

Corso: Dal cervello sociale all'emergere della società

Lezione: Interazione e Meccanismi di decisione nelle società umane complesse

Pietro Terna e Simona Cantono

4.5.12

h.14-16 Sistemi economici e complessità: perché la realtà economica è complessa (SC)

h.16-18 Simulazione e complessità per le decisioni nei sistemi sociali (PT)

11.5.12

h.16-17 Modelli ad agenti, esperimenti e neuroimaging per aprire la scatola nera comportamentale (PT)

h.17-18 Modelli ad agenti e statistica meccanica: autocatalytic percolation. Applicazioni 1 (SC)

18.5.12

h.16-17 Modelli ad agenti e statistica meccanica: autocatalytic percolation. Applicazioni 2 (SC)

h. 17-18 Esercizi con NetLogo (PT)

Materiale didattico online
Modalità tesi finale

Scienza Economica

Dalla teoria dell'equilibrio generale di Leon Walras (1874)* alla sistemazione epistemologica di Lionel Robbins 1

*L'inizio del 1900 è dominato dalla teoria dell'EG, così come sviluppatasi dal 1870 da Menger, Jevons, Edgeworth, Marshall, Walras, Pareto, Barone, Clark, Fisher, Wicksell

I postulati dell'equilibrio economico generale

La scelta

Il concetto di scarsità

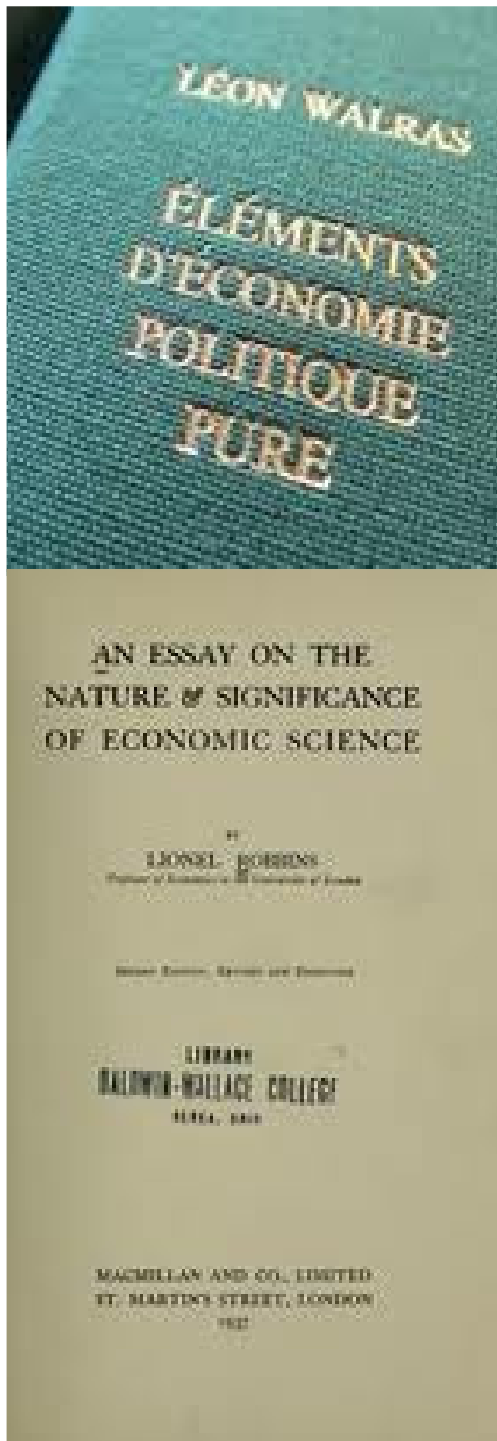
Massimizzazione dei fini / minimizzazione dei costi

Quattro condizioni necessarie e sufficienti

- Scopi molteplici;
- Scopi classificabili in ordine d'importanza;
- Mezzi limitati;
- Mezzi destinati anche ad usi alternativi.

La definizione di scienza economica

La scienza economica è la scienza "che studia la condotta umana come una relazione tra scopi e mezzi scarsi applicabili ad usi alternativi" (Robbins, 1932)



Scienza Economica

Dalla teoria dell'equilibrio generale di Leon Walras alla sistemazione epistemologica di Lionel Robbins 2

L'Equilibrio Generale

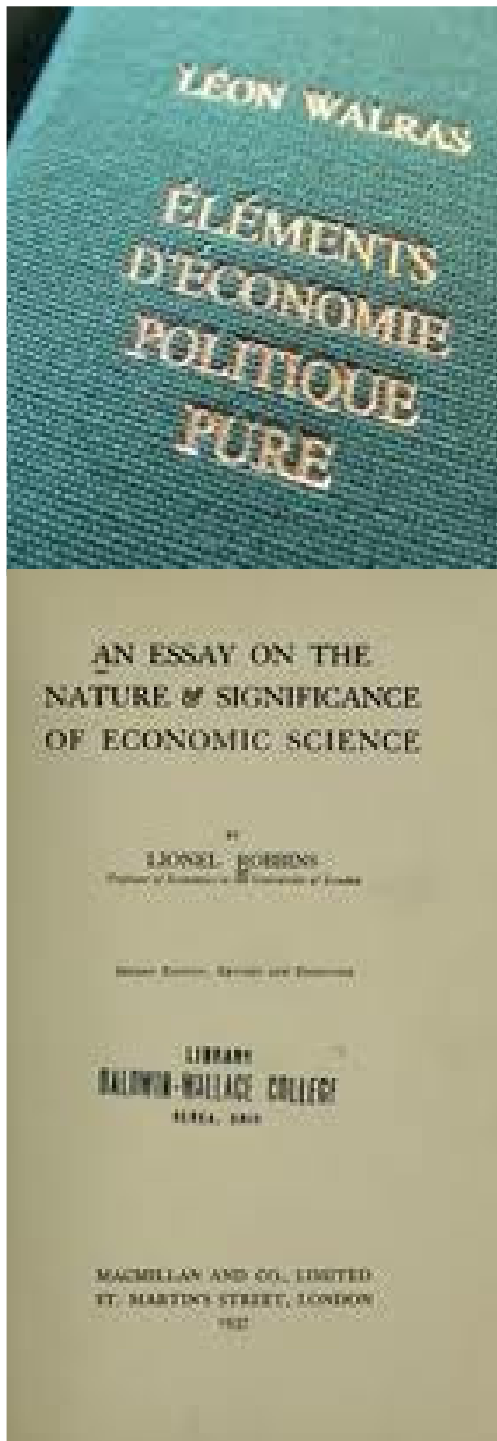
(equilibrio dei singoli soggetti isolatamente considerati e posizione di equilibrio dell'intero sistema economico)

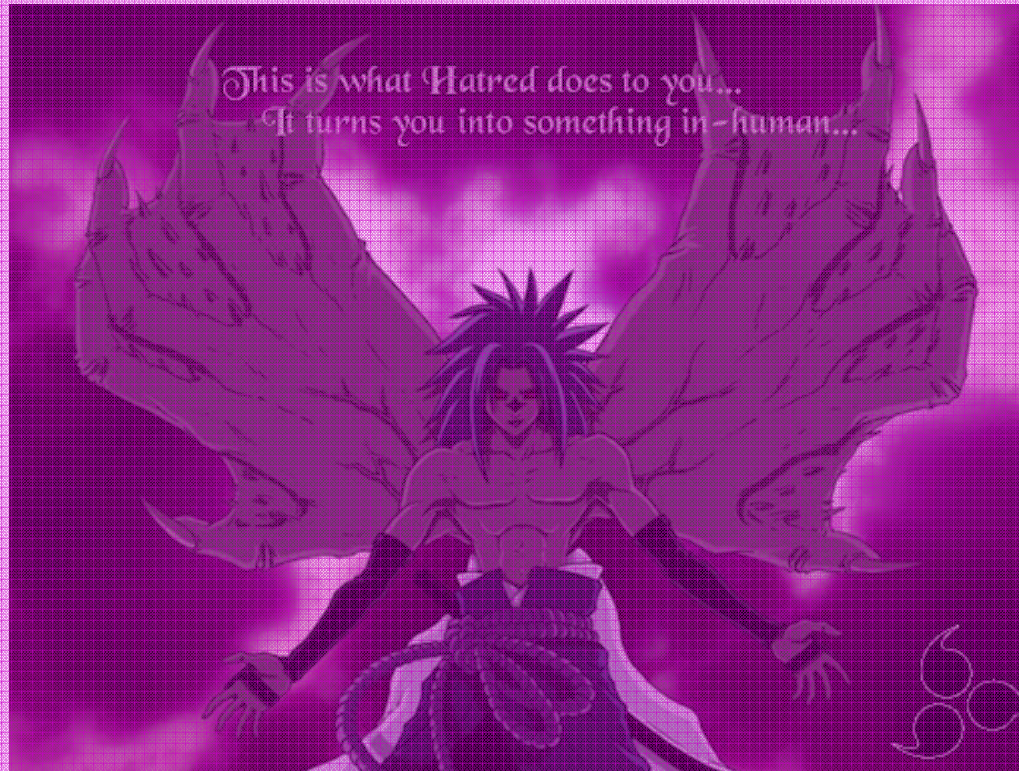
Problema: date certe quantità iniziali di risorse produttive, data una certa tecnica di produzione, dato il sistema di preferenze dei soggetti economici, determinare la quantità di beni prodotti e scambiati, nonché i prezzi ai quali tali scambi hanno luogo, nella configurazione di equilibrio generale, in quella configurazione cioè nella quale sono simultaneamente realizzate le posizioni di equilibrio verso le quali rispettivamente tendono i vari soggetti economici

L'economia è una scienza deduttiva al pari della meccanica classica

Per comprendere fenomeni complessi è necessario ridurli ad atomi, o parti elementari

Così alcune delle proposizioni fondamentali dell'economia derivano dalle "proprietà elementari dei corpi"



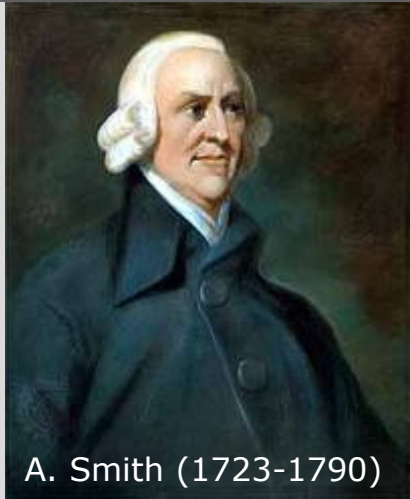


**In between demons and butterflies:
a path undertaken by economics towards complexity**

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The invisible hand

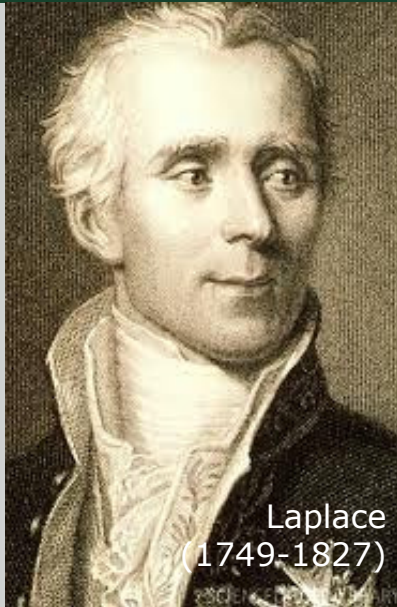


A. Smith (1723-1790)

The father of Economics

Markets are the result of human actions and not the outcome of planning; they are pervaded by a sort of spontaneous order and characterized by emergence

The demon of Laplace



Laplace
(1749-1827)

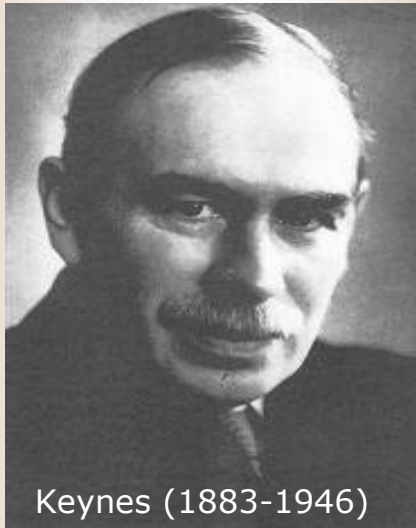
"We may regard the present state of the universe as the effect of its past and the cause of its future. An intellect which at a certain moment would know all forces that set nature in motion, and all positions of all items of which nature is composed, if this intellect were also vast enough to submit these data to analysis, it would embrace in a single formula the movements of the greatest bodies of the universe and those of the tiniest atom; for such an intellect nothing would be uncertain and the future just like the past would be present before its eyes."

Pierre Simon Laplace, *A Philosophical Essay on Probabilities* (1814)

The origin of positivism in Economics



J. S. Mill (1806-1873)



Keynes (1883-1946)

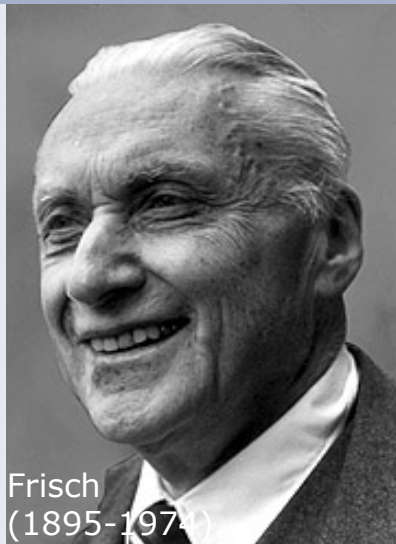
A voice in dissonance

"If we could determine what causes are correctly assigned to what effects, and what effects to what causes, we should be virtually acquainted with the whole course of nature. All those uniformities which are mere results of causation might then be explained and accounted for; and every individual fact or event might be predicted, provided we had the requisite data, that is, the requisite knowledge of the circumstances which, in the particular instance, preceded it." [*J.S. Mill, Of the composition of causes, 1859*]

Refusal of
deterministic reductionism

In Economics, causality refers to the attitudes, contentions and anticipations of purposive agents. Indeterminacy is intrinsic in such human phenomena.

The advent of Econometrics



Frisch
(1895-1974)

An inexhaustible fount of neologisms:

“[Econometrics is] economic theory in its relation to statistics and mathematics, [which unites] the theoretical quantitative and the empirical-quantitative approach to economic problems [with] constructive and rigorous thinking similar to that which has come to dominate in the natural sciences” (*Frisch, Editor’s Note, Econometrica, 1933*)

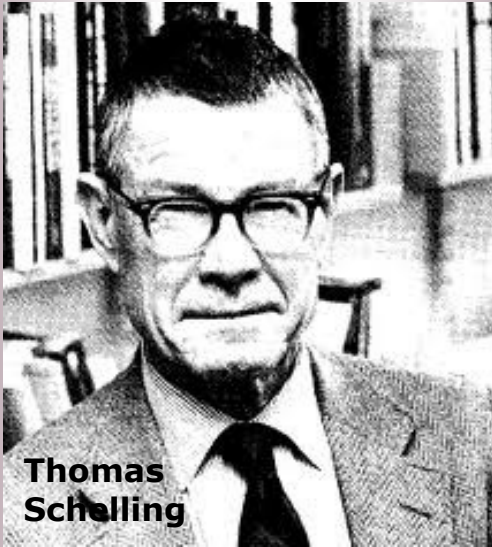


Lucas (1937)

The deep rest

The Revolution in Macroeconomics

Lucas argued that economic theory implies that preferences and technology are invariant to the rule describing policy but that decision rules describing the behaviour of private agents are not



The first paper in Economics of Complexity:

Thomas Schelling (1971)
"Dynamic Models of Segregation, "
Journal of Mathematical Sociology



CAS (Complex Adaptive System), a definition:

"Systems that involve many components that adapt or learn as they interact" (Holland, 2006)

Shared major features:

Parallelism, conditional action, modularity (i.e. building blocks), adaptation and evolution

Some reached objectives

Santa Fe Institute



Steven Durlauf

Special Issue on markets as CAS
The Economic Journal, June 2005



Sheri Markose

Computability and Evolutionary Complexity

Macroscopic properties cannot be formally or analytically deduced from the properties of its parts

Simple micro behavioural rules result in a self-organised macro outcome

Stylized facts about Complex Adaptive Systems: lock-ins, path dependence, network effects, nonlinearities from thresholds and self-referential calculations, power law distributions, long memory and fat tails

ACEs' models are computer-based artificial environments employed to simulate dynamics from large numbers of interacting agents with varying levels of computational and adaptive intelligence



The shadow of the Demon of Laplace



The dark side of analogy

Anderson (1923)



Take a breath

MORE IS DIFFERENT

Complex "Macroscopic" properties may be the collective effect of many simple "microscopic" components

"Real world is controlled ...
by the exceptional, not the mean;
by the catastrophe, not the steady drip;
by the very rich, not the 'middle class'.
...thus, we need to free ourselves from
'average' thinking."

End of Part I

LETTURE FACOLTATIVE, PER CHI VUOLE APPROFONDIRE GLI ARGOMENTI TRATTATI

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Drakopoulos, S. and Torrance, T. (1994) Causality and determinism in economics, *Scottish Journal of Political Economy*, 41(2)

Loucxa, F. (2007), *The Years of High Econometrics: A Short History of the Generation that Reinvented Economics*, London and New York, Routledge

Waldner, D. 2002 "Anti Anti-Determinism: Or What Happens When Schrödinger's Cat and Lorenz's Butterfly Meet Laplace's Demon in the Study of Political and Economic Development", paper Prepared for delivery at the 2002 Annual Meeting of the American Political Science Association, August 29 – September 1, 2002. Copyright by the American Political Science Association