

Władysław Milo

The Fundamentals of Economic Research



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Władysław Milo

The Fundamentals of Economic Research

Władysław Milo – University of Łódź, Faculty of Economics and Sociology
Institute of Econometrics, 90-214 Łódź, 41 Rewolucji 1905 St.

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Contents

Preface	9
Chapter 1. Truth and causes	13
1.1. Introduction	14
1.2. Notions of truth	15
1.2.1. Truth definitions	17
1.2.2. Determinants of quality of truthfulness criteria	27
1.3. Notions of cause	32
1.4. Criteria for causality	54
1.5. Final notes	62
Bibliography	63
Chapter 2. On randomness	73
2.1. Introduction	74
2.2. Qualitative concepts of randomness from antiquity until the XIX c.	75
2.3. Final remarks	93
Bibliography	94
Chapter 3. Isomorphisms, homeomorphisms, models and modeling	97
3.1. Introduction	98
3.2. Homeomorphisms and Isomorphisms	99
3.2.1. Intuitive characterizations of Homm & Isomm	99
3.2.2. Formal characterizations of Homm	104
3.2.3. Isomorphisms	106
3.3. Homeomorphism, isomorphism and models	112
3.3.1. Category of model	114
3.4. Principles of and problems related to modeling	120
3.5. Final remarks	126
Bibliography	126

Chapter 4. On models and modeling	129
4.1. Introduction	129
4.2. The essence of models	130
4.2.1. Fundamental questions	132
4.3. Domains and co-domains of models	140
4.4. Kinds of models	143
4.5. More specific forms of models	148
4.6. Modeling and principles of modeling	150
4.7. Models and modeling in economics	162
4.8. Final remarks	170
Bibliography	171
Chapter 5. On expectations. Part I	175
5.1. Introduction	175
5.2. Concepts of rationality	178
5.3. Rational expectations and rational predictions	183
5.4. Adaptive rational expectations and predictions	188
Bibliography	192
Chapter 6. On expectations. Part II	195
6.1. Introduction	195
6.2. Non-adaptive rational economic expectations: theories and models	197
6.2.1. H. Working's theory of rational economic expectations	206
6.2.2. J. Muth's theory of rational economic expectations . .	209
6.2.3. R. E. Lucas, Jr.'s theory of rational economic expectations	214
6.2.4. T. J. Sargent's theory of rational economic expectations	219
Bibliography	226
Chapter 7. On expectations. Part III	229
7.1. Introduction	229
7.2. Remarks on J. M. Keynes' and H. Working's theories of expectations	230
7.3. Remarks on J. Muth's theory of rational expectations	234
7.4. Remarks on R. E. Lucas' and T. Sargent's theories of rational economic expectations	236
7.4.1. Lucas' theory	236
7.4.2. T. J. Sargent's theory	239
Bibliography	243

Chapter 8. Methodological problems of choosing the instruments and effects of monetary policy	245
8.1. Introduction	246
8.2. Tools of monetary policy	250
8.3. Effects of monetary policy tools	258
8.4. Final remarks	266
Bibliography	268
Chapter 9. Calculus of potentials in physics, mathematics and economics	271
9.1. Introduction	271
9.2. The measurement and calculus of potentials in physics	272
9.3. The measurement and calculus of potentials in mathematics	280
9.3.1. Classical results	280
9.4. Non-classical results	289
9.5. Measuring potential in economics	290
9.5.1. Examples of empirical applications	296
Bibliography	298
Chapter 10. On theories and theorizing	303
10.1. Introduction	303
10.2. Theories in logic	304
10.3. Theories in mathematics	307
10.4. Theories in some other fields of science	309
10.5. Final remarks	316
Bibliography	317

Preface

Being a researcher in the field of economics requires broad cognition of the history of economics, including understanding the development of particular economic institutions and knowledge of historical facts and phenomena. In addition, especially recently, it requires advanced knowledge in the principles of measurement, the gathering, processing and analysis of electronic data, transparent description of facts and phenomena, explanation of data generating processes (DGP), methods of collating facts and making predictions, as well as methods of assessing the quality of the decisions of economic agents.

In order to satisfy these requirements, an empirical economist should aim at being able to build, by himself, empirical forecasting and/or practical decision making tools that are useful for large companies, banks, central banks or government, either at local or central level.

I share the view that in order to formulate a good economic theory or models that describe a given real economy well, an economist, or econometrician, should have long experience in economic modelling and be open to new ideas of economic theorizing and modelling. The advantages of practical experience in dealing with accounting principles are seen in the treatment of equilibria, e.g. in the texts of L. Walras and J. M. Keynes.

Having made the above remarks, it should also be added, that it is important to have access to current knowledge in the fields of logic, mathematics, computer science and statistics. Such knowledge and its repeated use help to develop habits with the goal of writing texts concerning economics at an academic standard close to the standards of the so called natural sciences (e.g. physics, chemistry, engineering).

The use of logic in economics can be easily seen in the texts, of e.g. J. J. Mill, W. Jevons, J. M. Keynes and B. Stigum. The language and rules of mathematical reasoning are commonly used by mathematically or quantitatively oriented economists, such as A. Cournot, M. Allais, L. Walras, A. Marshall, I. Fisher, P. Samuelson, R. Solow, R. Frisch, O. Lange,

M. Kalecki, D. Kreps, W. Eichorn, R. Allen, K. Arrow, G. Debreu, J. Nash, B. Stigum and K. Wicksell.

The practical use of econometrics and statistics is easily seen in the publications of, among others, J. Tinbergen, J. Cramer, O. Krelle, L. Klein, D. Hendry, W. Welfe, A. Baron, W. Maciejewski, W. Charemza, V. Dlouhy, R. Fair, J. Gruber, B. Hickman, J. Kornai, M. Nerlove, Z. Pawłowski, R. Wuandt, I. Sujan, K. Wallis, W. Milo, E. Pentecost and C. Papazoglou.

There is also a group of economists and econometricians that are theoreticians, i.e. they have solid foundations of knowledge in logic, mathematics, economics, and possibly in sociology and social psychology. Having this knowledge and great intuition, they can propose innovative theories and formal models of these theories and sometimes draw very unusual conclusions that are practically verifiable and important. Their propositions are often very influential, both theoretically and practically.

From the point of view of theorizing, modelling, forecasting and decision making, it is very important to recognize and understand the essence of fundamental concepts used in economics.

This monography presents and discusses the following categories of concepts:

- truth and causes (Chapter 1),
- randomness (Chapter 2),
- isomorphism, homomorphism, models, modelling (Chapter 3),
- models, modelling (Chapter 4),
- expectations (Chapter 5, 6, 7),
- instruments of monetary policy, the effects of their use (Chapter 8),
- potentia, calculus of potentias (Chapter 9),
- theory, theorizing (Chapter 10).

The presentation and discussion of these concepts include their historical roots, differences in their interpretation at various periods of time, their role in the development of science, and economics in particular, their usefulness in solving theoretical and practical problems in research and everyday life, perspectives for concrete applications, as well as technical thresholds and barriers to their theoretical and practical use. In addition, the idea of types of knowledge is discussed.

The first three chapters concern the general cognitive foundation of economic research, which is important for further reading and reflection. Chapters 4 and 5 should also be useful for researchers not involved in the field of economics. Chapters 6–9 strictly relate to economics, both in form and content. They present the author's thoughts on the essential purpose of economics and the usefulness of the categories discussed earlier.

The structure of the book is based on the relationship between concepts rather than on particular fields, although this is often not editorially pointed out. The main subjects of the text are the principles of modelling and theorizing and their usefulness to economists, treated broadly from the perspective of the methodology of science. Due to space constraints, some highly important scientific ideas are not addressed here, such as equilibrium, force (also as an economic concept), methods of measurement, mereological principles, games and entropy. However, they obviously deserve deep discussion within the framework of economics.

In the course of writing this book, I was lucky to have the technical support of Anna Krysińska, Dr. Paulina Malaczewska, Dr. Maciej Malaczewski, Dr. Dominika Machowska, Dr. Anna Michalak and Dr. Mariusz Górajski (in preparing the electronic version of the text), as well as Dr. Magdalena Ulrichs for carrying out econometric computations that illustrate the usefulness of statistical measures of potential GDP. I am very grateful to all of them. I express very special thanks to Prof. David Ramsey for reviewing and editorial contribution, which helped to improve essentially the clarity of the text. Special mention deserves Prof. Marek Gruszczyński, the University of Łódź Press reviewer, to whom I am obliged for many suggestions and critical remarks that helped to improve the reception of this book.

Chapter 1

Truth and causes

Summary

This chapter contains a synthetic treatment of the historical evolution of the concepts of truth and cause, as well as some recent conclusions about semantic content in the notions of truthness and causality. It should be stressed that these concepts were used by French and UK economists from the XVII c. and later by, among others, German, USA, Austrian, Spanish, Latin, Polish, Hungarian, Swedish and Italian economists. They used these notions according to their common intuitive meaning. In the English language literature, the first examples of a more formal use of these concepts was probably initiated in econometrics by H. Wold (1960), R. L. Bassman (1965, 1988) and C. W. J. Granger (1969, 1980). Later, the topics of causality were broadly discussed by, among others, K. D. Hoover (1990, 2001), S. F. LeRoy (1995), D. Hendry (1995), C. Sims (1972), A. A. Zellner (1979), J. Woodward (1995). The text presented below refers to some of the author's own texts written in Polish, e.g. W. Milo (2013, 2014), as well as to a very rich literature, mainly in the English and Polish languages. The results of our discussions will be illustrated by considering chosen texts of A. Smith, and remarks are made on the empirical verification of causality and truthness.

Keywords: truth, cause, truthness, causality, criteria for truthness, criteria for causality, causality and correlation.

1.1. Introduction

Truth and cause were and remain categories of notions. They have been the subject of hot debates from antiquity to the present. Such discussions have been carried out by representatives of all fields of science, arts, professions, age groups, nations and races, both theoreticians and practitioners. In economics, the positive role of these categories was particularly underlined by T. Koopmans and H. Simon from the Cowles Commission, as well as, R. Frisch, J. Tinbergen, O. Lange, M. Kalecki, J. M. Keynes, M. Allais, C. Granger, H. Wold, R. Bassman, R. Strotz, and later, e.g. B. Stigum and K. Hoover. Our presentation of 38 notions of truth and more than 30 notions of cause is mainly based on *Corpus Aristotelicum* written by Andronikos from Rhodos (I c. B.C.), and known to us e.g. from its Polish translation in 9 Volumes with ancient and modern commentaries taken from the appropriate translations into the main European languages. If there are errors in these interpretations, the author takes responsibility for them. It is hard to say today whether our modern understanding of the 7 ancient Greek words for “truth” and 67 words for “untruth”, as writes J. Woleński, is exactly the same understanding as ancient Greeks used in day to day life. Similar remarks may be formulated for the words “cause” and “uncause”. A growing tendency can be observed, beginning in the XIX c., among both scientists and non-scientists to accept the view that we cannot recognize the precise causes of real life facts, events, phenomena and processes and the truth about them is hidden, latent. Thus the only thing we can do is to estimate the probabilities of their occurrence. This stance has been accepted even by physicists, chemists, engineers, physicians and economists.

Nowadays, in all types of sciences, as well as the life of societies, the language of stochastics is in common use as a way to speak about our ignorance regarding why something happens. The question of how has become more often asked than question of why, because of the ideological impact of the Enlightenment and Positivism, together with the rapid progress in inventing new tools of measurement, production and experimentation. The XX c. technological revolution, resulting in the massive use of personal computers and smartphones, as well as easy access to user-friendly programming packages carrying out logical and mathematical computations and presenting multidimensional graphics, has created natural grounds for making empirical research accessible and enjoyable – research connected with simple questions of how empirical processes behave and what are the chances of their patterns of evolution repeating in the future.

Throughout the history of modern economics, XVIII–XXI c., the question of why has always had an important status. Economists and financiers are keen to infer the causes of economic facts, events, phenomena and processes. In this respect, they have used deterministic analysis and, also very often since the 80-ties of the XX c., empirical analyses based on the results of econometric modelling.

Section 2 presents chosen formulations of the notion of truth from the classical and modern eras. In Section 3, we consider formulations of the notion of cause made by the philosophers of ancient Greece and by more modern thinkers. Section 4 considers practical problems involving the inference of the essential causes of economic phenomena using models based on economic theory.

It is hoped that this brief presentation of the unusually rich history of the development of the notions of truth and cause will be useful to economists who have the need to expand their theories or models by including an analysis involving these concepts.

1.2. Notions of truth

It is known that the roots of notions of truth can easily be found in the everyday use of national (or, in earlier times, tribal) languages. Greek uses the word “*αληθεια*”, in Hebrew we have “*met*” and “*munah*”, in Latin it is “*verum*” or “*verite*”, in German “*Wahrheit*” and in Polish “*prawda*”. In all of these languages, there are nouns and adjectives that commonly enrich the meaning of the word “truth”. In common thinking, the notion of truth still exists as a reference point, despite the fact that post – modernists treat the word in a hostile way.

In order to discuss the concept of truth, it would be instructive to first answer where we should search for and find the truth. There are plenty of fields, places and objects in which it can be found. These are, as follows:

1. The realms of Nature, Science, Arts, Culture, Civilization, Worlds, Universe;
2. Pronouncements, propositions, judgements, sentences, lemmas, theorems;
3. Theories and models of objects, phenomena, processes;
4. Perception, recognition, observation, measurements, awareness, seeing, consciousness, discoveries;

5. Beliefs, opinions, convictions, views, expectations, habits, stereotypes;
6. Feelings, emotions, sensations, impressions, imagination, thrills, will, wants;
7. Descriptions, explanations, analyses, predictions, discussions, corroborations, justifications, proofs, arguments, evidence;
8. Facts, events, phenomena, processes, states of the World, Universe;
9. Acts, actions of the senses, Reason, Mind, human and animal brains, as well as the actions of Nature's elements and particles;
10. Languages (natural, scientific, artificial);
11. Properties, features, attributes of things, objects, processes;
12. Causes, effects, reasons and consequences, relations, functions, mappings, correspondences, homomorphisms, isomorphisms, $A \Rightarrow B$ implications, premises, conclusions;
13. Aims of thinking, acting, and their results;
14. Cognition, knowledge, requirements for: cognition, knowledge, reasoning, analysis, experiments, modelling, theorizing, effective actions, existence of life;
15. Consistency and concordance of thought with reality;
16. Logical value of judgements, sentences;
17. Obviousness, certainty, utility of ideas, notions, principles of thinking, essence of being;
18. Factual understanding of things by observers.

The most general and all-entailing is category (1). It contains both physical objects and their names, as well as, virtual-fictional artifacts.

The most highly psychological are categories (6), (4), (5), which provide both positive and negative stimuli for all the possible activities of economic, political-social agents, as well as scientists.

The categories of notions labelled [2, 3, 7, 8, 10, 11, 12, 13, 14, 15, 16, 17, 18] are especially important for scientists. According to category (9), the truth should be sought by all men, in particular by scientists, artists, and entrepreneurs.

In a certain sense, truth bearers, givers and shelterers or, on the other hand, truth veilers, destroyers, spoilers, humbuggers and misrepresenters are objects belonging to the above categories.

1.2.1. Truth definitions

The following definitions of truth, DT1 – DT26, were adapted from the literature cited at the end of this chapter:

DT1. TRUTH is the well justified, necessary and desired final result of a process of observation.

DT2. SCIENTIFIC TRUTH is a set of reported, observational, factual, indicative sentences and statements about reality concerning nature, society, economics, politics, culture, science, the world, universe, abstract world of ideas and any conclusions logically drawn from them in the form of theses, theorems, axioms, theories and models concerning the quantitative/qualitative relationships between facts, events, phenomena and processes that take place either in the real world or in the abstract world of notions.

DT3. LOGICAL TRUTH is the logical value of propositions, sentences, statements, axioms, lemmas, theorems, scientific laws, theories, models or sentences resulting from the laws of logic based on substituting sentences by expressions of natural or scientific language or truthful logical implications of the type $\alpha \Rightarrow \beta$, α – premiss, β – conclusion.

DT4. ETYMOLOGICAL TRUTH is the meaning, appropriate to the original historical language, of whole pronouncements, propositions, sentences and statements, or parts of theorems and theories.

DT5. RELATIONSHIP TRUTH is the relation between X and Y , where $X \equiv$ thing(s), fact(s), event(s), phenomenon(s) or process(es), and $Y \equiv$ pronouncement(s), proposition(s), sentence(s), axiom(s), theorem(s), law(s), theory(ies) or model(s). A relation can be one of the following: a correspondence, function, mapping, operation, homomorphism or isomorphism.

DT6. LIFE or PRAGMATIC TRUTH is (are) pronouncement(s), proposition(s) or opinion(s) in the form of “life wisdom” that is (are) accepted by the majority of people in a place, region, country or group of countries. These forms of truth are commonly used as the bases for decisions, behaviour, imagination, beliefs, expectations, customs and lifestyle, as well as “unwritten contract(s)” or recorded contracts and accords.

Note 1.1. DT6 should be prominent in empirical quantitative economics, econometrics, social psychology, behavioural psychology and sociology. Some examples of truths of this type are as follows:

- “There are situations when the truth should not be uncovered”, Pittakos (640–569 b.c.). Politicians willingly use this advice;
- “The truth lies in the middle”, Solon (640–559 b.c.);
- “The language of truth is simple”, Eurypides (480–406 b.c.), Aischilos (535–455 b.c.);
- “Useful truth derived from the senses is preferable”, Protagoras (480–410 b.c.);
- “Truthful knowledge comes from Reason, untruthful knowledge from the senses”, Democritus (470–361 b.c.);
- “You cannot recognize truth, while not recognizing cause”, Aristotle (384–322 b.c.);
- “Most people judge others emotionally through feelings of love, expectations, hatred or fear. Only a few judge according to truth or rightness”, “To live is to think”, “The force of habits is great”, Cicero (106–43 b.c.);
- “A greedy man always wants more”, “The masks of truth are misleading”, Horatius (65–8 b.c.);
- “Verum – index sui et falsi”, B. Spinoza (1632–1677);
- “Undiscovered evil grows”, “Work wins everything”, Vergilius (70–19 b.c.);
- “Competition awakens the feeling of indigence and deficiency amongst losers”, Wang Chong (27–97 c.);
- “If language is incompatible with the truth about things, matters do not lead to success”, Kung-fu-cy (551–479 b.c.);
- “Famousness annihilates reverence”, Zoroaster (VII/VI b.c.);
- “The man who recognizes the truth may write it on the table of his heart”, Hebrew Bible.

DT7. RATIONAL ACTIONS, COGNIZANT WITH THE TRUTH OF PRINCIPLES as the effect of discovering the laws governing the existence of things, where principles are abstracted forms of these laws.

DT8. TRUTH IS A REGULATOR, STEERER OF REASONING, INFERENCE, TECHNICAL ACTIONS due to Reason’s need to recognize the priority of prima principia laws which decide about the existence, shape, position and ordering of things in Nature.

DT9. THE CONSISTENCY OF TRUTH is the consistency of the objective state of things in Nature with the inference of cognizant beings in the form of unspoken or spoken thoughts, convictions, dianoic judgements, theorems and theories.

DT10. CAUSAL TRUTH is the corroboration of a causal relationship (logical implication) between real facts, events, phenomena, processes of Nature or between abstract notions of them.

DT11. TRUTH \equiv $\pi\rho\acute{\alpha}\gamma\mu\alpha \equiv \alpha\lambda\eta\upsilon\epsilon\iota\alpha \equiv \tau\omicron \ddot{\omicron}\nu \equiv \tau\omicron \ddot{\omicron}\varsigma$ is a thing, being, fact, event, system of events, deed or action which can be denied only in thought.

DT12. TRUTH is a property of non-contradictory thinking and judgement by an individual about oneself at a specific time.

DT13. TRUTH is that which seems clear to everybody according to their senses (Protagoras).

DT14. FACTUAL TRUTH is the factual understanding of things (Anaxagoras).

DT15. CORROBORATIVE TRUTH is the result of verifying the properties of things, which contains the minimal number of incorrect perceptions about the facts connected with these things, despite possibly describing the greatest number of properties attached to these things.

DT16. TRUTH is the effect of correct reasoning according to logical rules connecting thoughts about an object with the object itself or relating a subject to predicates about that subject.

DT17. TRUTH is the purpose of thinking, acting and selecting the means necessary to realize a given aim.

DT18. TRUTH is the phenomenal nature of a thing determined by its shape, size, mass, structure, colour, motion or degree of content.

DT19. TRUTH is the effect of using correct perceptions and premisses based on empirical knowledge to infer causes.

DT20. TRUTH is the composition of persistent quantitative and qualitative properties of things, natural phenomena, relationships between things, phenomena, or the properties of notions and their essential dependencies, including their compatibility.

DT21. TRUTH is the obviousness of the existence of physically non-substantive ideas regarding things, objects of mathematical and logical knowledge, as well as causes, to thoughtful beings.

DT22. TRUTH is certainty, persistency, rightfulness of judgments, rules of reasoning.

DT23. TRUTH is the durability, constancy of an object's existence.

DT24. TRUTH is factuality, testability, certainty, credibility, obviousness, simplicity, exactness of knowledge.

DT25. TRUTH is what an honest, sincere, noble, faithful man says or does.

DT26. TRUTH is the revelation of God and his prophets.

Definitions DT1–DT24 have, among other things, the following features (where V – G denotes Verum – Givers, and V – B denotes Verum – Bearers, and the symbol V denotes truth):

- They are adaptations of texts from ancient philosophical and religious literature (e.g. Corpus Aristotelicum, Hebrew Bible), as well as modifications of these ideas proposed by thinkers and scientists in later periods.
- Thanks to growing awareness of the great ancient civilizations of India and China among their modern representatives, it can be seen that similar thoughts originated there with a slightly different distribution of accents.
- In the class V – G we can distinguish the following “truth givers”: God(s); masters; teachers; gurus; prophets; shamans; philosophers; scientists; observers. The definitions DT24, DT25, DT26 are directly or indirectly connected with them.
- In the class V – B we can make distinctions between and connections with appropriate sets of definitions: properties of Nature (DT1, DT11, DT23, DT25), properties of thoughts (DT1, DT11, DT23), results of perceptions, observations, testing, corroborations (DT1, DT2, DT10, DT13, DT15, DT19), natural and scientific languages, theories, models (DT3, DT24), relations of things and processes to sentences (DT5, DT9, DT12, DT22), common beliefs, opinions (DT4, DT6, DT9), laws and principles of thinking, acting and reasoning (DT7, DT8, DT10, DT12, DT14, DT16, DT21, DT22), aims of thinking and acting (DT17), the essence of the properties of Nature, and essence of notions (DT10, DT15, DT18, DT19, DT20, DT21, DT22, DT23, DT24).
- Economists should be interested, possibly to varying degrees, in all of the definitions from class V – B.

It is worthwhile to underline that the above definitions of truth do not exhaust the list of existing or pertinent ones. We may describe, e.g. the following various types of truth:

- necessary, sufficient V,
- hidden, unhidden V (covered, uncovered, transparent V),