

ACCS Winter School

# The New Evolutionary Economics of Micro Meso Macro

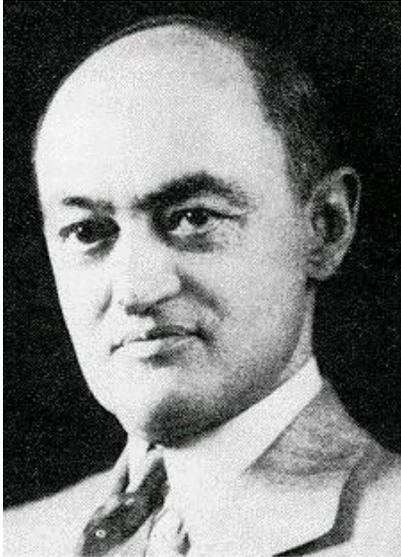
All about how an economic system is a complex system  
(with some applications to financial markets)

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# Joseph Schumpeter



Capitalism is an evolutionary process, a perennial gale of creative destruction

‘The essential point to grasp is that in dealing with capitalism we are dealing with an evolutionary process. Capitalism, then, is by nature a form or method of economic change that not only never is but never can be stationary.

The fundamental impulse that sets and keeps the capitalist engine in motion comes from the new consumers, the new goods, the new methods of production or transportation, the new markets, and the new forms of industrial organization that capitalist enterprise creates.

This process of Creative Destruction is the essential fact about capitalism. It is what capitalism consists in and what every capitalist concern has got to live in. Every piece of business strategy acquires its true significance only against the background of that process and within the situation created by it. It must be seen in its role in the perennial gale of creative destruction ...’ (1945: 82–5)

Economics is the study of the economic system, and a market capitalist economy is an evolutionary system.

So, why not use evolutionary and complex systems theory for economic analysis?

Option 1: Existing framework, but with evolutionary extensions

Option 2: New framework

Micro Meso Macro is Option 2

But a new framework means a new ontology to underpin new theoretical and empirical analysis. This is based about meso.

'Our civilization depends, not only for its origin but also for its preservation, on what can be precisely described only as the *extended order* of human cooperation, an order more commonly, if somewhat misleadingly, known as capitalism.

The extended order is probably the most complex structure in the universe – a structure in which biological organisms that are already highly complex have acquired the capacity to learn, to assimilate, parts of suprapersonal traditions enabling them to adapt themselves from moment to moment into an ever-changing structure possessing an order of a still higher level of complexity.

In the course of time new features arise which did not exist before: self-perpetuating and evolving structures which, though represented at any one moment only by particular material embodiments, become distinct entities that in various manifestations persist through time. ... Such a model, once it has appeared, becomes as definite a constituent of the order of the world as any material object. These orders preserve their general character only by constant change (adaptation).' (1989: 151)

## Friedrich von Hayek



Market capitalism is the extended order of human cooperation as an open evolving complex system.

# The problem

- How to analyse economic coordination and change in a way that is useful for the study of growth and development, technological and institutional change, market and price dynamics
- The problem is that micro-macro is no good. Why? Because it cannot analyse the process of change as it actually happens, through changing connections and changing populations.
- Micro sums to macro is static and without structure (also without knowledge as interactions and populations). It does not deal with populations, networks, structures or processes.
- For analysis of economies as evolving complex adaptive systems, we need to start with what exists and what changes

# Economic systems are made of rules

Rules are the elements of meso.

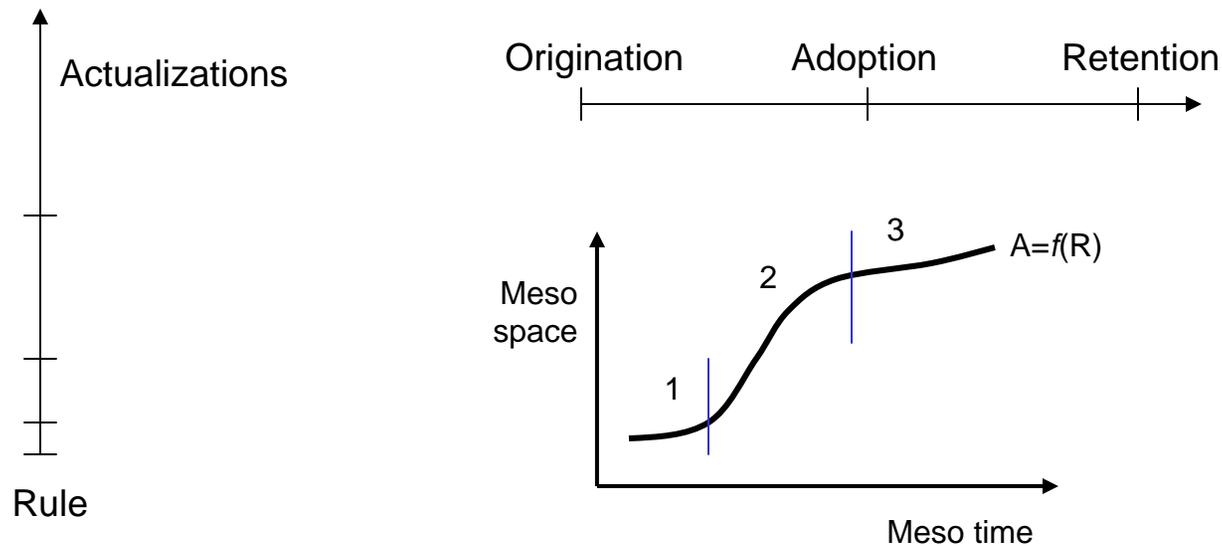
A meso is a rule and its population of actualizations.

The complexity of an economic system resides in the variety of the actualizations (meso population), the micro systems (of actualizations) and the macro systems (of meso)

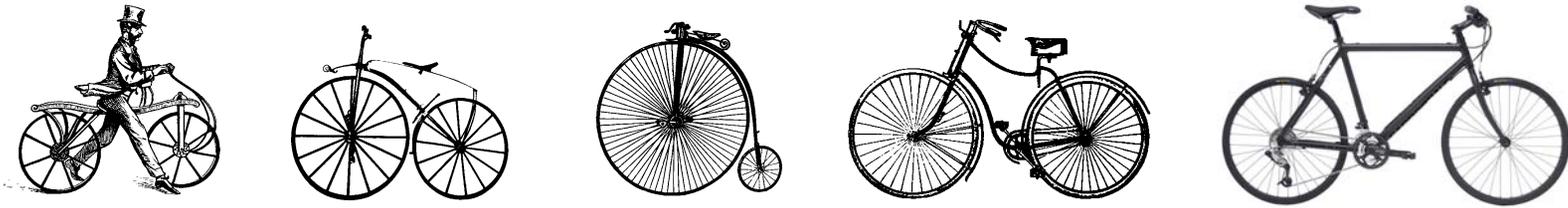
# Meso is a generic rule and its trajectory

A meso unit is a generic 'rule' and its population of actualizations.  
A meso trajectory is how a meso unit changes with time

Economic evolution is the origination, adoption and retention of novel generic rules. It is the coordination of meso units (economic order) and change in meso systems in consequence of meso trajectories (economic evolution).



## Example: the bicycle 'rule'



A meso trajectory, with micro and macro implication

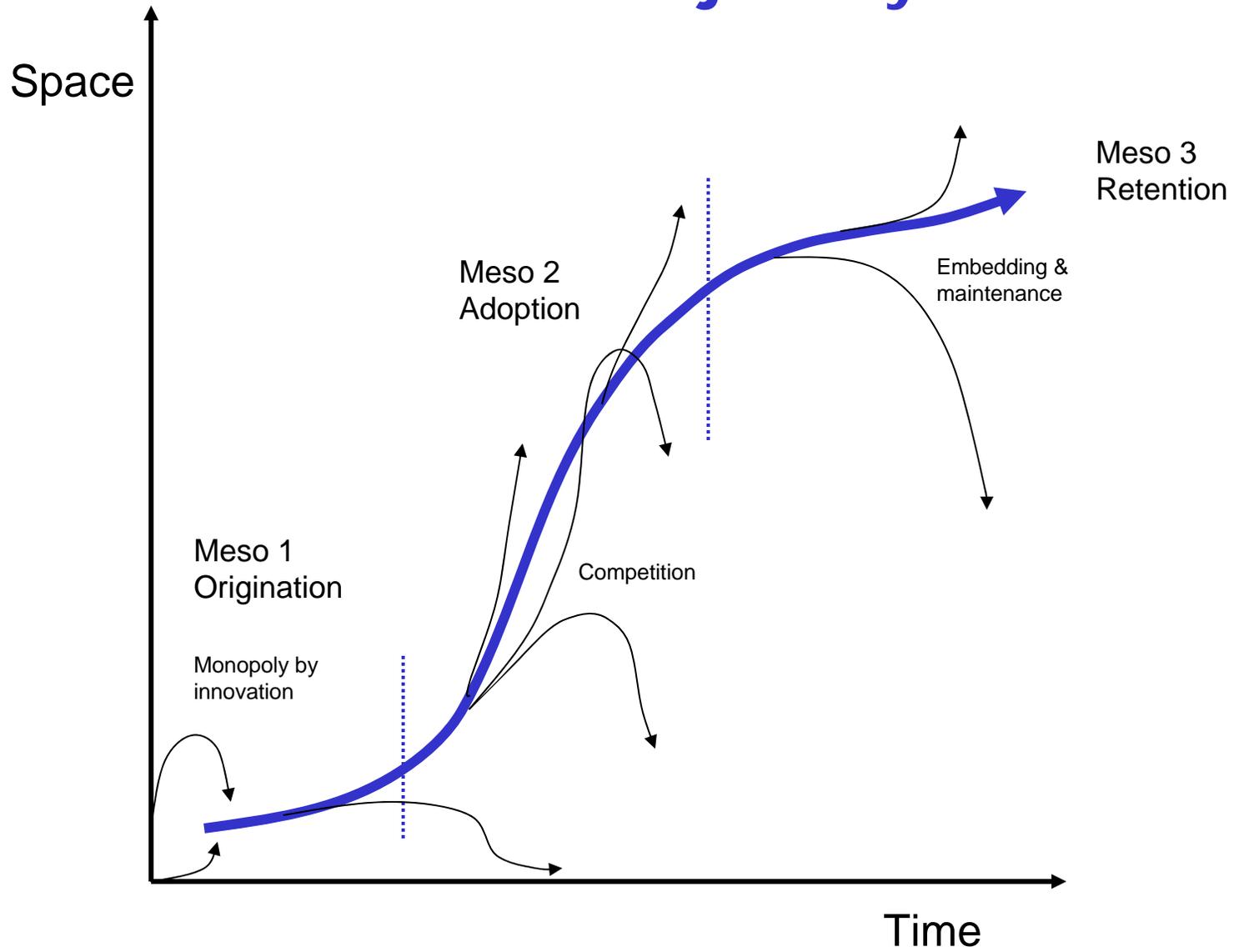
The evolution of the bicycle rule and the evolution of bicycle population and operations



Micro: Each individual adopter of the bicycle rule

Macro: Bicycles and their interaction with everything else

# Meso trajectory



# An economic system is a complex system of meso

- Economic evolution is the process by which a novel generic rule enters the economic system

Systems of meso rules carried by agents :	micro-economics
Changing population of rule actualizations :	meso-economics
The system of meso populations of rules :	macro-economics

The emergent rule and its growing population	(meso trajectory)
Micro structure and dynamics of agents carrying rules	(meso systems)
Macro structure and dynamics of rule populations	(systems of meso)

# Three-Phase Meso Trajectory

## Phase 1:

**Origination** of a novel generic rule. The origination phase is that where the rule enters into existence (changing the dimensionality of the system) by entrepreneurial imagination or consumer experimentation.

## Phase 2:

**Adoption** and adaptation of the rule in a population of carriers. The adoption phase is the communication of the rule to other carriers, who then adopt the rule. The population of the rule changes from one to many.

## Phase 3:

**Retention** and maintenance of that rule in a population of carriers. Retention is where the carriers stabilize the rule for ongoing use. This is where behavioural routines and social institutions form.

# Meso 1 Origination

- Meso 1 begins with micro. Agent as rule-maker, imagination and experimentation in the face of uncertainty. The originator carries a new rule and thus has potential to develop new capabilities and engage in new interactions.
- Can occur on producer or consumer side. (More prevalent on producer side because of R&D). May involve new products, new consumers, new expectations, new organizations, new interactions, new markets, new laws and new institutions, and perhaps all of these at once.
- Macro effects of meso 1. A new monopoly as the first phase of de-coordination of existing meso-macro structure. (Competition will grow out of monopoly in meso 2, and perhaps collapse back again in meso 3)
- De-coordination begins as connections between actualizations change because of the presence of something new. A new product that impacts on both complementary and substitute products will affect the frequency of both, and so disturb the deep and surface structure of macro.

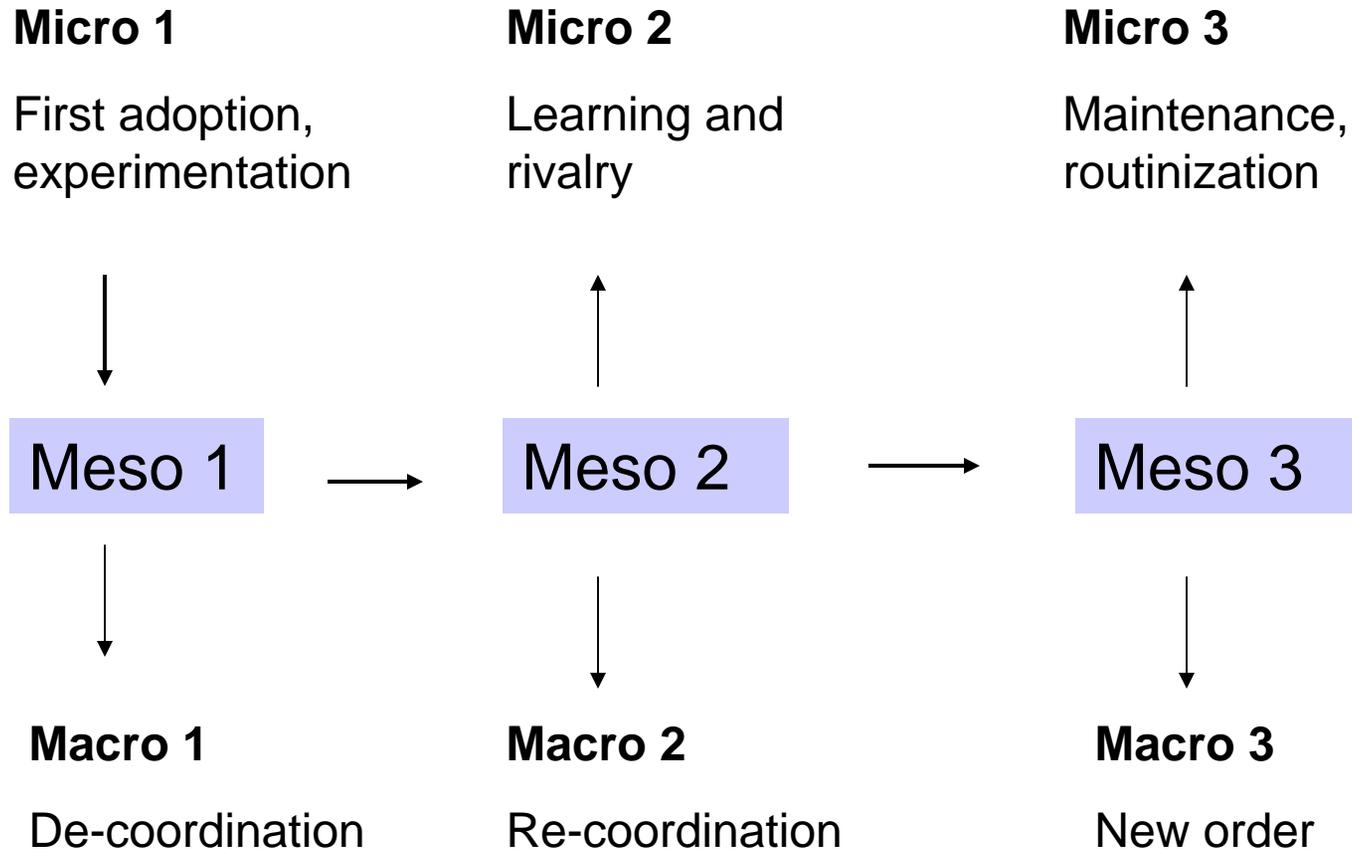
## Meso 2 Adoption

- Meso 2 is the path to full adoption and the emergence of a new rule-population (meso unit), beginning with those that contest the new monopoly position while there is still much uncertainty, and ending in a process of normalization of behaviours about the new rule (uncertainty becomes risk).
- The Micro domain of Meso 2 consists of a layered process of experimentation and learning that gives rise to an ordered structure of leaders and followers. Growth in variety of the rule and its actualizations, competitive rivalry, selection processes operating on variety
- Market growth and segmentation by the diffusion through an initial market leading to the formation of related markets and support institutions.
- The deep and surface structure of the macro both drives and constrains this developmental and experimental micro process of meso evolution. Deep structure re-coordination of rules, in terms of whether or not the new rule fits. Surface structure re-coordination of populations of meso.

## Meso 3 Retention

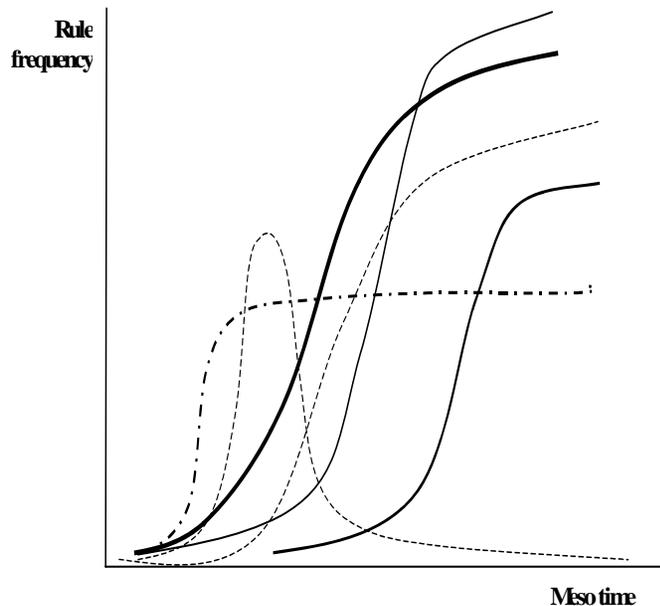
- The retention of the rule and its population (the meso) as an on-going process. Achieved through maintenance in the micro and replication in the macro. In both cases refers to a meta-stable distribution of normalized or institutionalized activities
- At the micro level of Meso 3, all extant carriers that will adopt have adopted. Normalization to the new rule is underway and on-going. The boundaries of carriers will stabilize about a new division of labour, structures knowledge, expectations and regional and industrial organization. Meso 3 is the world of stable knowledge concepts, such as skill, routine, competence, capability, institution etc.
- The macro level of Meso 3 is the phase in which population structures of meso replicate statistically. This is an ordered state, but one where new orders begin to break-off and to replicate along their own trajectories. New meso 1 emerge from extant meso 3.
- The time to Meso 3 depends upon how radical the rule is, on how long it takes a society to adjust. This may take months, years, or longer

# Micro and macro along a meso trajectory



# MESO CLUSTER

A meso cluster is a set of co-evolving meso trajectories, such as in regional development or technologies. It has three phases:



- 1 Interaction of innovative rules into an ordered system
- 2 Co-evolutionary adaptation of rules (dynamics)
- 3 Cluster institutions (embedding of rules)

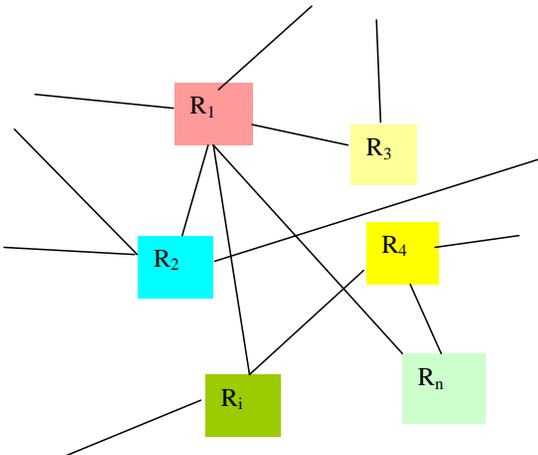
The meso unit and trajectory is the theoretical building-block of evolutionary economics, but all applied analysis involves clusters

Clusters form about both production and consumption

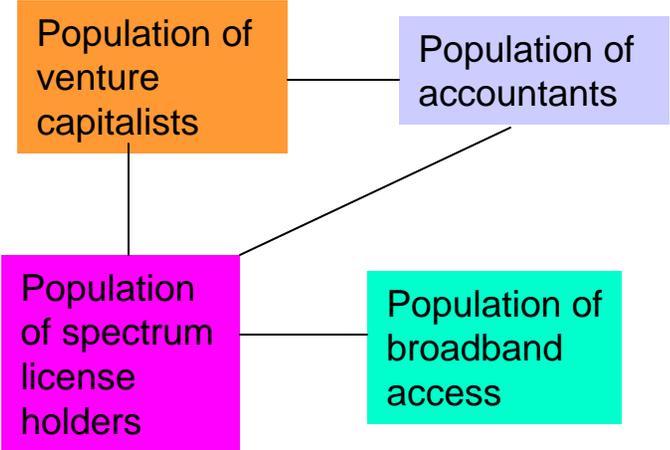
# MACRO COORDINATION (DEEP & SURFACE)

## A new view of macro

Deep rule structure is about how rules fit together in themselves



Surface rule structure is about how rule populations fit together



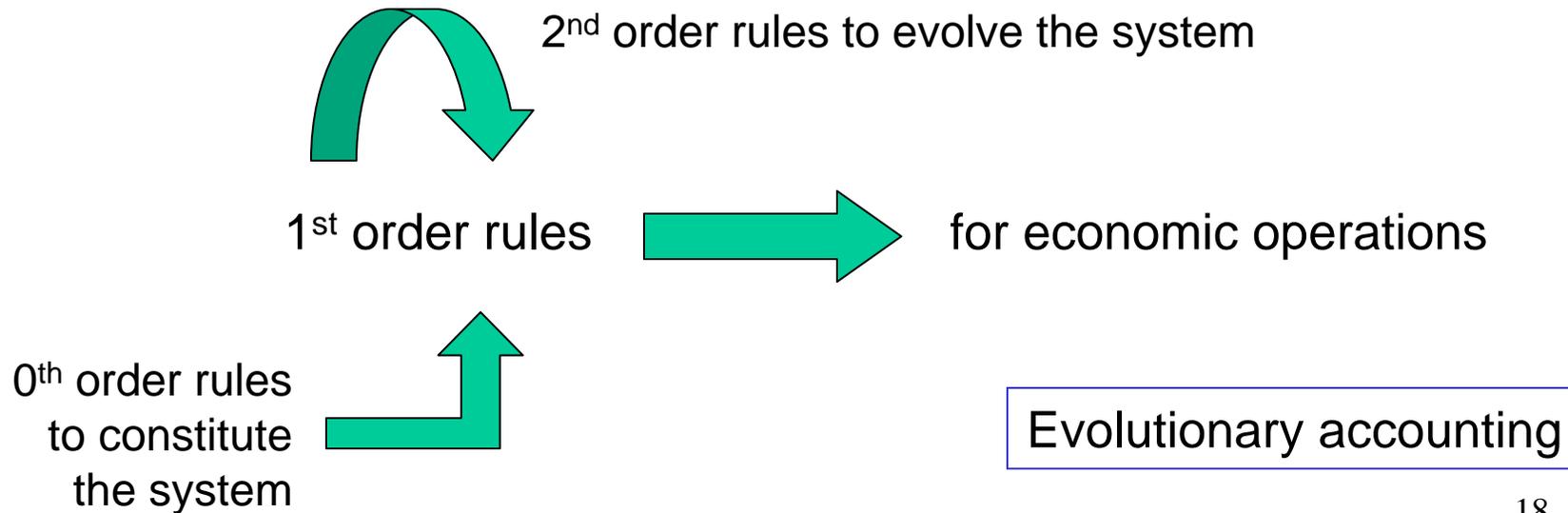
Coordination failures can occur at the deep and surface level

# Orders of Rules

0<sup>th</sup>-order rules are constitutive rules. Rules for rules.

1<sup>st</sup>-order rules are generic rules for economic operations

2<sup>nd</sup>-order rules are reflexive. Rules about rules



# Generic Applications

- Market and industrial dynamics (along a meso trajectory)
- Analysis of technological and institutional change
- Analysis of structure (at micro and macro level) in relation to change
- Analysis of growth and development
- Analysis of the role of finance, entrepreneurship, uncertainty, profit and competition, and value of adaptation

# Financial markets

- Not econophysics. Forecasting is pointless for such high-order complex systems.
- The financial system is a complex system in terms of the interactions it has with the economic system (of meso)
- Real bubbles theory (finance, entrepreneurship and growth)
- Degenerative investment rules
- Profit, uncertainty, and finance

# Financial markets: Real bubbles theory

- Bubbles are bad because they are disruptive in the SR
- But during a bubble, experimentation is cheap, the real cost of capital is low
- This promotes variety generation (in new meso)
- Which feeds long run economic evolution
- Therefore bubbles are good?

# Financial markets: decision rule cascades

- Investment rules as meso
- E.g. investment property decision rule (1999-2004)
- Or technology stocks decision rules (1995-2000)
  
- What starts off as a complex decision rule as it becomes adopted by more and more agents (cascades) begins to degrade.
- Implications for speculative up-swings...

# Financial markets: Multi-agent multi-market simulation

- Can use more detailed analysis of different classes of agents (i.e. different trading rules) interacting in different classes of market (bonds, money, equities)
- Simulations (Morrison 2004, and Axtell 2005 'the complexity of exchange', EJ) show that the complexity of the market mechanism itself is key to explaining market outcomes. Results on zero-intelligence traders shows similar results.
- Markets vary in their rule structure (ebay vs supermarkets vs real estate). Some are more complex than others. We are only just beginning to understand that.

# Conclusion

- The new evolutionary economics is the study of market capitalism as an open evolving complex adaptive system in which coordination and change are simultaneous problems. Micro meso macro provides a framework for such analysis
- A basis for unifying various 'evolutionary' and 'complex systems theory' based approaches to economics

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