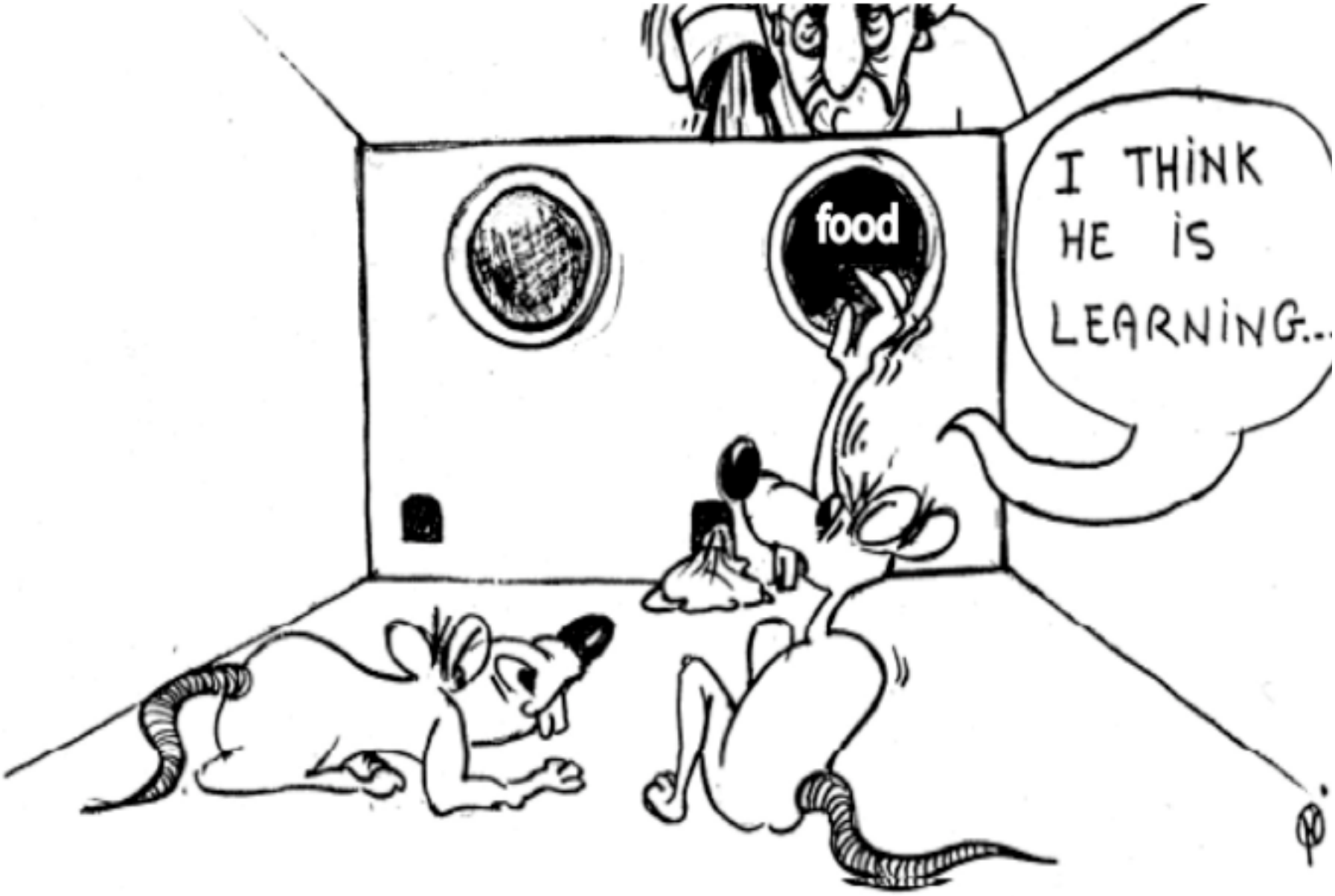
- By this we mean that we have a model based on the rational optimising behaviour of the individuals in the market or economy.This has been widely criticised from Simon onwards.
- In standard market models and in particular in macro models we characterise aggregate behaviour as resulting from such an individual model.
- Yet much structure is lost under aggregation so this is not legitimate theory.

Rationality

- Why are we so attached to our rational individuals?
- Mathematical convenience or economic plausibility?
- The assumptions are not testable they come from introspection. (Pareto, Koopmans, Hicks…..)
- They do not allow for development of preferences over time.

Another Way Out: Learning

- Lucas: Agents do not optimise they just use those rules which have done well in the past.
- The basic problems with learning.
- Which is learning in economics, the learner or the environment? Particularly when the environment is a market composed of other agents.


food
I THINK HE IS LEARNING...

The notion of market equilibrium

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- Our notion is a static one from classical mechanics.
- Existence is proved under very general conditions but what does it mean?
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The Aggregation Problem

We insist on a simple link between individual and aggregate behaviour

Individual and Aggregate Behaviour

- Even in the most traditional model, rejection of some conclusion about individual behaviour at the aggregate level may not be a rejection at the individual level.
- Quote from Larry Summers

The other side of the coin: Aggregation may add structure

- It may well be the case that the aggregate is better behaved than the individuals.
- Some property that may hold at the aggregate level may not hold at the individual level.
- Testing on aggregate data may induce us to validate an erroneous individual model
- Gode and Sunder's "zero intelligence" traders

Individual and Collective Rationality

- In the sort of world in which individuals interact directly, aggregate outcomes may be more, or less, “rational” than individual behaviour.
- The result at the aggregate, or market, level may be consistent with standard models
- However this may not reflect the standard maximising behaviour of the individuals.

Markets and the Division of Labour

- Adam Smith argued that the extent of markets and the benefits from the division of labour were intimately related.

- « The individual reference looks to the occupation and will of each person. The lyre player is to act like a lyre player, the carpenter as a carpenter, the philosopher as a philosopher, the orator as an orator »

- Epictectus *Discourses 3.23.4-5*.

- The profession, or specialised activity, one undertakes conditions one's tastes, and one's place, in society. Thus this voluntary diversification is, to some extent, self perpetuating.

Brief Reminder: Our Basic Aims as Economists

- We wish to explain economic phenomena
- We would like to construct models based on reasonable assumptions that lead to testable conclusions
- When confronted with empirical data it should be possible to reject the model

Theoretical Markets

- Standard market models provide us with few, if any, refutable propositions.
- In stripping away all but the assumptions on the individuals we have thrown away explanations of economic phenomena as the result of interaction and the way that interaction is organised. Markets and their institutions have been left to one side.
- Our assumptions on individuals do not bear close examination. They are what we want them to be and not what we observe them to be.

The Nature of Markets

Some comments.

History, sociology and anthropology

- Each of these disciplines has been involved in the analysis of markets and their evolution over time.
- There are literally thousands of careful studies of particular markets as well as descriptions of how markets have evolved over time.

Markets: An ancient tradition

« Ce très vieux type d'échange se pratiquait déjà à Pompei, à Ostie ou a Timgad la Romaine, et des siècles, des millénaires plus tôt: la Grèce ancienne a eu ses marchés; des marchés existent dans la Chine classique comme dans l'Egypte pharaonique, dans la Babylonie où l'échange était si précoce…En Ethiopie, les marchés par leurs origines se perdent dans le temps »

Ferdinand Braudel, « Les Jeux de l'Echange »

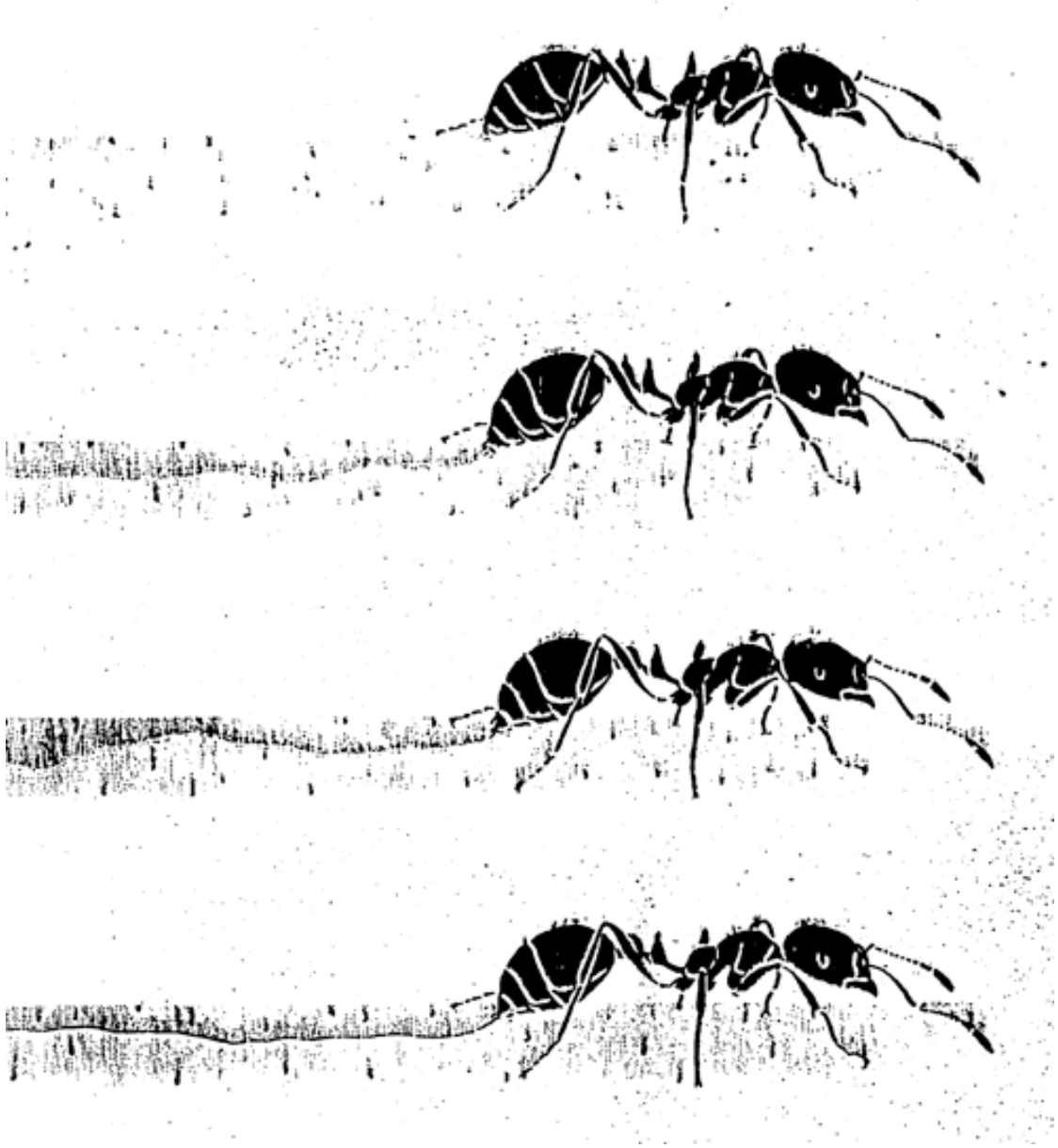
Some examples.

- Claire de Ruyt's study of the agora in ancient Rome, its functioning, its structure and its rules.
- John Padgett's study of some markets in Florence, his comparison of the differences between the markets for wool and silk
- Clifford Geertz's study of North African souks
- Theodore Bester's study of Tsukiji, the Tokyo fish market.
- Mitchel Abolafia's study of Bond traders on Wall Street Making Markets ,

What do these have in common?

- A rich tapestry of interactions between different agents
- A variety of rules which emerged over time
- Self-organisation and continuous change
- Aggregate features which cannot be reduced to the behaviour of a typical or « representative » individual.

A Good Example



The reaction of economists

- « Yes, but all this is too complicated, we have to simplify to model »
- Why simplify away market structure?
- To retain individual rationality.
- Yet, physicists and other scientists would not expect global phenomena to be like individual phenomena.
- Why not allow for a difference between individual and market behaviour?
- Individuals are simple, markets are not.
- Economists have concentrated on agents, not on markets or coordination.

Empirical Examples

Fish Market Kuwait

Hoi An Fish Market


株佃大忠
株佃大忠

The Tokyo Fish Market

Why Fish Markets?

Why choose fish markets? they exhibit two features which make them a natural subject of analysis for economic analysis.

Firstly, fish is a perishable good, stocks cannot be carried over. This makes the formal analysis of the market simpler.

Secondly the organization of such markets varies from location to location with little obvious reason.

In Iceland,for example there are 32 auctions, 18 of these are English, i.e. rising price and 14 are Dutch, i.e. descending price.
At Lorient in France, fish is sold through a combination of pairwise trading and auction
At Sete it is sold by Dutch auction
At nearby Marseille by pairwise trading.
The fish market in Sydney is conducted as two simultaneous Dutch auctions
That at Ancona has three such auctions.

Some historical background

- Fish markets have fascinated historians and economists.
- Historians give detailed descriptions of how fish markets operated in different places at different times.
- Economists give various accounts of how prices are formed on these markets and models of behavior of the buyers and sellers.
- The first accounts of the functioning of fish markets are of those in early Greece.
- A detailed account of the functioning of the surprisingly sophisticated main fish market in Rome is given by De Ruyt (1983).

Some historical background

The fish market was an important feature of Mediterranean life

This was one of the first areas in which markets developed

it is not surprising that there are many accounts of their functioning from the time of the Greeks till the present.

We have analyzed data from the Ancona and Marseille fish market, which probably exist since the early Roman period.

The first market bubble

The first market bubble is probably that for red mullet,
a Mediterranean fish which became highly prized at the time of the Romans.

Cicero, Horace, Juvenal, Martial, Pliny, Seneca and Suetonius all discuss in detail the « unreasonable »price of this fish which they considered to be based on a fad.

The price of large specimens of the fish rose to extraordinary levels during the Roman empire and at one point three specimens fetched 30,000 sesterces. Even allowing for the problems of converting to modern prices, (the conversion gives $300).

The emperor Tiberius imposed a sumptuary tax on the fish market.
The bubble burst and Macrobius noted that prices had become “reasonable” again.

The Marseille Fish Market

- 500 buyers and 50 sellers, not always present
- No prices posted
- We have data for every transaction over 3 years

    I) price

    ii) type of fish

    iii) weight

    iv) name of buyer

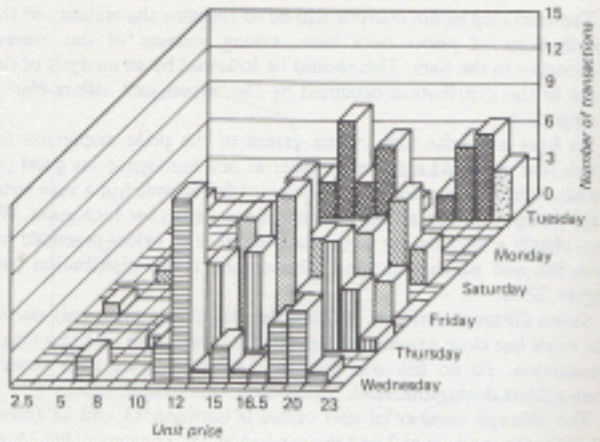
    v) name of seller

There is a lot of complicated interaction

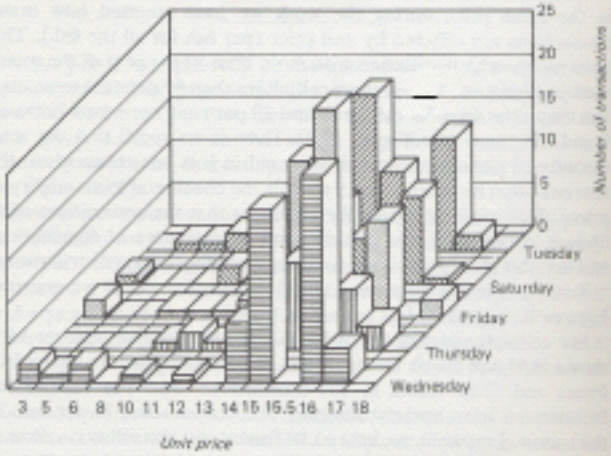
- The agents know each other
- They meet regularly
- They are heterogeneous
- They discriminate

The Marseille Fish Market

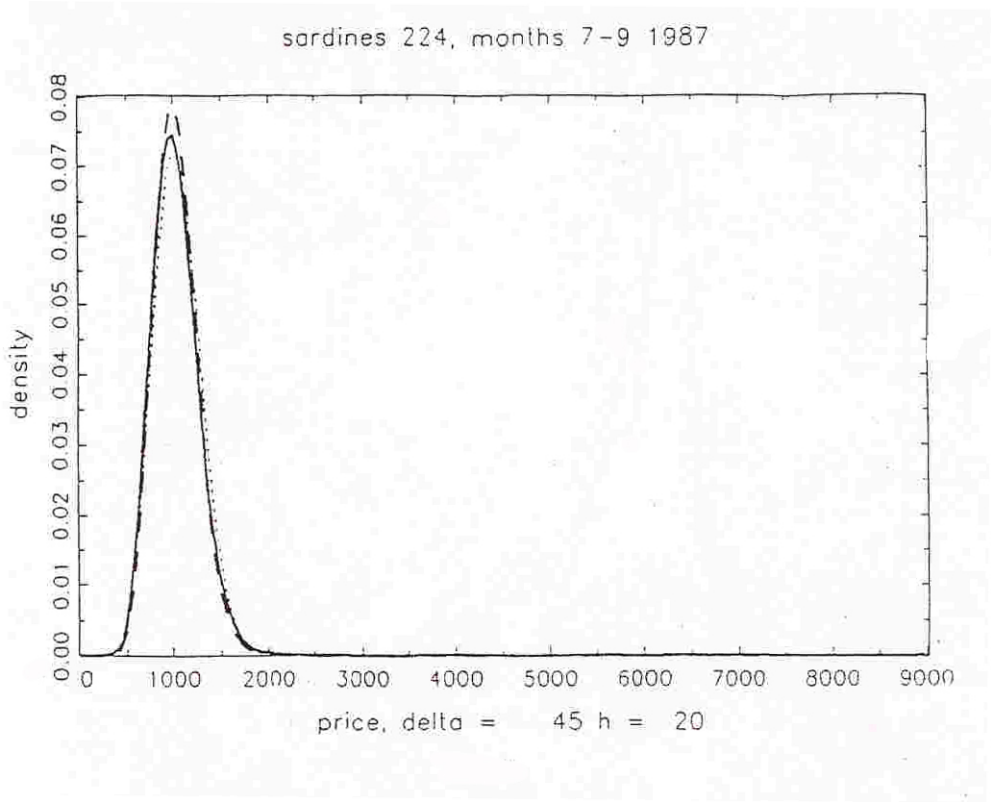
- The distribution of prices does not correspond to what one would expect from such a market.
- Yet the distribution over time is stable
- Individual demands are not classical but aggregate relations are.



Distribution of fish 44 during week 1–7 July 1987



Distribution of prices for fish 40 during week 1–7 July 1987


sardines 224, months 7-9 1987
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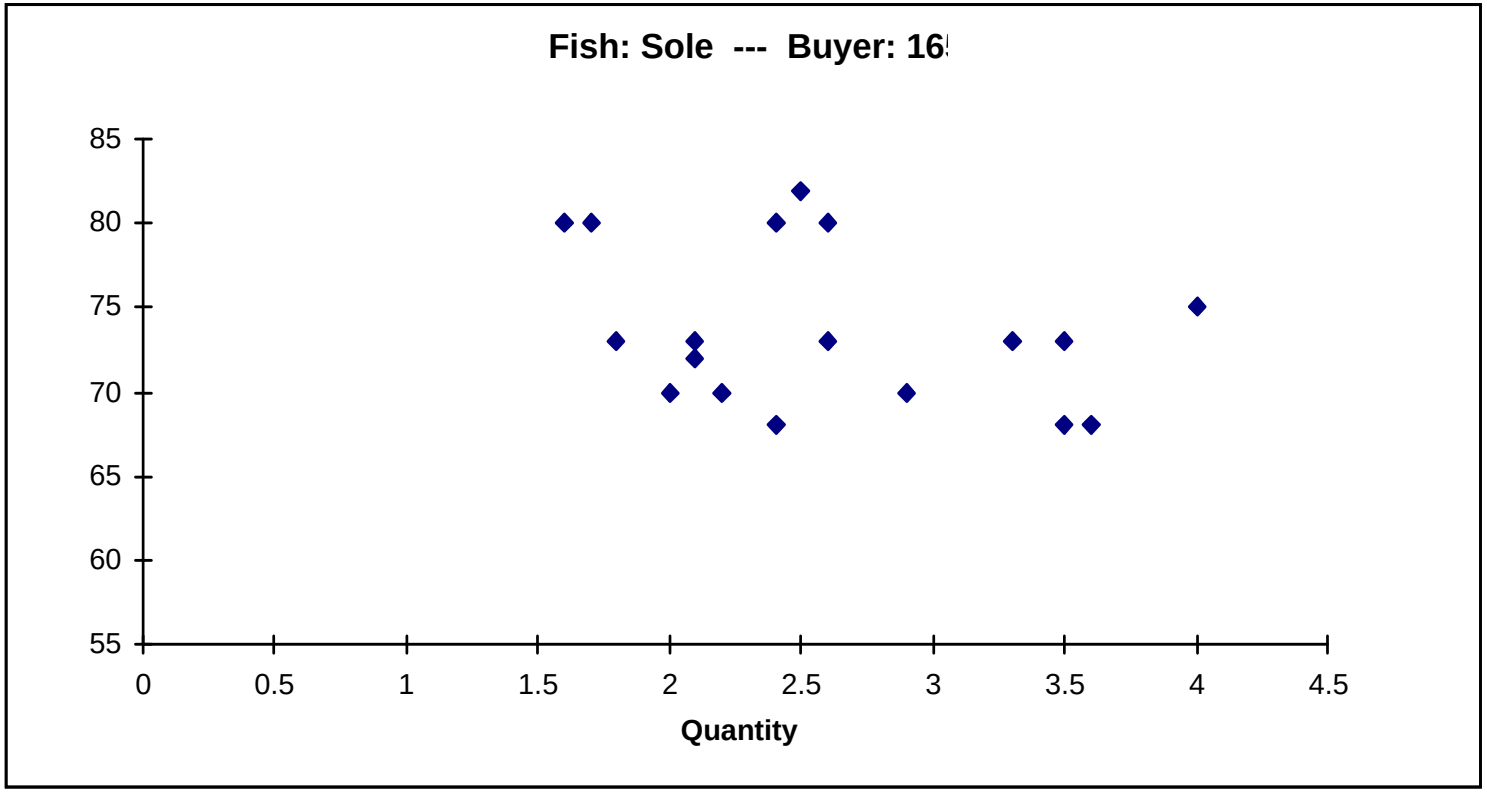
Fish: Sole --- Buyer: 16
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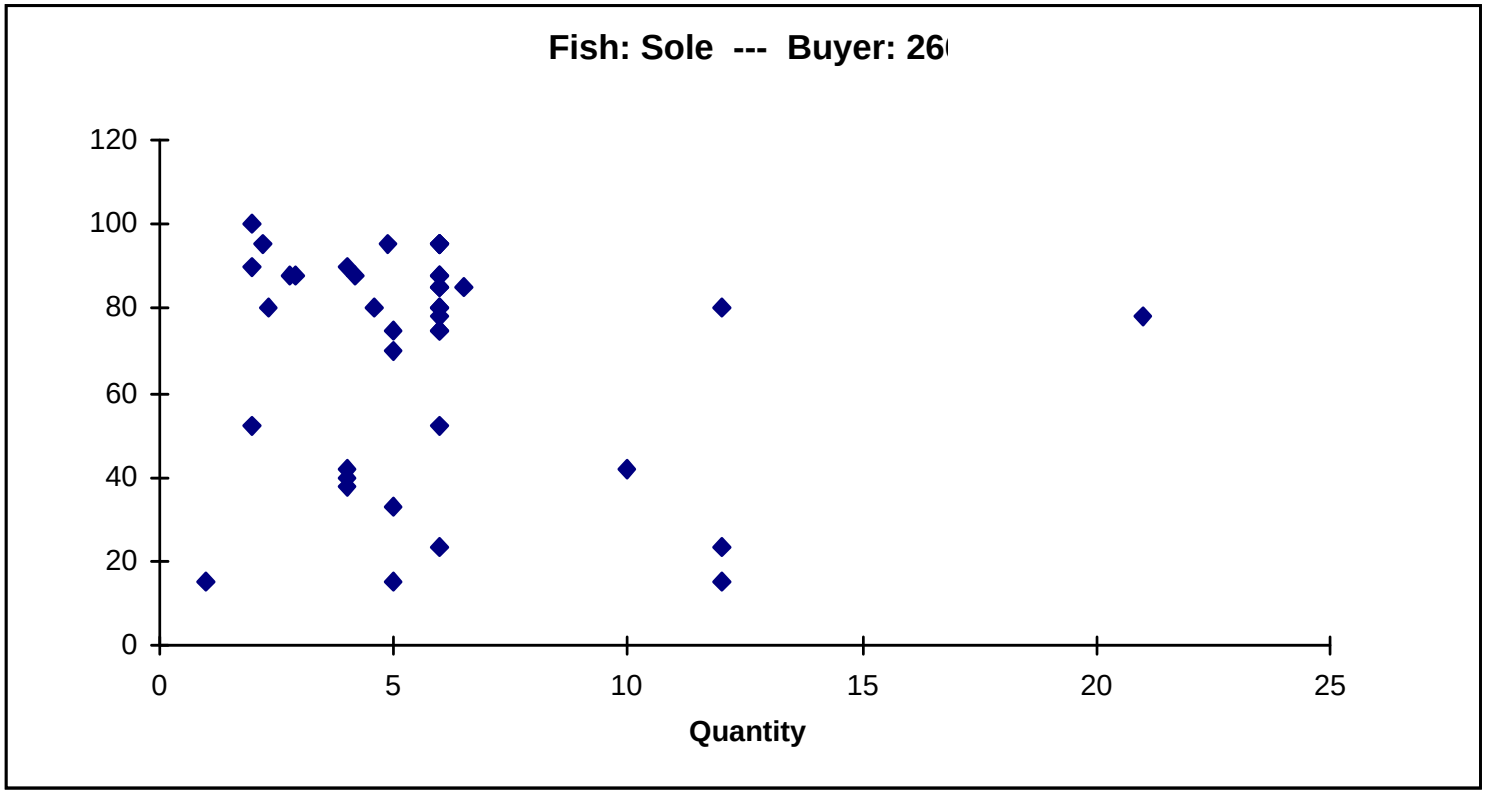
Quantity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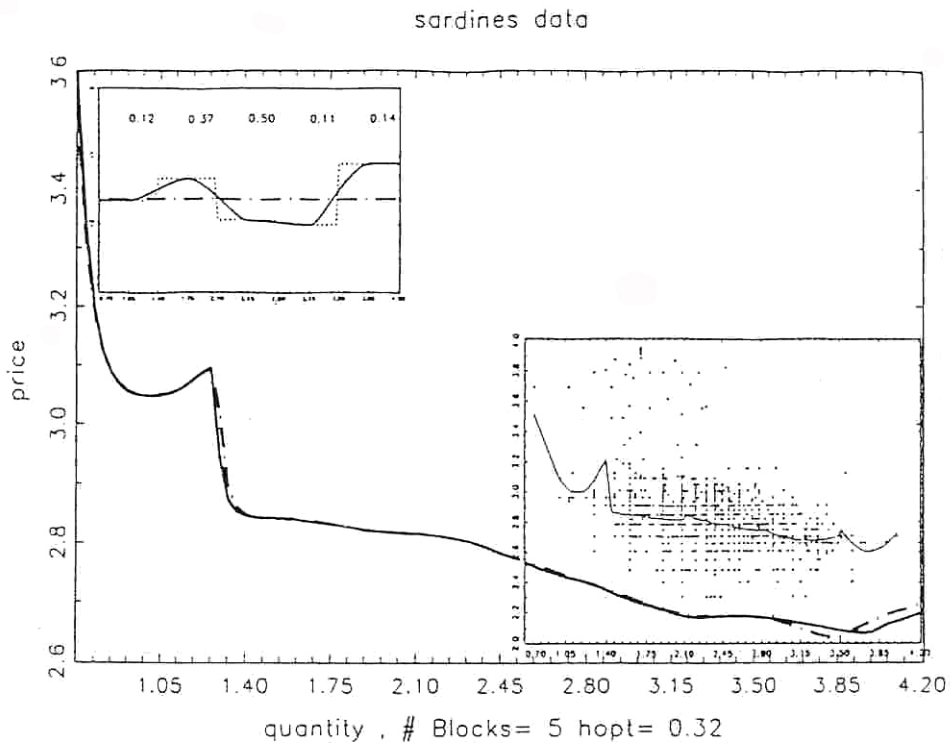
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3.6
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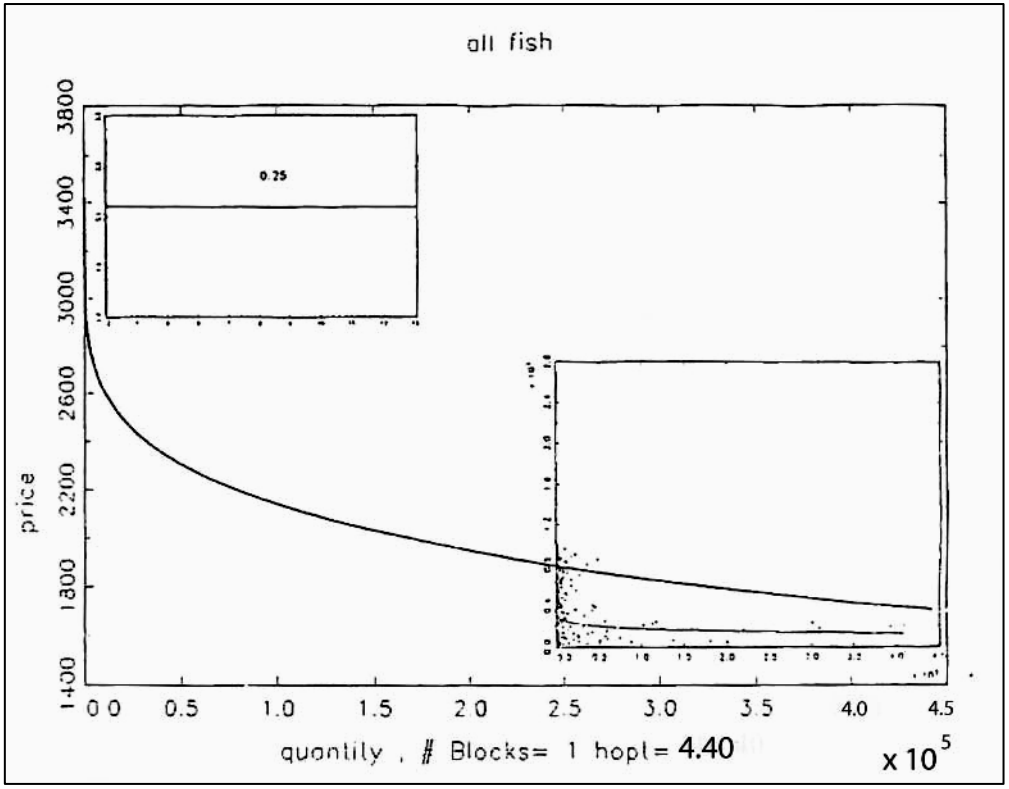
all fish
price
3800
3400
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2600
2200
1800
1400
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0.0
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3.0
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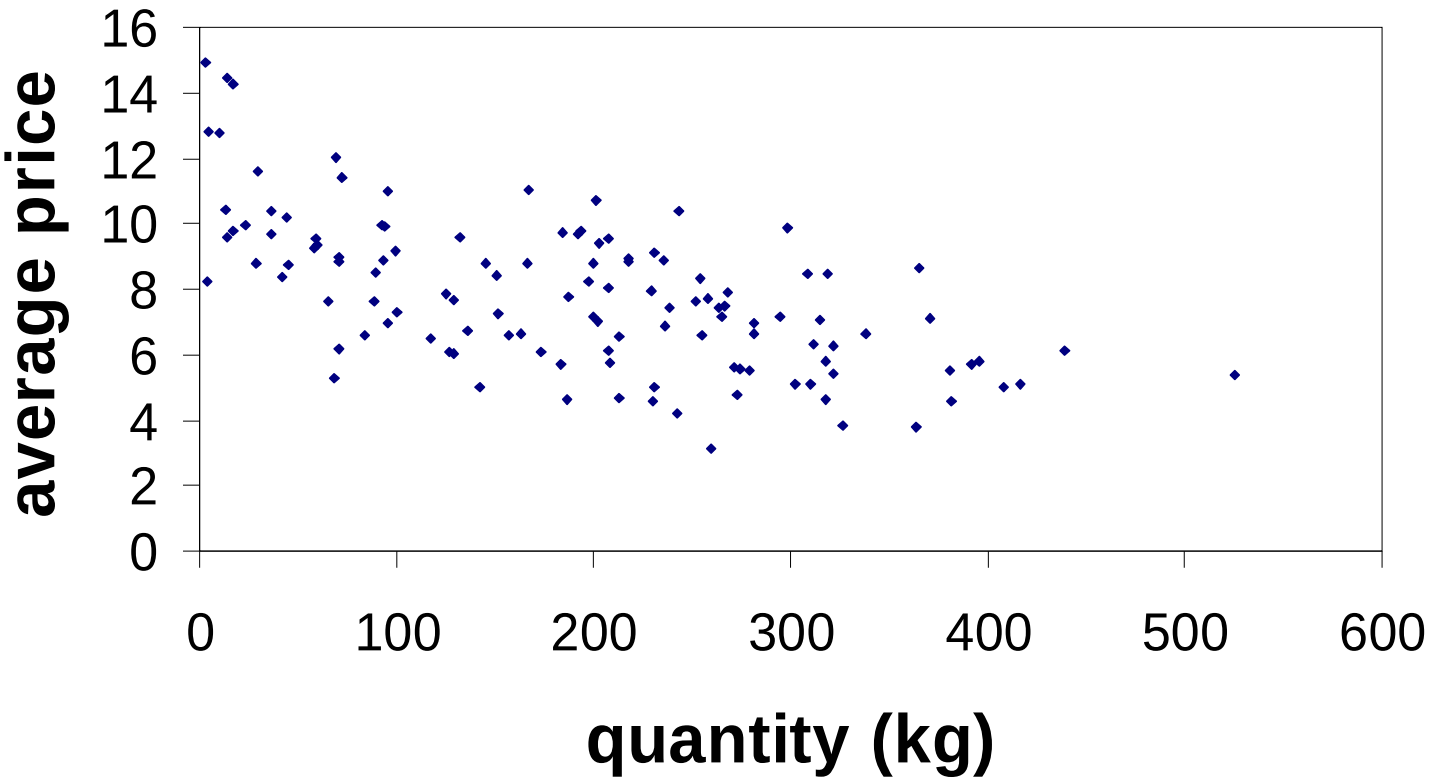
4.0
4.5
quantity , # Blocks= 1 hopt= 4.40
x 10^5

The Ancona Fish Market

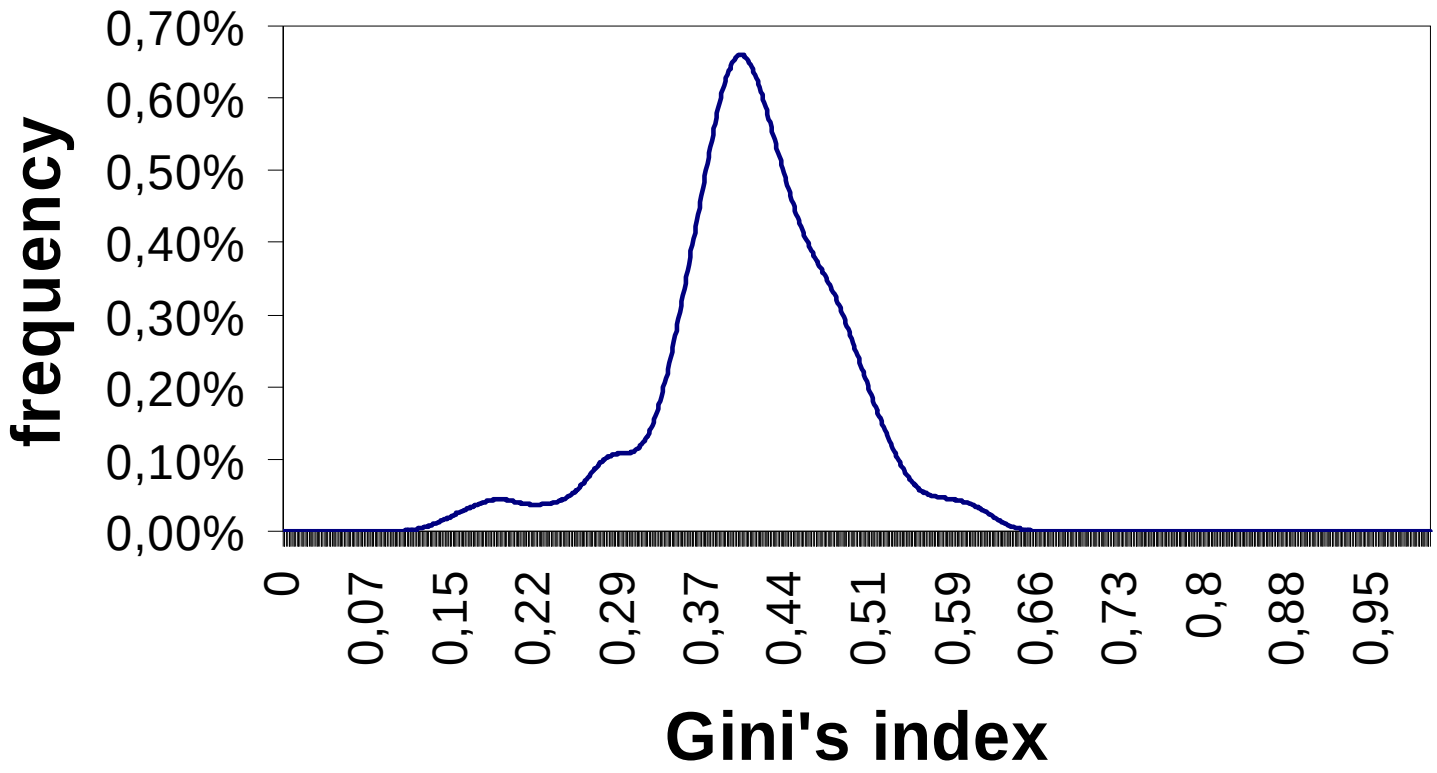
- The Ancona Fish Market.
- Open 4 days a week (Tu.-Fr.; 3.30-7.30); € 25millions
- Dutch auction: 3 simultaneous auctions: 15 transactions per minute
- 170 buyers: 20 wholesalers, 150 retailers *(ambulanti, rionali, pescherie)*
- Bidders are not the final consumers
- 55 sellers: 2 types *(strascico, rapidisti).* Order of presentation of the different vessels' lots is drawn at random; reservation price
- Data: January 2002-June 2003
- Total number of transactions: 53566

Price quantity relation

(daily data – specie 13 – whole period)



Buyers loyalty



Complicated individual interaction but simple aggregate result.

- The market organises itself so that more fish is sold at lower prices.

The importance of institutions

- In the preceding examples we saw two different mechanisms.
- It is worthwhile just to examine one of these briefly.
- Institutions are characterised by rules and these rules evolve.

Trade and its organisation

- None of the following obvious questions which arise as soon as we look at real markets, is answered within the standard market model
- Who trades with whom?
- How is this organised?
- Who sets prices and how?
- What are the prices at each stage?
- These questions are not, in general, meaningful without direct interaction.

A particular market mechanism widely used in practice

Auctions

Auctions: An efficient allocation mechanism.

Auctions: An efficient allocation mechanism

- The emergence of rules
- Amazon and Ebay
- Stopping times
- Designing or evolving mechanisms?

Poor design: Learning Response

- The EPA put in place a pollution permit trading scheme.
- Estimated cost of reducing by one ton of sulphur dioxide $750 against electricity firms' estimate of $1500.
- Price of permit on the market $150
- What happened?

The Flawed Double Auction

- The permits were sold by double auction. Bids and offers were ranked. The highest bid got the lowest offer and the bid price was paid.
- Under this system, buyers try to bid low as they pay their bids and sellers offer low to get the highest bids.
- Result prices low.
- A secondary market immediately grew up and the permits were traded at a higher price.
- The individuals learned how to function in the original market and other individuals profited from the arbitrage opportunities to create a new institution.

The California Electricity Market

- This market was opened to competition with catastrophic consequences.
- Electricity companies were obliged to sell their generating plants. They had to buy electricity from new producers.
- Demand for electricity is volatile over a given time period. Generating capacity is a long-term investment.
- An auction system was set up.
- Prices rose sharply at peak periods. Producers exploited the inelastic demand.
- Retail prices were controlled.
- Pacific Gas and Electric filed for bankruptcy.
- No long term contracts were allowed.
- The power grid, a natural monopoly has to be controlled.

What answers have been developed? A Different Theoretical Approach

The Market as a Complex System

A Less Demanding View

- Think of a world in which agents use simple rules and interact with those around them
- They learn from and about those with those with whom they are linked
- Their network of relations governs the evolution of the market
- This is the view associated with complexity

How does it help?

- Analysing fish markets we can explain:
- The evolution of loyalty on the two markets
- The evolution of prices over the day
- Price discrimation
- The sharing of the surplus.

The advantages of this approach

- In the sort of model associated with the complexity approach, we have a view which is more consistent with facts.
- We can have a different notion of equilibrium, (see Foellmer, Horst and Kirman (2005).

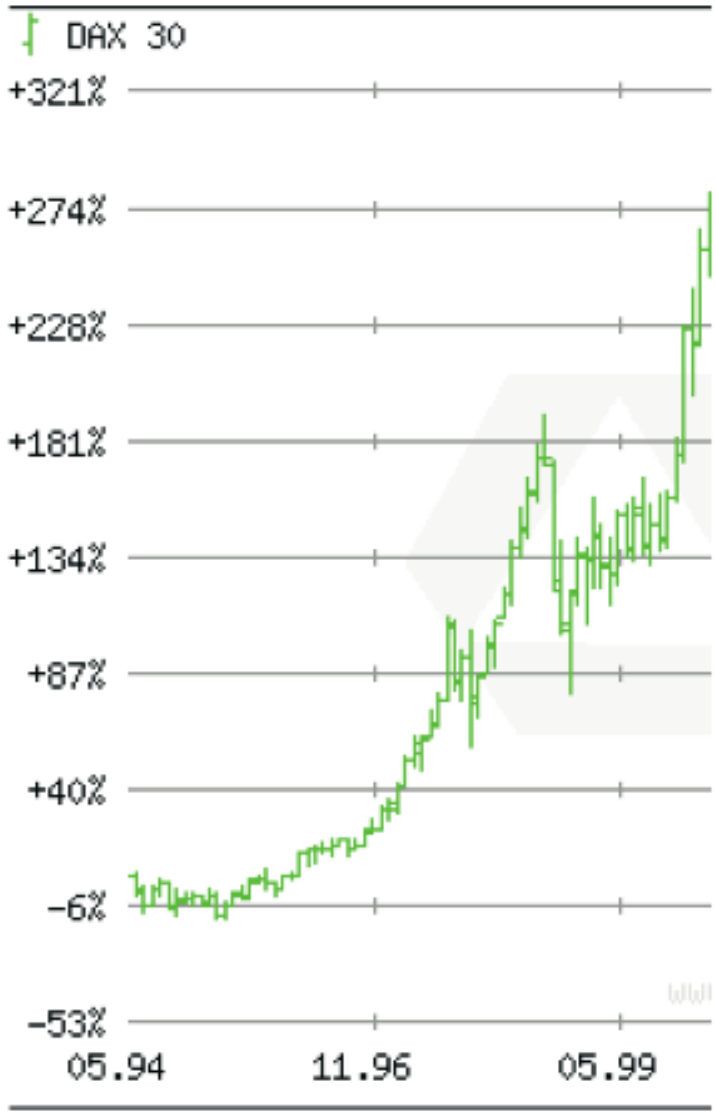
Another Example: Financial Markets

Financial Markets

- In the standard model, the evolution of asset prices follows a *Geometric Brownian Motion* in the spirit of Bachelier (1900)
- Markets are efficient in that all information is contained in the prices
- Yet this poses many problems when compared with reality

Stylised Facts from Financial Markets to be explained.

- Herd behaviour
- Bubbles and crashes
- Information cascades
- Fat tails of the distribution of returns
- Long memory
- Presence of trade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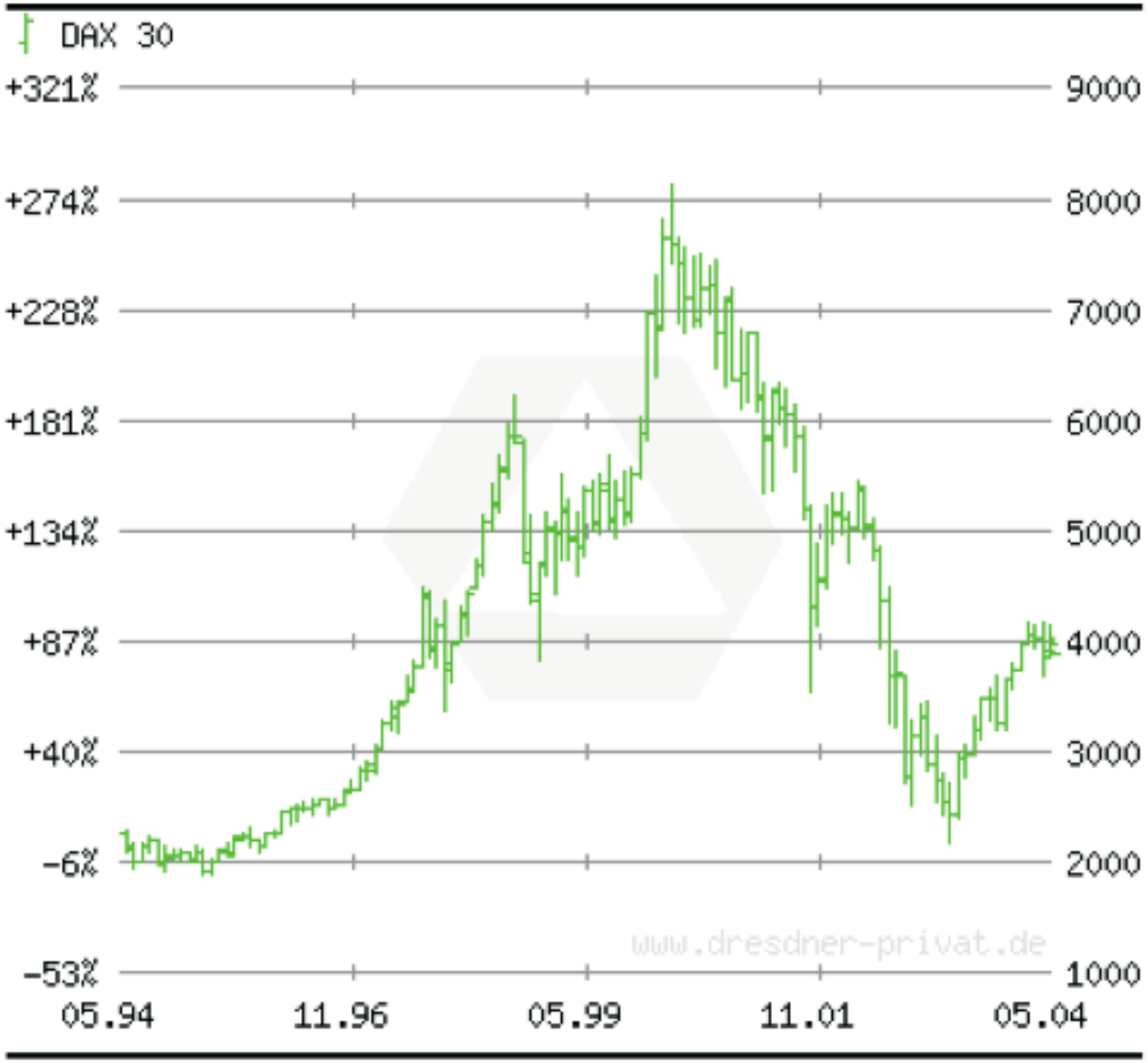
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Where did the switch come from?

- Derive a more complicated stochastic process to retrieve the standard model but which still has all available information contained in prices.
- Put it down to an exogenous shock, but then you must be able to identify the shock
- Leave the beaten track and find a market model of interacting agents which generates this sort of shift

Back to the Different and Simpler Approach

A More Realistic Approach to Information Transmission

Herding behaviour and Informational Cascades

- Here rational individuals, by their interaction, achieve an inefficient result
- They infer information from the behaviour of others and may as a result throw away their own information.
- This can lead to “inefficient” results.

Looking into the sky quickly gets passers-by to follow.

A week on the wild side

Herding

"It is better (...) to fail conventionally than to succeed unconventionally."

J.M. Keyns (1936)

"Forget about the fundamentals and think about the investors."

The Economist (1998)

"The herd is never stupid for too long."

T. Fiedman (2000)

Replace optimisation with simple Rules

- Agents use simple rules
- They choose amongst these rules
- Their motivation may be different
- Experience
- Imitation of success
- Conformism

Different views of predicted Prices

If markets are efficient then we have:

$$E\left(S_{t+1}\middle|I_t\right)=S_t$$

Here agents assume that they can predict, I.e

$$E\left(S_{t+1}\middle|I_t\right)=\left(\Delta S_{t+1}\middle|I_t\right)+S_t$$

Forecasting rules

- What form should they take?
- Typically “Fundamentalists” and“Chartists”
- The idea here is that people choose a forecasting rule.
- Which rule to choose ?
- Use your own experience.
- Why not that of others ?
- Rules do best when they have many followers.
- This will cause a self-reinforcing swing to the currently more successful rule if success is a criterion for choice.
- However when rules are not "perfect" forecasters other less popular rules may do better.

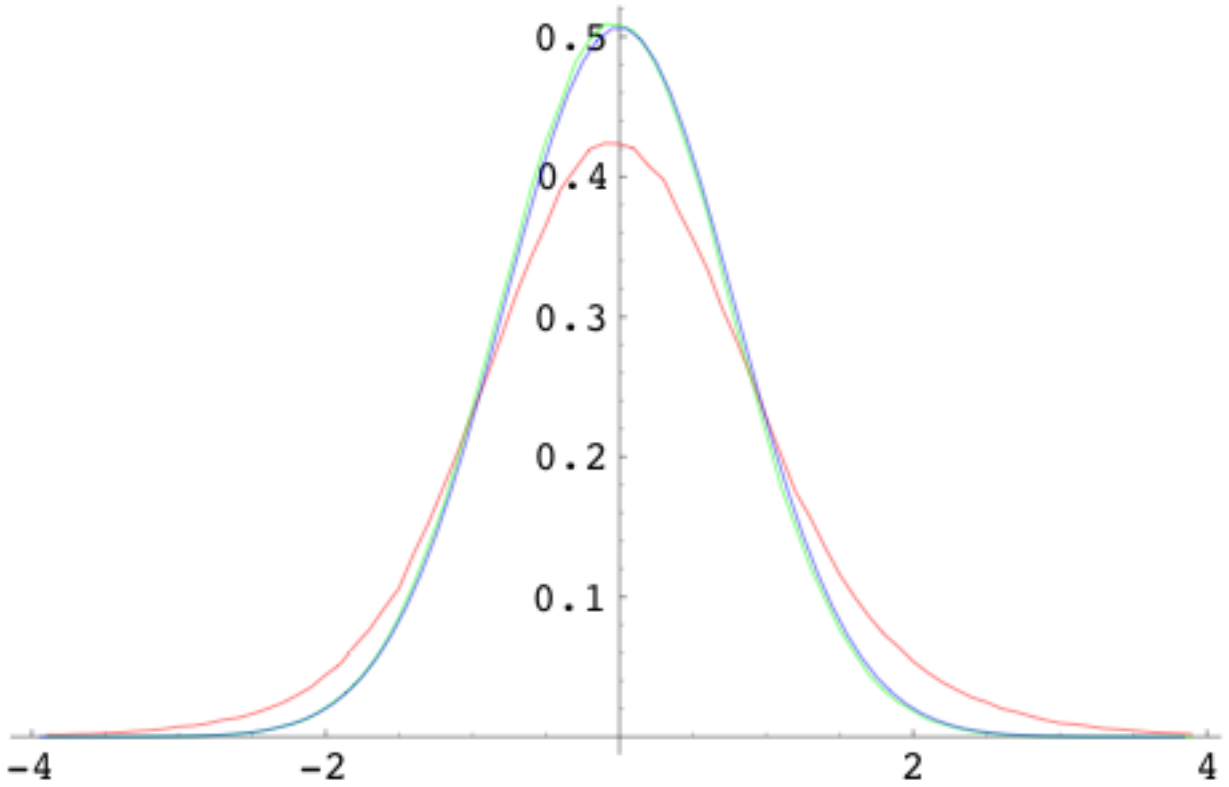

Figure 1: Empirical stationary distribution of asset prices in a model with (red) and without (green) chartists.

Bubbles and Crashes

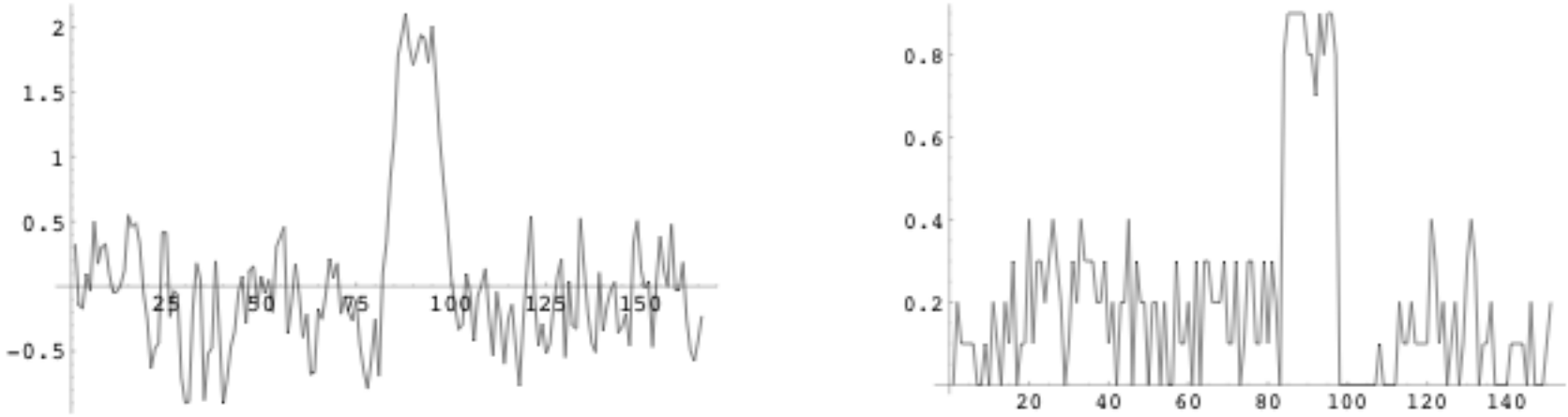

Figure 2: A bubble and the corresponding fraction of chartists.

Is this sort of model an improvement?

- Interaction between market participants can generate realistic phenomena.
- The asset price does not settle to a steady state.
- In the long run the stochastic price process has structure. A new idea of equilibrium, (Foellmer Horst and Kirman (2005)
- The presence of chartists generates long memory and fat tails.
- Beliefs, commonly held, are self fulfilling

Overall Conclusions

- Much has been written about markets in other disciplines but economic theorists have paid little attention to how actual markets function.
- Markets and the individuals who participate in them learn and adapt
- Market behaviour is not like individual behaviour
- The self-organisation of interacting individuals generates market phenomena

Overall Conclusions 2

- Information is dispersed across individuals and is not transmitted through some central signals
- How markets with individuals behaving in a simple but plausible way, come to be coordinated is what we need to explain
- This can only be done by accepting that there is a co-evolution of market institutions and individual behaviour.