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Vesna Jablanovic
**Budget deficit and chaotic
economic growth models**

The application of chaos theory
in the analysis of the budget deficit growth



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1. Introduction

1.1. The Lakatosian neo-Walrasian research program and chaos theory

The economic method as a scientific method is the process by which scientists create consistent representation of the economic reality [Jablanovic (1998,1999, 2000, 2005, 2006, 2008, 2010)].

The economic method consists of four phases: (i) observe of a economic phenomenon or group of economic phenomena ; (ii) set up the hypothesis to explain the economic phenomena and / or the relation between economic phenomena; (iii) predict the existence of other phenomena, and / or the relation between economic phenomena, or to predict quantitatively the results of new observations; (iv) perform the experimental tests (if it is possible) of the predictions by several independent experimenters and properly performed experiments.

The economic method is characterized by the predictive power. If the predictions of an economic theory are found to be in disagreement with new economic reality, the theory may be discarded as a description of reality, but it may continue to be applicable within a limited range of measurable parameters.

New economic theories are first assumed to fit into the existing theoretical framework. If the new economic phenomenon cannot be accommodated than the theory should be modified.

Changes in scientific thought need the change of the scientific method.

Lakatos' contribution to the philosophy of science was an attempt to resolve the perceived conflict between Popper's theory which implied

that new theories may be inconsistent with apparently empirically well supported older theories, and the revolutionary structure of science described by Kuhn.

For Lakatos, a succession of slightly different theories and experimental techniques is called 'irrefutable' 'hard core'. Lakatos called the changing collections of theory 'Research Programmes'. On the other hand, protective belt is consists of auxiliary hypotheses. A research programme contained 'methodological rules.

The Lakatosian research programme consists of methodological rules: some tell us what paths of research to avoid (negative heuristic), and others what paths to pursue (positive heuristic).

A Lakatosian scientific research program has several elements:

- Firstly, it has a hard core of irrefutable proposition. Hard core, as the set of axioms for a program is to be accepted as true;
- Secondly, there are the positive heuristic (i.e. metarules that indicate how the hard core can generate falsifiable theories) and the negative heuristic (i.e. propositions that protect the hard core from criticism);
- And, finally, protective belt which contains theories to be tested.

A scientific research program is progressive if successive theories in protective belt represent progressive problem shifts. Degenerative research program is opposite.

The neo-Walrasian research program is characterized by its hard core, its heuristics, and its protective belt. (E. Roy Weintraub, 1985)

The hard core hypothesis are:

- There exist economic agents.
- Agents have preferences over outcomes.

- Agents independently optimize subject to constraints.
- Choices are made in interrelated markets.
- Agents are perfectly informed.
- Observable economic outcomes are coordinated.

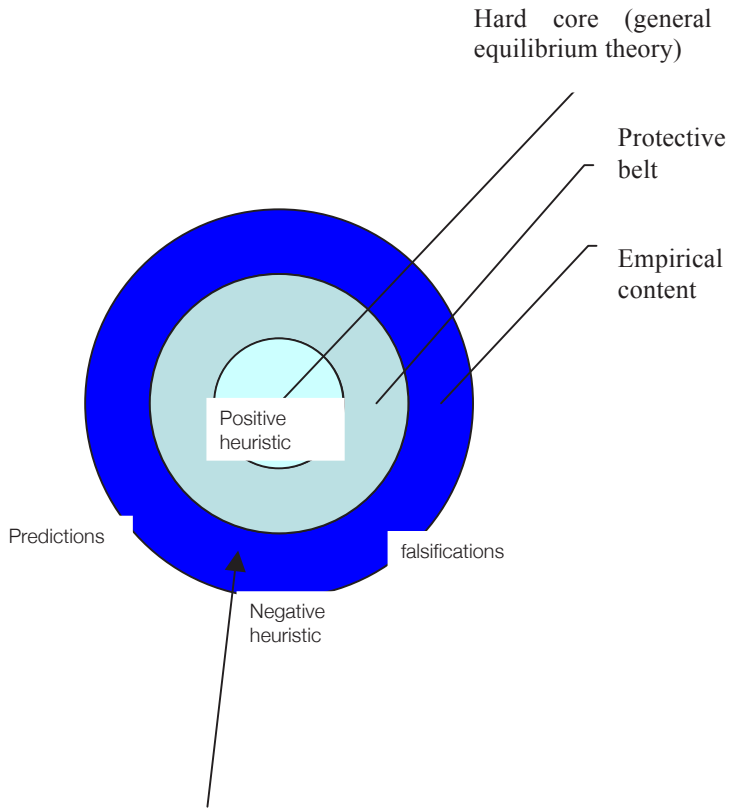
The positive heuristics of the program consist of proposition like the following:

- Create theories in which economic agents optimize.
- Create theories that make predictions about changes in equilibrium states.

The negative heuristics of the program consist of proposition like the following (E. Roy Weintraub, 1985):

- Do not create theories in which irrational behavior plays any role.
- Do not create theories in which equilibrium has no meaning.
- Do not test the hard core preposition.

Economic methodologists and philosophers of science must study development not only of the economic theories but also of the economic methods. In this sense, it is inconceivable that an understanding of the economic theory can proceed without understanding of the development of chaos theory.



Chaos theory has significantly changed the methodology of economics.

Figure 1.1.1. Neo-Walrasian research programme and chaos theory