

Rational deconstruction of rational reconstruction

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Abstract

Imre Lakatos' impressive historiographical methodology has served as the foundation of several works in the history of science. The method is closely related to his philosophy of science, the so called methodology of scientific research programmes. This paper attempts to provide a criticism of the Lakatosian method by providing a detailed analysis of a historical case study from the field of the history of economic thought, namely Philip Mirowski's thesis concerning the impact of physics on the marginalist revolution in economics. I will reconstruct Mirowski's reconstruction explicitly in Lakatosian terms and show that the consistent application of Lakatos' historiography leads to contradictions.

Keywords

philosophy of science · history of science · historiography · Imre Lakatos · rational reconstruction · history of economic thoughts

“Philosophy of science without history of science is empty; history of science without philosophy of science is blind” [14, 102]

Introduction

How should we interpret the first sentence of Lakatos' [14] a paraphrase of Kant's famous dictum? Is it worth the trouble reviewing the methodology of scientific and historiographical research programmes 40 years after their first publication? Especially in light of the fact that there have been works with case histories of particular sciences using Lakatos' methodology. Furthermore, what is the difference between a historically sensitive “theory of scientific rationality” [14, p 103] and other philosophical concepts of science from the viewpoint of a historian? The paper attempts to answer these questions.

In Imre Lakatos' theory of appraisal history of science plays a key role. In particular, he suggests that methodologies can be commensurated and evaluated with the help of history of science. In this paper I point out an ambiguity in the Lakatosian framework that has several consequences regarding the entire Lakatosian historiography.

Firstly, I shall briefly discuss the role of the history of science in the Lakatosian system and outline the main components of his philosophy of science, which is inevitable for further investigations. Secondly, I will outline Lakatos' historiographical method and analyze the role of history of science in the Lakatosian framework. Thirdly, I shall illustrate my theoretical problems with a historical case study from the field of the history of economic thought. The case study will focus on Philip Mirowski's thesis concerning the impact of physics on the marginalist revolution in the history of economic thought [20, 21]. I will reconstruct Mirowski's thesis explicitly in Lakatosian terms and thus show that several parts of his thesis – which is based on the Lakatosian historiography – are untenable exactly because of the Lakatosian methodology. At the end of this article I shall summarize my findings.

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Methodology of scientific research programmes

Lakatos' philosophy of science is a 'transitional' concept between the theories of scientific rationality – which stem from the empiricist-positivist tradition – and the post-kuhnian tendencies. Lakatos criticizes both the logical positivist and Popperian standpoint concerning scientific theories and demarcation criteria as well as Kuhn's and Feyerabend's concept of 'over-emphasizing' irrational aspects of scientific change. He appreciates Kuhn's and Feyerabend's historical approach but stays within the Popperian boundaries because of his conviction regarding scientific rationality. Consequently, he intends to generate a theory of scientific rationality which is free from the shortcomings of his predecessor's works and in which history of science takes a crucial role. At this point we shall briefly discuss those basic concepts of the Lakatosian framework, which is inevitable for further investigations.

The central element, the so called *scientific research programme* is a series of theories that can be appraised in the light of rational criteria which can also be rationally evaluated. In relation to the *demarcation problem* Lakatos mentions:

"It is a succession of theories and not one given theory which is appraised as scientific or pseudo-scientific. But members of such series of theories are usually connected by a remarkable continuity which welds them into research programmes" [13, p 47].

A scientific research programme constitutes a theoretically progressive problem-shift "if each new theory has some excess empirical content over its predecessor, that is, if it predicts some novel, hitherto unexpected fact" [13, p 34] and in addition it constitutes an empirically progressive problem-shift "if some of this excess empirical content is also corroborated, that is, if each new theory leads us to the actual discovery of some new fact" [13, p34]. In case of both theoretical and empirical progressivity the research programme is called progressive, otherwise the case is labelled as degenerating¹.

In a research programme isolated theories are linked by the positive and negative heuristics. The positive heuristics of the programme outlines the problems, problem-solving strategies and procedures to follow, while negative heuristics "tells us what paths of research to avoid" [13, p 47]. The negative heuristics delimits the 'hard core' – another characteristic element of the research programme – which contains irrefutable principles, assumptions, etc. that can never be modified because of meeting counter-evidences or any other methodological decisions, in spite of the 'protective belt' of auxiliary, observational etc. hypotheses "which has to bear the brunt of tests and get adjusted and re-adjusted, or even completely replaced, to defend the thus hardened-core" [13, p 48].

Lakatos combines certain elements of conventionalism and

¹ More precisely, if the members of the series of theories provide only post-hoc explanations to empirical facts, then the research programme is called stagnant.

falsificationism. The continuity of scientific growth is 'justified' by accepting spatio-temporally universal theories by convention instead of accepting singular factual statements. However, the evaluation of these theories has to be made using "hard Popperian elements" [14, p 112]. Therefore, the historical research based on the Lakatosian concept is a "long-extended theoretical and empirical rivalry of major research programmes, progressive and degenerating problem-shifts, and the slowly emerging victory of one programme over the other" [14, p 118].

"The most important such series in the growth of science are characterized by a certain continuity which connects their members. This continuity evolves from a genuine research programme adumbrated at the start" [13, p 47].

That is, the hard core, the positive and negative heuristics of the programme had been outlined beforehand but they can only be reconstructed retrospectively. Hence, the Lakatosian history and historiography of science is closely related to his philosophical concept.

The role of history of science

History of science in the Lakatosian framework has a double role. On the one hand it is used as the 'application' of the philosophy of science, on the other hand it is used for evaluating the methodologies suggested by the various concepts of the philosophy of science. Let us turn to the first problem, as the second one is not relevant in this paper.

At first Lakatos argued that "philosophy of science provides normative methodologies in terms of which the historian reconstructs 'internal history' and thereby provides the rational explanation of the growth of knowledge" [14, p 102] Writing an internal history or rationally reconstructing the history of a science often results in forcing our present viewpoint of scientific problems on the past, i.e. declaring how 'things ought to have happened'.

"It is not only the ('internal') success or the ('internal') defeat of a programme which can be judged only with hindsight: it is frequently also its content" [14, 119].

Certainly all philosophical concepts of science suggest different historiographical methodologies and result in different rational reconstructions. In practice historians committed to different philosophical trends present different accounts on the same topic. As an illustration considers the most influential „modern methodologies or logics of discovery" [14, p 103], which outline philosophical theories of science as sets of "(possibly not even tightly knit, let alone mechanical) rules for the appraisal of ready, articulated theories. Often these rules, or systems of appraisal serve as 'theories of scientific rationality', 'demarcation criteria' or 'definitions of science'." [14, p 103] The four methodologies to be analyzed are *inductivism*, *falsificationism*, *conventionalism* and Lakatos' own philosophical concept, the *methodology of scientific research programmes*.

"The internal history of *inductivists* consists of alleged discoveries of hard facts and of so-called inductive generalizations.

The internal history of *conventionalists* consists of factual discoveries and of the erection of pigeonhole systems and their replacement by allegedly simpler ones” [14, p 118]. A ‘pigeonhole system’ can be any kind of organization of historical facts into a coherent whole, which is based on a convention. “But the conventionalist does not regard any pigeonhole system as provenly true, but only as ‘true by convention’ (or possibly even as neither true nor false)” [14, p 105]. For a conventionalist historian the ‘guiding principle’ of scientific change is the pursuit of simplicity and not the growth of ‘true-content’. The falsificationist historian emphasizes the significance of falsifiable theories based on bold conjunctures that are on the one hand ‘scientific’, because they can be brought into conflict with a basic statement, and on the other hand ‘content-increasing’, i.e. they predict ‘novel facts’ which are unexpected in the light of previous knowledge. The logic of falsificationism implies that the most important historical events are negative crucial experiments². The significance of these negative crucial experiments is determined by the significance of the falsified theory.

And, finally, according to the *methodology of scientific research programmes* „the great scientific achievements are research programmes which can be evaluated in terms of progressive and degenerating problem-shifts; and scientific revolutions consist of one research programme superseding (overtaking in progress) another. This methodology offers a new rational reconstruction of science” [14, p 110].

Lakatos combines certain elements of conventionalism and falsificationism. The continuity of scientific growth is ‘justified’ by accepting spatio-temporally universal theories by convention instead of accepting singular factual statements. But the evaluation of these theories has to be made using „hard Popperian elements” [14, p 112]. Therefore, historical research based on the Lakatosian concept is searching for “long-extended theoretical and empirical rivalry of major research programmes, progressive and degenerating problem-shifts, and the slowly emerging victory of one programme over the other” [14].

Lakatos points out that any internal history or rational reconstruction “needs to be supplemented by an empirical (socio-psychological) ‘external history’” [14, p 102], the role of which is to explain those elements of history that cannot be included in a theory of rationality. The situation of the ‘demarcation-line’ between the external and the internal history depends for the most part on the chosen methodology. For example the adherence to a falsified theory becomes an irrational external factor in a history which is based on falsificationist methodology. But in the case of the methodology of scientific research programmes a “pigheadedness” and the “modesty” [14, p 113] – because even if a research programme is lagging behind, may still stage a comeback – is inherently rational. In addition the “successful predictions of novel facts (i.e. that a discovery of a fact preceded or followed a theory) are irrelevant both for

² A detailed analysis of the role of crucial experiments is Lakatos 1978c.

inductivists and falsificationists, (...) only their logical relation is decisive” [14, p 114]. By contrast, in the methodology of scientific research programmes these anticipations of novel facts are indicative of progressivity and constitute with the priority disputes³ the vital part of the internal history. However, the Lakatosian methodology cannot even explain the different speeds of development, which are influenced by political or psychological factors. These aspects of development have to be indicated in the footnotes, which are to reconstruct the external history.

An illustration: the Mirowski thesis

In order to illustrate⁴ these problems let us now examine a case study from the field of the history of economic thought. The Lakatosian historiographical concept is a very popular approach among historians of economic thought. There are numerous papers [3, 6, 7, 11, 16] and books [4, 18] that advocate applying the methodology of scientific research programmes. [22] gave an explanation to this popularity, although the Lakatosian concept was and has been reconsidered also by historians of economics (see [1, 2, 8]).

Our case study is centred around two works by Philip Mirowski [20, 21]. Although Mirowski does not explicitly consider himself a Lakatosian historian, the spirit of Lakatos can be discovered in the structure of his reasoning. He follows the methodology of historiographical research programmes in its very clear form suggested by Lakatos. On the one hand, he provides a formal reconstruction supplemented by external explanations, and then *appraises historical facts based on that reconstruction*. As Blaug (2009) mentions it “must be about the best example one can find in the literature of a ‘rational reconstruction’ masquerading as a ‘historical reconstruction’” [5, p 285].

Mirowski [20, 21] explores the ‘transition’ from classical political economy to neoclassical economics during the second half of the 19th century, i.e. the so-called *marginalist revolution*. The often misleading expression ‘revolution’ is frequently applied by historians of economics because of the fundamental changes introduced by the marginalists. The outstanding, leading marginalist authors of this period: William Stanley Jevons [12], Léon Walras [23] and Carl Menger [19] concentrated, in contrast to classical political economists, on the microfoundations of economics. They postulated a utilitarian theory of value and tried to create an abstract, yet precise language for their investigations to separate economic theory from the policy and

³ According to Lakatos occasionally his methodology constitutes a narrower scope for internal history: „For instance there may have been an experiment which was accepted instantly – in the absence of a better theory – as the crucial experiment. For the falsificationist such acceptance is part of internal history; for me it is not rational and has to be explained in terms of external history” [14, p 116].

⁴ The illustration can be considered as the continuation or accomplishment of the Lakatosian project, i.e. the evaluation of methodologies with the help of a presented history of science.

business applications.

Mirowski [20,21] focused on the analogies between the structures of the theories of economics and physics, as well as on the use of mathematics in economic theory. In his explanation the main effect of the transition to marginalism is supported by changes in contemporary physics: “[T]here was a readily identifiable discontinuity in economic thought in the 1870s and 1880s which was the genesis of neoclassical theory; and both its timing and intellectual content can be explained by parallel developments in physics in the mid-nineteenth century” [20, p 363].

Later he detailed his concept in a voluminous book [21], in which he extended his scope. He also considered the neoclassical theory of production in a separate chapter and broadened his theory to include the period of classical political economy by analysing the role of physical metaphors. In this paper let us focus on his original idea concerning the neoclassical consumption model.

The central element in Mirowski’s argumentation is the analysis of the *structural and conceptual similarity* between neoclassical consumption theory and analytical mechanics⁵. First he takes the canonic (as a matter of fact, also the actual⁶) form of the two theories and gives a rational – what is more: formal – reconstruction, in which he links physical and economic quantities (displacements⁷ and quantities to be consumed, forces and prices, potential energy and utility, respectively) by designating them with the same symbols. Following this formalisation he shows that by applying the Hamiltonian principle of least action⁸ – which is closely related to conservation principles – we will obtain the crucial differential equation of motion (on a *minimal* energy level) in mechanics and the differential equation of exchange⁹ (which provides *maximal* utility to agents) in economics. Thus he concludes that the mathematical structures of these theories are similar.

He bases his reconstruction on the work of Irving Fisher [10], who actually dealt with the analogy between the two theories. Concerning the conceptual similarity of analytical mechanics and economics Mirowski only emphasizes the ‘mystic’ neoclassical concept of utility:

“In exact parallel to the original concept of potential energy, these utilities are unobservable and can only inferred from theo-

⁵ The principal methods of analytical mechanics are suited to be generalized to other fields of physics, but Mirowski (1984 and 1989) only uses mechanical quantities in the reconstruction, although he argues for that physics of the 19th century is not already *mechanistic*.

⁶ The relevant parts of analytical mechanics of the period do really not differ too much from their present forms; this is not at all the case with respect to neoclassical consumption theory.

⁷ More precisely generalized coordinates.

⁸ The Hamiltonian action function (the time integral of the difference of kinetic and potential energy) has a stationary point along the motion of the system, or in other words the first variation of the Hamiltonian action function equals zero.

⁹ The ratio of marginal utilities equals to the ratio of prices (under certain technical conditions concerning the utility function to be analysed).

retical linkage to other observable variables” [20, p 368].

In his reconstruction Mirowski [20, 21] also investigates the biography¹⁰ and publications of leading marginalists. On the one hand, he shows that the majority of authors (Jevons, Walras, Pareto, Edgeworth, Antonelli) were more or less familiar with physical theories of the period. On the other hand, by examining concrete texts, he emphasized that marginalists often used physical metaphors in their explanations and wrote about methodological similarities between the two disciplines.

To sum up the thesis, Mirowski [20, 21] intends to provide an explanation by the detailed examination of the appearance of a physical metaphor (1) to the origin of the ‘strange’ neoclassical concept of utility, (2) to the mathematization (or the use of *conditional extremum calculus*) of economic theory in the period and (3) to the success¹¹ and parallel discovery¹² of neoclassical theory.

Moreover, Mirowski addresses the question why Menger – who is generally mentioned as a member of the marginalist ‘triumvirate’ – did not use any mathematics in his works, and why Marshall – who is generally considered the person that clarified and synthesized neoclassical theory – abandoned physical metaphors and used minimal mathematics in his famous book [17]. Therefore, Mirowski [20, 21] discusses the role of Menger¹³ and Marshall separately, and gives some additional historical explanations.

Mirowski’s concept has at least two remarkable features. On the one hand, when speaking about physical metaphors, he always refers simply to conservation principles (and in this manner speaks generally about the “energetics metaphor”) and treats extremum principles, field theory and conservation principles as the same thing¹⁴. On the other hand, he expresses hard criticism¹⁵ and makes several normative statements – based on the actual state of neoclassical theory as the ‘end product’ of the development of economic thought – against certain neoclassical authors (mainly concerning their natural scientific competencies).

¹⁰ Mirowski [20, 21] focuses mainly on letters and personal relations between marginalists and (natural) scientists.

¹¹ This is explained mainly by the declaration of physics-like scientific features in economics.

¹² Jevons, Menger, and Walras published their works independently, in three different languages in three different countries. At the time of publication there was no contact among them.

¹³ About the role of Menger, Mirowski [20] states that “Austrians were not neoclassicals” [20, p 370]

¹⁴ This identification is not at all evident, neither in mathematical, nor in historical or philosophical [9] sense. Mirowski [20, 21] does not cite any argument for the identification.

¹⁵ “[O]ne can venture a broad inductive generalization from past patterns: that a substantial non-neoclassical economic theory will distinguish itself by consciously repudiating the energetics metaphor” [20, p 377].

The Mirowski-thesis as a historiographical research programme

At this point let us reconsider Mirowski's thesis explicitly in Lakatosian terms, i.e. let us identify a historiographical research programme, which deals with a scientific research programme. According to the thesis, the central element of the neoclassical scientific research programme is the 'energetics metaphor' (classical field theoretical approach¹⁶ to conservation principles) as the *hard core*. The *positive heuristics* of the programme consists of the annexion of the scientific methodology of physics (and, as a consequence, the conditional extremum calculus), the research of the analogous versions of physical concepts (in this context, the introduction of a quantitative utility-concept and the postulation of a special utilitarian theory of value) and, finally, the extension of the system to other fields of economic problems, mainly to the production theory and the general equilibrium theory. The negative heuristics of the programme suggests avoiding the use of non-quantifiable economic concepts and moral philosophical, normative statements. The transition from the cardinal utility approach, which had a physiological character, to the ordinal theory of utility can be considered as the modification of the protective belt.

The hard core of Mirowski's historiographical research programme is that the crucial influence upon the formation and development of certain economic theories is due to the energetics metaphor. The positive heuristics of the programme is the intention to historically explain the formation and development of economic theories based on physical metaphors. The negative heuristics can be avoiding the integration of those authors into the marginalist group who did not apply mathematical tools (e.g. Menger).

As mentioned in the previous section, the central element of Mirowski's rational reconstruction is the structural similarity between two canonic models. According to Lakatos, in all cases when an author 'misunderstood', 'incorrectly or not at all applied' the energetics metaphor, the historian has to generate an external historical explanation. These 'mistakes' can thus be appraised in the light of the internal history, which tells us how things ought to have happened.

In the light of the above, the following normative statement becomes adequate:

"When the physical metaphor is imported into social sphere, neoclassicists were not at all precise about what the conserved entity was, and they have not yet been able to settle this issue" [20, p 374].

It is obvious that the latter problem is problematic only if we use the metaphor of conservation principles as a starting point. Mirowski [21] constantly departs from that metaphor (fixation of the hard core) and, therefore, he finds no or con-

¹⁶ The earlier, substantial approach to conservation principles is the element of the hard core of classical political economy (Mirowski 1989, 4th chapter), if we broaden the Lakatosian reconsideration.

fused explications of a conservation principle made by earlier marginalists¹⁷ But the 'correct explication' has been found neither in the leading marginalists [21, p 250] nor in the case of their followers [21, p 241]. Hence, he accuses them of misunderstanding the physical theory of the time. To confirm this, he cites some disputes among marginalists and people well educated in mathematics and physics¹⁸ Moreover, in a letter of Laurent, the "most constructive person in the debates," Mirowski thinks that by reading between the lines he discovered an *implicit* (!) attempt at the formulation of a conservation principle [21, p 247].

It is not evident whether it is reasonable to call these instances 'mistakes' or 'misunderstandings' and hence whether to consider them parts of the external history, given that there is no author who would confirm something that is claimed by the historian to be the hard core of his historiographical research programme. Let us examine another example to illustrate this point.

Mirowski's rational reconstruction implies that the conserved quantity is the *sum of utility and expenditure* in the neoclassical system. According to Mirowski [21, p 242] the misunderstanding of physical theory is manifested in the fact that if marginalists had been able to identify this as the conserved quantity, then they would have recognized that ontologically different quantities cannot be added to it.

Moreover, Fisher [10] made another 'mistake' according to Mirowski [21]. He constructed a schedule to demonstrate economic and physical analogies. Mirowski [21, p 225] 'completes' this schedule with four more items based on his own concept (see Table 1).

The sum of utility and expenditure is analogous to the total energy, hence expenditure is analogous to kinetic energy. *Allowing for his additional items* [21, p 228] considers Fisher's analogy between force and marginal utility a mistake¹⁹ (in his concept force was analogous with price). Consequently, he brands again something in the original historical document as a 'mistake' in order that the system of norms be fixed by his own historiographical research programme.

According to the internal history one can assert that the neoclassical scientific research programme is degenerating. According to the value judgement of Mirowski it is not 'substantial' (or in Lakatosian terms: the empirical content is only slightly corroborated), moreover, it is somewhat inconsistent or contains a 'category-mistake' because ontologically different quantities are added within it. Within the Lakatosian framework this is a possible and plausible statement. But how can we appraise Mirowski's historiographical research programme?

¹⁷ In the case of Canard [21, p 202], Cournot [21, p 210] and Gossen [21, p 214].

¹⁸ Respectively: Walras-Bertrand [21, p 246], Walras-Laurent [21, p 244–245], Pareto-Laurent [21, p 246] and Fisher-Gibbs [21, p 242].

¹⁹ Mirowski also considers as Fisher's analogy between particle and individual a mistake, but that does not have any important consequence (individuals can be identified with the vectors of consumed quantities or with their preferences, as Mirowski suggests).

Tab. 1.

Mechanics	Economics
a particle	an individual
Space	Commodity
Force	Marginal utility or disutility
Work	Disutility
Energy	Utility
Work or energy=force×space	Utility=marginal utility×commodity
Force is a vector	Marginal utility is a vector
Forces are added by vector addition	Marginal utilities are added by vector addition
Work and energy are scalars	Disutility and utility are scalars
The total energy may be defined as the integral with respect to impelling forces.	The total utility enjoyed by the individual is the line integral with respect to marginal utilities
Equilibrium will be where net energy (energy minus work) is maximum; or equilibrium will be where impelling and resisting forces along each axis will be equal.	Equilibrium will be where gain (utility minus disutility) is maximum; or equilibrium will be where marginal utility and marginal disutility along each axis are equal.
If total energy is subtracted from total work instead of vice versa the difference is "potential" and is a minimum.	If total utility is subtracted from total disutility instead of vice versa the difference may be called "loss" and is a minimum.
Component force along an axis is equilibrium	Price of commodity in equilibrium
Kinetic energy	Total expenditure
Displacement	Incremental unit of commodity
Conservation of energy	Conservation of utility plus expenditure

Mirowski [21, p 224–225] completes Fisher's [20, p 85–86] schedule with the last four items.

If we had been able to make historical predictions in the 1870's concerning the development of the relations between physics and economics, based on the works of the leading marginalists 'infected' by physical metaphors, then this would have indicated the progressivity of the historiographical research programme. The fact that Fisher was indeed interested in analyzing analogies between economics and physical theory 30 years after the marginalist revolution could be considered as a corroborated historical prediction. But Fisher did not write about conservation principles at all. According to Mirowski's assessment:

"What appears most striking about such a comparison is that even Fisher, the most sophisticated scientist among the nineteenth-century neoclassical economists, still displayed an inadequate comprehension of the formalism of the energy concept and, as corollary, a lack of appreciation of the metaphorical dissonances involved. (...)

His chosen tactic was to avoid discussion of the conservation of energy at all costs, even if it meant some misrepresentation of the model appropriated from physics" [21, p 228-230].

Consequently, the coherence of the historiographical research programme can be saved (only) by correcting these 'mistakes' with the help of the internal history (see Mirowski's additional items in Fisher's schedule). But by doing so we have to deem more and more historical facts parts of the external history, which means that the empirical content of the programme shrinks.

At this point we have to pose the question whether it can really be regarded as "inadequate comprehension", "avoided discussion" or "misinterpretation" from a scientist's part if an ele-

ment that the historian considers essential is lacking from his work. Moreover, it is possible to show that, within another reconstruction²⁰, Fisher's analogies form a coherent system²¹ without using the conservation principle at all²². It seems to be erroneous to suppose that Fisher made mistakes by disregarding the metaphor of the energy concept and by forming his analogies differently. He was simply concerned with something totally different. *However, it cannot be regarded as a 'failure' when a scientist follows a line of reasoning which is different from that of the historian.* Even if it were a failure, we would be still facing a distortion of history.

In addition, if we compare Mirowski's historiographical research programme with other programmes and we do not appraise it in itself, we face the problem of erecting a hierarchy of historical facts. For example, let us consider Blaug's historiographical research programme. The hard core of this programme is that marginalist revolution "was not an abrupt change but only a gradual transformation of old ideas" [5, p 291] centred around the maximization principle.

In this framework, the use of physical metaphors becomes

²⁰ The budget set is a holonomic scleronome constraint and consumed quantities are analogous with simple space coordinates and not generalized coordinates.

²¹ The hard core of the historiographical research programme would be worth revising and it would make sense to distinguish the concept of extremum and conservation principles because the earlier one is referred to in the original texts, whereas the latter one is not (as Mirowski also objects).

²² The problem is probably caused by the delimitation and dynamics of the system: "something must be conserved in order to apply the techniques of constrained extrema, the 'maximum principle'" [20, p 374]. As mentioned, there are no mathematical, philosophical or historical arguments for this statement.

part of the external history, but Menger's (and Marshall's) work is an important part of the internal history. Thus, the empirical contents of the two historiographical research programmes are totally different, and if we want to compare them, we have to regard certain facts as more important than others. In order to establish this hierarchy among facts we can turn to any historiographical research programme, but we do not have any independent guidelines.

Summary

In the preceding sections I provided a review and a form of criticism of the Lakatosian historiography and his system of appraisal. After having introduced the basic notions of Lakatos' philosophy of science and historiography, I analyzed Lakatos' train of thought concerning the appraisal of various historiographical concepts and also the related scientific methodologies.

I illustrated my findings by introducing a historical case study from the field of the history of economic thought. The case study aimed at examining the types of problems arising when applying a Lakatosian historiography. The rigid structure of the system of appraisal implies that we have to consider certain historical (often not unimportant) facts mistakes or parts of external history, which are thus not explained by the theory of scientific rationality. The amount of these facts increases drastically in case we widen the extent of the historical period to be analyzed regarding the same historiographical research programme, i.e. the programme gets inevitably degenerating.

Moreover, the situation will be worsened by the interpretation of hierarchy and prediction of historical facts. Interpretations based on an arbitrary rational reconstruction, determined by some hard core dependent value judgement, are very similar to what Lakatos himself called 'distortion of history' in the case of another system of criteria.

References

- 1 **Backhouse R (ed.)**, *New Directions in Economic Methodology*, Routledge, London, 1994.
- 2 ——— (ed.), *Explorations in Economic Methodology: From Lakatos to Empirical Philosophy of Science*, Routledge, London, 1998.
- 3 **Blaug M**, *Kuhn versus Lakatos or Paradigms versus Research Programmes in the History of Economics*, Method and Appraisal in Economics (Latsis S J, ed.), Cambridge University Press, Cambridge, 1978.
- 4 ———, *The Methodology of Economics, or How Economists Explain*, Cambridge University Press, Cambridge, 1980.
- 5 ———, *Economic Theory in Retrospect*, Cambridge University Press, Cambridge, 2009.
- 6 **Coats A W**, *Economics and Psychology: The Death and Resurrection of a Research Programme*, Method and Appraisal in Economics (Latsis S J, ed.), Cambridge University Press, Cambridge, 1978.
- 7 **De Marchi N**, *Anomaly and the Development of Economics: The Case of the Leontief-paradox*, Method and Appraisal in Economics (Latsis S J, ed.), Cambridge University Press, Cambridge, 1978.
- 8 **De Marchi N, Blaug M (eds.)**, *Appraising Economic Theory: Studies in the Methodology of Research Programmes*, Edward Elgar, Aldershot, 1991.
- 9 **Fehér M**, *Changing Tools*, Akadémiai Kiadó, Budapest, 1995.
- 10 **Fisher I**, *Mathematical Investigation into the Theory of Value and Prices*, Yale University Press, New Haven, 1926.
- 11 **Hutchinson T W**, *On the History and Philosophy of Science and Economics*, Method and Appraisal in Economics (Latsis S J, ed.), Cambridge, 1978.
- 12 **Jevons W S**, *The Theory of Political Economy*, Macmillan, London, 1888. 3rd edition (first published in 1871).
- 13 **Lakatos I**, *Falsification and the Methodology of Scientific Research Programmes*, The Methodology of Scientific Research Programmes (Worall J, Currie G, eds.), Cambridge University Press, London, 1978a.
- 14 ———, *History of Science and its Rational Reconstructions*, The Methodology of Scientific Research Programmes (Worall J, Currie G, eds.), Cambridge University Press, London, 1978b.
- 15 ———, *Criticism and the Methodology of Scientific Research Programmes*, Aristotelian Society, London, 1968.
- 16 **Latsis S J**, *A Research Programme in Economics*, Method and Appraisal in Economics (Latsis S J, ed.), Cambridge University Press, Cambridge, 1978.
- 17 **Marshall A**, *Principles of Economics*, Macmillan and Co., London, 1890.
- 18 **Mair D, Miller A G**, *A modern Guide to Economic Thought: An Introduction to Comparative Schools of Thought in Economics*, Edward Elgar, Aldershot, 1991.
- 19 **Menger C**, *Grundsätze der Volkswirtschaftslehre*, New York University Press, London, 1871.
- 20 **Mirowski P**, *Physics and the 'Marginalist Revolution'*, Cambridge Journal of Economics **8** (1984), 361–379.
- 21 ———, *More Heat than Light: Economics as a Social Physics, Physics as Nature's Economics*, Cambridge University Press, Cambridge, 1989.
- 22 **Redman D A**, *Economics and the Philosophy of Science*, Oxford University Press, Oxford, 1993.
- 23 **Walras L**, *Éléments d'économie politique pure; ou théorie de la richesse sociale*, El Corbaz Lausanne, 1874.