What is Self-Influential Economic Theory?[#]

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Introduction

Social sciences are quite young in the meaning of use of mathematical methods and formalization of the results, compared to the natural sciences. The knowledge system of social sciences is not based as much on system lemma-proof as it is in the natural sciences. It seems then that social sciences cannot experience a crisis, because much of them is based on assumptions.

Nevertheless we cannot say that all social sciences are young. A classic example is legal science, which is millenniums old, but still changing due to the ever changing nature of society, in spite of use of basic building blocks of law – non-extensive first-order predicate calculus and deontic logic since the ancient Rome. Legal science surely utilizes the contemplative type of rationality (internal congruity of the legal system), which manifests itself by the compliance of the lower-order legal norms with the laws and constitutional laws) and mechanical type of rationality, which reacts to the actual state. The use of constructive type of rationality in legal sciences is however limited compared to the other social sciences, because of the nature of legal science, which does not construe new worlds, but rather reacts to the existing ones.

Economics are more fertile ground for constructive rationalism. In fact constructive rationalism is broadly used there and frequent absence, lack of manifestation or immeasurability of the examined matter, together

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with the need to surprise with new theory sometimes negatively affect the internal congruence of theory itself, as well as the neutrality of the new theory. Frequent impossibility to formalize the whole theory, stemming from the complexity of the socio-economic environment and from immeasurability (as mentioned above) quite complicates the falsification by the theoretical means. The particularistic systems, created by axiom-lemma-proof structure, which are too narrow for social sciences, are sometimes tight even for natural sciences (Bod, 2004). Nevertheless the vagueness is too widespread in many niches of economics. I will show some examples in the subsequent text.

Vagueness of theory is only one of the pitfalls that economic theories have to avoid to. Another one is, in the absence of axiomatic system, and in the presence of tremendous influence of one unfalsifiable assumption, the wide range of results of the same mathematical apparatus. Let us mention the IS-LM model and the assumption about sensitivity of investments to the interest rates (cp. Blinder and Solow, 1972), or the assumption about efficient markets and the consequence for the validity of the most of mathematical apparatus used in corporate finance, and even the applicability of the fair value in accounting. Those, who concentrate their attention to behavioral finance, could tell.

Self-reference and self-influence

The problem of self-reference occurs mostly in linguistics (Bordum, 2002), philosophy (Hoffmann, 2011), or forecasting (cp. Grandmont and Laroque, 1991). The examination of self-referencing in general economic theory is rather rare and in particular the examination of self-fulfilling or self-justifying theories seems to be limited to examination of dynamics of such systems with respect to stability of self-fulfilling equilibria, convergence to self-fulfilling expectations in stochastic linear or nonlinear macroeconomic models or in game theory with adaptively adjusted expectations of players (Grandmont and Laroque, 1991). That provides the economics with instruments to test consistence of theories and their theoretical falsifiability, which are rather rarely used.

Unfortunately most of the knowledge in social sciences is self-referencing without any direct intention to be so. It is not a self-referencing in the exact meaning of the words as used in linguistics, but rather self-influence. So a successful theory, such as capital asset pricing

model, or efficient market hypothesis, if accepted by wide enough public, start to influence their own validity. Dynamics of learning and the publicity are however determinants to the observability of the self-influence. An example from politics shows that if leader convinces the people he leads that conflict is inevitable and that neighbors are violating their rights, this statement fulfills itself sooner or later, because the people, which are manipulated this way, start to behave hostile towards neighbors. The history of mankind is full of examples. If everyone believed without any reasonable doubts that Earth and Universe and all beings were created by God, then no one would attempt to explain evolution in the way Darwin did.

Unintentional or hidden self-referencing (not only self-influence) unfortunately also did not sidetrack financial economics. I came across a typical example of such self-reference while studying (Ruback, 2002), which examines the so called tax shield (product of interest and tax rate). By assigning the risk component of rate of return to systematic risk, initial assumption about the rate of return to tax shield and unfortunate choice of stochastic and deterministic nature of variables Ruback (2002) "proves" his claims. The "proof" is based on the fact that a derived systematic risk component is congruent with the original assumptions. But such circularity is rather rare and without enough attention it can sneak in especially at closed-form equations with more than one mutually dependent variable, which is directly unobservable.

Nevertheless the self-referencing, expectably mostly positive, is not in the focus of this paper. Self-influence is the less flagrant and more hidden flaw of any theory that complicates its falsifiability.

Definition I: Self-influential theory

The self-influential theory is theory such that satisfies all of the statements:

1. *The theory in question proposes or contains any rules that can be used in human (economic) behavior.*

2. *The theory in question explains behavior of (economic) subjects in a better way than preceding theories, thus its use can be beneficial to the (economic) subjects, whose behavior it describes.*

3. *The (economic) subjects, whose behavior is explained by the theory in question, can exploit its results.*

4. *The theory in question is known to (economic) subjects, whose behavior it explains.*

5. *The observations necessary for the empirical falsification of the theory in question depend on the behavior of (economic) subjects, who are target public to the theory, or who can have any measurable advantage stemming from using the theory in question.*

Conjunction of all of the above conditions is necessary for a self-influencing theory. The subjects, whose behavior is explained by the theory in question, can exploit any benefits form the theory, if and only if it itself is beneficial and if the (economic) subjects have knowledge of the theory in question and the capability to exploit it. The condition of knowledge of the theory assumes that the theory is known long enough and provides better explanation of the observable phenomena and/or provides any measurable (observable) advantage to its users. If the theory in question is not useful and gives no competitive edge, widespread knowledge does not help it to manifest itself and the theory is easily and correctly empirically falsifiable. If the theory in question is known only to limited number of target public (few ones) and could give them competitive edge over the others then its users would like to conceal the useful knowledge from the others, thus the consequences of the theory cannot manifest in full. The positive results of empirical falsification of the theory in question are then false, but for a limited time after the knowledge (theory in question) become publicly known. Depending on the velocity of the propagation of the theory in question in practice, empirical falsification results can be positive at the beginning and negative later (thus theory is first rejected and then accepted).

The condition of circularity, i.e. observations necessary for empirical falsification come from subjects influenced by the theory has its manifestation in science: self-influence is fortunately not a frequent problem of natural sciences at the basic level, except for the problem of influence of measurement on the measured variable. The necessary conditions of self-influential theory include the possibility of exploitation of economic effect of the theory in question. Thus the most suitable

science to utilize the potential of examination of self-influence among the social sciences is economics.

Forms of self-influence

The self-influence can take two major forms: self-justification and self-falsification.

Definition II: Self-justifying theory

The self-justifying theory is self-influential theory, at which the behavior of (economic) subjects, which exploit the theory in question, supports such theory.

Definition III: Self-falsifying theory

The self-falsifying theory is self-influential theory, at which the behavior of (economic) subjects, which exploit the theory in question, can contradict such theory.

The target public of the theory in question, which is also source of behavior generating the data necessary for empirical falsification of the theory in question, would behave mostly in the way the theory in question predicts, as follows form Definition I., otherwise we do not examine self-influential theory. That seemingly precludes existence of self-falsifying theory, but is in line with self-justifying theory. A careful reader can get impression that self-falsifying theory is contradiction. That is nevertheless not true, because any theory that fulfills the requirements of self-influential theory, cannot be purely self-falsifying. We define the term only for the purposes of understanding, otherwise it contradicts its definition.

Definition IV: Purely self-falsifying theory

The self-falsifying theory is self-influential theory, at which the behavior of (economic) subjects, which exploit the theory in question, contradicts such theory.

Nevertheless due to the (sometimes) quite long time, which the theory needs to fully reflect in practice, purely self-falsifying theories can be sometimes identified after a quite long time.

On the other hand we define self-justifying theory is always purely sulf-justifying, because otherwise it would be indistinguishable from the non-purely self-falsifying theory.

Efficient market hypothesis
– a non-purely self-falsifying theory

The self-falsifying theory is rather regime-switching, which we will show on example of efficient market hypothesis (cp. Malkiel, 2005). We will note the statements by uppercase letter "S" and Arabic consecutive number, and the conclusions by uppercase letter "C" (etc.):

S1: Economic subjects are greedy.

S2: Wealth can be gained at the capital markets by buying undervalued and selling overvalued capital assets.

S3: Information about the factors influencing price are available to all investors at the same time and they exploit it immediately.

S4: Cost of trade at capital markets is negligible and there are no barriers to trading capital assets.

S5: Undervalued asset is such, which price is lower, than implied by available information. Overvalued asset is such, which price is higher, than implied by available information.

S6: Capital market is a place, where economic subjects trade capital assets.

C1 (from S1, S2, S3, and S4): In every moment prices at the capital markets reflect all available information (capital markets are efficient)

C2 (from S1 and S2): Economic subjects buy only undervalued assets and sell only overvalued assets.

C3 (from C1, and S2): No economic subject can gain wealth at efficient capital market.

C4 (from C1, C2, C3 and S1): No economic subject will trade at efficient capital markets.

C5 (from C4 and S6): Efficient capital market does not exist.

Seemingly that is end of the row of statements and consequences, however it is not:

S7: Price of capital asset is determined by trades performed by

economic subjects.

S8: Capital markets exist.

C6 (from S1, S2, S7, S8 and C5): Capital markets are not efficient.

C7 (from S1, S2, and C7): Economic subjects will trade at the capital markets.

C1 (from C7, S1, S2, S3, and S4) – as above.

Thus we are back at the beginning and from theoretical point of view it is impossible to determine the validity of efficient market hypothesis. It is non-purely self-falsifying economic theory, however at some point of the logical row of statements and consequences we find a result (C6) contradictory to the original finding (C1). In static environment it has no solution. However the simulation of consequences in a dynamic environment with heterogeneous expectations of economic subjects would lead to C6 and C1 not reachable at the same time at economic individual. If C6 and C1 could cyclically switch and investors behaved mutually independently, then one would always find large enough group of economic subjects, who try to beat the market. The above logical examination of efficient market hypothesis is however only an example, because careful reader would probably find many more ways of manifestation of efficient market hypothesis, e.g. by exploiting the stochastic behavior of capital asset prices.

An example of self-justifying theory – CAPM

It is rather difficult to find a scientific purely self-justifying theory in the same way we did find a self-falsifying one at the efficient market hypothesis. The first reason is that most of the scientific theories are based on quite rigorous rules, among which the internal consistency and falsifiability have the major role. Due to the impossibility to describe behavior of unrestricted set of economic subject by simple rules most of the scientific theories take some assumptions, which simplify the world they describe, thus economic subjects do not behave purely according to self-influencing theory (efficient market hypothesis is a rare exception). The second reason is rather complicated structure of scientific theories, which allows the effects of self-justifying theory to be observed rather in a long term.

An example of self-justifying theory can be capital asset pricing model. An evidence, which could support the opinion that capital asset

pricing model (Sharpe, 1964) is of self-justifying nature is the development of empirical literature on corporate diversification discount (Matsusaka, 2001, p. 411). In 1960's the effects of segmental diversification were positive, then they turned to negative and stayed negative until recent paper by Campa and Kedia (2002), who stress the endogenous nature of segmental diversification. The main reason why capital asset pricing model is a hot candidate for self-justifying theory is that it does not make any strong assumptions, which would preclude its application in practice. We can also test the capital asset pricing model in the way we did test the efficient market hypothesis. The main sources of variation of price of share, if we accept that price is determined as ratio of next expected dividend and required rate of return, is the variation of those dividends, and variation of the required rate of return. The variance of product of 1/required rate of return and next dividend is determined by size and variance of both (Goodman, 1960). Higher beta means in the (Sharpe, 1964) framework higher required rate of return, thus lower variance of the price. If economic subjects derive the systematic risk based on past (regression) beta coefficients, a shock causing beta to increase in year 0 results into decrease of variation of price of examined (individual) asset, thus beta decrease. Depending on the way economic subjects use the capital asset pricing model it may lead to oscillating betas as well as betas converging to level implied by the riskiness of the second component of the dividend/rate of return ratio, by the riskiness of the dividend. Although the analysis above is only verbal and quite simplistic, it shows that if economic subjects start to behave at the capital markets according to capital asset pricing model, it can be difficult to falsify it, even empirically. The main reason is normative (rather than positive) nature of capital pricing model, which in Sharpe's (1964) paper describes the ideal behavior of economic subjects, who take into account the possibility to reduce risk by creating portfolio. That implicitly gives guide how to look at risk-return relationship and due to its simplicity capital asset pricing model popularity persists (Brunner et al. 2001), no matter that a lot of proofs has been brought against capital asset pricing model and especially against its testability or predictive power, and this model even became empirically weaker over time (Chan and Lakonishok, 1993).

Some properties of self-influential theories

We need to ask, which theory can become self-influential, and on the other hand, what are the properties of self-influential theory.

Each scientific theory has its normative and positive aspects (cp. Frankfurter and Phillips, 1995, or McGoun, 1993 in the case of capital asset pricing model). Nevertheless a theory, which is based on empirical observations, i.e. which builds on the numerous previous empirical research, has probably stronger positive side. A theory, which describes ideal case, like the capital market asset pricing model is, is preponderated rather towards the normative aspect.

To become self-falsifying, the theory in question does not need to be much of normative nature. Efficient market hypothesis, for example, does not provide any guideline for its users (economic subjects) and just describes, what happens, if the conditions for the existence of efficient markets are valid. The self-falsifying theory does not have to be widely accepted, a possibility of behavior of economic subjects, which would contradict the theory in question, is sufficient. We do not need empirical evidence that the theory is self-falsifying. In fact it is difficult to distinguish the self-falsifying theory from any other based on empirical evidence, because we cannot find out, whether the lack of reflection of the theory in question in practice results from lack of satisfaction of the condition necessary for the self-falsifying theory, or the empirical findings falsify the theory because of its self-falsifying nature. The self-falsification is therefore reachable for almost any theory and the finding whether the theory is self-falsifying, or not, can be made mainly on the theoretical base.

On the other hand self-justifying theories need to have strong normative background. Again, the example mentioned above as self-justifying theory, the capital asset pricing model, provides a very clear guideline to economic subject, how to estimate the rate of return, appropriate to the systemic risk inherent to the capital asset in question, no matter what the actual practice is. Sharpe's (1964) paper is in fact purely theoretical. There are two ways of proving the self-justification of a theory – empirical and theoretical. The empirical way of proof is stronger, because it implicitly answers all questions, whether the theory in question classifies at least as self-influential. The theoretical way of distinction of self-justifying theory is however more beneficial, because it can be used in ex-ante manner so that appropriate ways of examination of such theory are chosen.

Conclusions & discussion

The problem of circularity in any knowledge system (mostly closed) is an appealing one. The human history is full of thought systems (or in more general knowledge systems), which are both closed and self-referential, or self-influential. The age of science brought more rigorous approaches in examination of thought systems, but did not eliminate self-reference, not to mention self-influence, of the scientific theories (as a subset of thought systems). The self-reference and self-influence is however mostly problem of social sciences, which build on assumptions and preferences of the examined subjects (which are unfortunately sometimes unobservable), rather than on measurement and repeatable experiments. Thus self-influence is not a matter for natural sciences, in which such problem reduces mostly to the incorrect procedure of experiment or of measurement.

This paper provides a basic proposal of classification and distinction of self-influential theories. Those can be self-justifying and self-falsifying theories. Contrary to the self-referential theories, which do refer to themselves, and thus are quite well guessable, the bounds of self-influential theories are much fuzzier. In fact almost any theory, either more normative, or more positive, has the potential to be self-influential, but only the normative ones have the potential to be self-justifying.

As this paper is an initial stage of author's research in self-influential theories, it necessarily simplifies the view of the matter. The subsequent research should concentrate on methodological aspects of distinction of self-influential theories, provide closer examination of their properties, and last, but not least, discuss the appropriate ways of testing them before their application. That can be a tricky task, as only laboratory experiments or thought experiments are in hand and even the laboratory experiments seem to yield unrealistic results (Levitt, and List, 2007). Although any theoretical concept has the potential to be self-influential, few have the power to be really influential in practice. Those are however of such importance that we need to classify tools, which are available for their ex-ante examination. According to my own view, which can be incorrect, a large part of political, legislation, and economic decisions are based on heuristic way of treating problems, which needs formalization. Among the applications of the theory of self-influence, all regulatory disciplines are the most appealing.

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ABSTRACT

Self-influence and self-reference are among the largely omitted, but quite substantial properties of thought systems in social sciences. These can have significant impact on the ways we can test such thought systems (theories), their applicability and reliability. This paper defines the basic terms of self-influence, which contrary to self-reference, is sneaky and demonstrates in practice over longer periods of time. The outline of classification of self-influence presented in this paper draws on notorious examples – CAPM and efficient market hypothesis. These examples show that philosophy has still much to tell about the methodology of science in economics.

Key words: Self-influence, self-reference, CAPM, EMH, philosophy of science

JEL classification: A10, B40, G10.