Session 2. – Some considerations about the notion of ‘rationality’ in the social sciences and the nature and role of modelling in Economics

- Introduction
- The notion of ‘rationality’ in the social sciences:
  - ‘Substantive’ rationality
  - ‘Procedural’ rationality
  - Popper’s ‘Rationality Principle’
- Some ‘philosophical’ considerations about the nature and role of modelling in Economics.

Introduction (I)

- Most, if not all, social phenomena are ultimately the result of a large number of individual actors behaving in a *certain* way. It is highly unlikely that individual behaviour is arbitrary. Rather, the latter is normally seen as being *purposeful* or *goal-oriented*.

- *Goal-oriented* individual behaviour is a common assumption across the social sciences. It is often associated to 'rationality'.

- Research programs across the social sciences tend to differ in the assumptions they make with respect to: (i) the way actors *beliefs* are formed, and (ii) the *extent* to which they manage to attain their goals.

Introduction (II)

- Scientific models are pervasive across both the natural and the social. In the latter, they are particularly important owing to the absence of ‘universal laws’.

- The presence of numerous auxiliary assumptions which are not derivable from the theory they are supposed to be based on is what, according to Morgan & Morrison (1999), makes models largely *autonomous* from theoretical principles.

- However, there is no consensus in the scholarly literature as to what is the *epistemic* value of theoretical models.

The notion of 'rationality' in the social sciences (I)

- The notion of human rationality that is concerned solely with the *consequences* of rational choice is known as 'substantive' rationality.

- Simon (1976) posits that behaviour is substantively rational 'when it is appropriate to the achievement of given goals within the limits imposed by given conditions and constraints'.

- Accordingly, 'rational' behaviour is a kind of *purposeful* or *intentional* behaviour directed towards a concrete goal, e.g., the maximization of utility. The focus of scientists is not so much on *how* decisions are made but in *what* decisions are made.

The notion of ‘rationality’ in the social sciences (II)

- According to Simon (1965), models grounded on ‘substantively’ rational individuals share a common framework characterised by:
  - A set of alternative courses of action that are available to the individual.
  - ‘Perfect foresight’ that allows individuals to predict the consequences of choosing any possible alternative, and
  - A fixed criterion for determining *which* set of potential consequences he prefers.

- In such models, rationality is defined as ‘the ability of actors to select that course of action that leads to the most preferred set of predicted consequences’ (Simon, 1965).

The notion of ‘rationality’ in the social sciences (III)

- This approach to ‘rationality’ *implicitly* assumes that the environment is known or knowable (i.e. ergodic) so that individuals have sufficient cognitive abilities to deal with a complex world.

- In neoclassical economic models, agents exhibit ‘substantive’ rationality. Individual optimization thus constitutes the specific crystallization of the ‘substantive’ rationality assumption.

- The notion of ‘substantive’ rationality can be usefully split into three parts: ‘means-rationality’, ‘beliefs-rationality’, and ‘ends-rationality’.

The notion of 'rationality' in the social sciences (IV)

- 'Means-rationality' implies the *optimality* of one´s actions *given* one´s desires and beliefs regardless of whether or not the latter are correct. As a minimum, 'means-rationality' implies *consis-tency* of choice or lack of contradiction.

- In neoclassical economics, 'means-rationality' is characterized by consistency in the preferences of individuals in the sense of *transitivity*: if an agent prefers *a* to *b* and *b* to *c*, then *a* must also be preferred to *c*.

The notion of 'rationality' in the social sciences (V)

- 'Beliefs-rationality' implies that an individual is rational to the extent that her (subjective) view of the world represents a good approximation to the 'true' model (e.g., correct beliefs).

- Finally, 'ends-rationality' implies that the behaviour of actors is *purposeful* or oriented to the achievement of a given goal and, hence, not the result of sheer chance.

- For instance, in neoclassical economic models 'ends-rationality' is usually associated to the pursuit of 'self-interest'. This has been so since Edgeworth stated in his *Mathematical Psychics* (Edgeworth, 1881) that 'the first principle of Economics is that every agent is actuated *only by self-interest*'.

The notion of ‘rationality’ in the social sciences (VI)

- The alternative to the notion of ‘substantive’ rationality is the notion of ‘procedural’ rationality. According to Simon (1976, p. 131), ‘behaviour is procedurally rational when it is the outcome of appropriate deliberation’.

- The notion of ‘procedural’ rationality shifts attention from the consequences of choice to the *process* of making choices where the emphasis lies in the presence of a decision process based on *systematic and appropriate deliberation*.

- ‘Procedural’ rationality is the common approach to rationality across the social sciences with the exception of ‘rational choice’ theory.

The notion of ‘rationality’ in the social sciences (VII)

- The notion of ‘procedural’ rationality is also coupled to Simon´s (1954) notion of ‘bounded’ rationality according to which there are *insurmountable* constraints on the ability of individuals:
  - To acquire, process, and store all the information that may be relevant to the problem at hand and, hence,
  - To identify the ‘optimal’ course of action for a given a set of beliefs and desires.
- Thus, given such constraints it is ‘rational’ for actors to adopt *procedures* or ‘rules of thumb’ which:
  - Work reasonably well over a wide range of scenarios, and
  - Prevent actors from incurring the costs of making the detailed evaluation required to make the optimal decision under each possible scenario.

The notion of 'rationality' in the social sciences (VIII)

- According to advocates of the notion of 'bounded' rationality, the existence of these constraints generally prevents individuals from 'optimizing' (Simon, 1979).

- In research programs in economics other than the neoclassical one behaviour is normally viewed as 'rule-based' and, hence, as not being optimizing:
  - Institutional: behavioural rules stem from the existence of *social norms* and *habits*.
  - Keynesian: behavioural rules stem from the presence of *fundamental* or *Knightian* uncertainty.
  - Behavioural: the pervasiveness of *bounded* rationality implies that actors' behaviour systematically *deviates* from the predictions of SEU theory.

The notion of ‘rationality’ in the social sciences (IX)

- Popper´s thesis is that there is no fundamental difference between the natural sciences and the social sciences since both of them resort to the construction of models or *typical* problem-situations (P-S) to explain and predict events.

- If anything, models are viewed as being even more important in the social sciences due to the absence of ‘universal laws’.

- According to him, models are an *over-simplification* of reality and, hence, do not represent the facts truly (Popper, 1994).

The notion of ‘rationality’ in the social sciences (X)

- Popper makes a distinction between ‘rationality’ as a personal attitude and his ‘rationality principle’.

- He defines the former as the ‘attitude of readiness to discuss one´s beliefs critically and to correct them if they turn out to be wrong’.

- The ‘rationality principle’ (*RP*), Popper explains, has nothing to do with the assumption that men adopt a rational attitude. It is a methodological principle which assumes that ‘our actions are always adequate to our problem-situations *as we see them*’ (Popper, 1994).

The notion of 'rationality' in the social sciences (XI)

- According to Popper's *RP*, explanations of human behaviour should proceed as follows (Koertge, 1975). Let us assume the problem is to explain *why* individual *A* adopted a certain type of behaviour, say *X*. The first step (step I) is to describe the P-S of *A* at the time the type of behaviour (*X*) was adopted.

- Such description will include subjective elements (like preferences, beliefs and goals) and objective elements (like physical, technological, and social constraints).

The notion of ‘rationality’ in the social sciences (XII)

- The second step is to provide an analysis of the P-S. The third step of the explanation is to add the ‘rationality principle’.

- The final step consists of the *explanandum*, i.e., that *A* did *X*. In the case of a scientist whose objective is to explain an observed phenomenon, *RP* is brought up when she connects the analysis of the P-S with the social phenomenon to be explained.

The notion of ‘rationality’ in the social sciences (XIII)

- The complete *RP* as formulated in Koertge (1979) emphasizes the connection between the actors’ action and the *systematic deliberation* process that made the individual behave as he did.

- Koertge (1979) also points out that the former implies that some systematic non-random decision procedure be used.

- Consequently, decision rules based on different approaches to ‘rationality’ (e.g., substantive, procedural, etc.) are admissible provided they are applied in a *systematic* way.

The notion of 'rationality' in the social sciences (XIV)

- Koertge (1979) insists that, for Popper, to explain an action using *RP* does not imply that the agent's beliefs are correct nor that his method of making decisions is the best possible one but only presupposes that the individual assessed the situation in a systematic way.

- According to Popper, in the social sciences *RP* plays a role that is analogous to the universal laws of the natural sciences. He says that *RP* is an *animation principle* which plays a role in SA similar to that of Newton's Laws in the explanation of motions within the solar system (Popper, 1967).

The notion of ‘rationality’ in the social sciences (XV)

- He makes clear that *RP* is *not* true insofar as it is an *over-simplification*: ‘The rationality principle is false. I think there is no way out of this. Consequently, I must deny that it is *a priori* valid’ (Popper, 1967).

- Nevertheless, he believes it represents a good approximation to the truth. Therefore, *RP* ‘does not play the role of an empirical explanatory theory, of a testable hypothesis’ (Popper, 1967).

- Rather, he views it as an integral part of every testable theory and proposes to avoid blaming it whenever our theory breaks down in the wake of empirical tests.

The notion of 'rationality' in the social sciences (XVI)

- His methodological advice to social scientists is thus *never* to abandon it so that, in the wake of a refutation of their model, they should always revise their models of the agent's P-S.

- He offers two arguments in favour of this strategy:
  - We learn more if we blame our situational model in the aftermath of a negative empirical result, and
  - The adoption of such principle reduces considerably the arbitrariness of our models

The notion of ‘rationality’ in the social sciences (XVII)

- As for the first argument, he explains that:

‘The main argument in favour of this policy is that our model is far more interesting and informative, and far better testable, than the principle of the adequacy of our actions. We do not learn much in learning that this is not strictly true: we know this already.’ (Popper, 1985)

The notion of ‘rationality’ in the social sciences (XVIII)

- As for the second argument, Popper explains that:

‘The attempt to replace the rationality principle by another one seems to lead to complete arbitrariness in our model-building. And we must not forget that we can test a theory only as a whole, and that the test consists in finding the better of two competing theories which may have much in common; and most of them have the *RP* in common’ (Popper, 1985).

The notion of 'rationality' in the social sciences (XIX)

- As Hands (1985) notes, Popper's first argument above means that, if we are to be consistent with *RP*, 'the falsification of a specific theory only means that we have misspecified the "situation", i.e., that we have attributed the wrong preferences or constraints to the individual'.

- The second argument implies that, although *RP* is potentially falsifiable, *we choose to make a methodological decision that, when faced with a falsifying observation, we will stick to it* and revise instead our hypotheses about the desires, beliefs and constraints faced by individuals (Hands, 1985).

The nature and role of modelling in Economics (I)

- Recent debates about the role of scientific models owe a lot to the collection of essays included in a volume edited by Morgan & Morrison (1999).

- A survey by Morgan & Knuuttila (2012) provides a panoramic view of the 'state of the art' in the academic literature on the status and role of scientific models.

- Some issues related to the nature and role of models are also covered in the collection of journal papers included in a 2009 Symposium at *Erkenntnis* titled 'Economic Models as Credible Worlds or as Isolating Tools'.

The nature and role of modelling in Economics (II)

- In what follows, we summarize the debates between so-called ‘isolationists’ and ‘constructivists’ concerning the nature and role of theoretical models.

- We will argue that, despite some differences in their account of models, both of them imply that models are ‘tools or artefacts for surrogate reasoning’ that allow us to make *inferences* about the ‘real world’.

The nature and role of modelling in Economics (III)

- A recent account of the views of so-called ‘isolationists’ is in Mäki (2009) who claims that the ‘method of isolation’ is the method actually applied in an important class of models in science, including economics.

- Cartwright (2009) argues that modelling consists of *isolating* the ‘capacity’ associated with a certain feature of a system. By ‘capacity’ she means a power that systems with that feature have to produce a *result* that is characteristic of the ‘capacity’.

The nature and role of modelling in Economics (IV)

- According to Mäki (*op. cit.*), models allow us to 'isolate' a causal factor or mechanism. Such 'isolations' or neutralization of other disturbing factors are normally achieved by means of *idealizing assumptions* and silent omissions (*op. cit.*, p. 30).

- In turn, *idealizations* consist of deliberate falsehoods that either exaggerate or understate the role of a specific factor whereas *abstraction* is an operation employed to 'isolate' the universal from particular instances.

The nature and role of modelling in Economics (V)

- Mäki (*op. cit*.) recognizes that idealizing assumptions are often false and are manipulated as 'strategic falsehoods that serve the purpose of isolation'.

- However, he insists that a theory may be 'true' even if it is partial and involves idealizations. In particular, a seemingly false theory may be 'true' if it manages to capture the *isolated* causal factors in an appropriate way.

- In short, for Mäki, 'isolation' is the *end-result* and idealizations and omissions are methods for generating 'isolations'.

The nature and role of modelling in Economics (VI)

- Notably, Mäki (2005, p. 308) draws a useful analogy between the role of experimentation in the natural sciences and models: whereas in laboratory experiments some intervening factors are ‘sealed off’ by means of experimental controls, models rely on assumptions to neutralize the effect of those factors.

- The ‘isolationist’ account of models is criticized in Knuuttila (2009, pp. 62-63) who provides two reasons why she thinks the former is inadequate.

The nature and role of modelling in Economics (VII)

- First, she argues that Mäki (2009) illegitimately assumes that the 'causal structure' of the world is such that the causes of a given phenomenon are *separable* and thus potentially isolated.

- Second, she argues that mathematical modelling in economics is guided mainly by the practical requirements of *tractability* which means that the model is normally attributed properties that facilitate mathematical representation from which one can derive deductive consequences.

The nature and role of modelling in Economics (VIII)

- Knuuttila (*op. cit*., p. 63) argues that, as these properties are attributed to the model, the latter looks increasingly like an intricate 'construction' rather than an experiment involving isolations to 'seal off' the influence of other causal factors.

- She also adds that models are normally built 'with their results in mind' and that, when added to the impossibility of separating different causal factors, its features reflect the 'search for specific results' process rather than a process of 'isolation' of a causal factor that operates in the 'real world'.

The nature and role of modelling in Economics (IX)

- The notion that scientific models should rather be regarded as ‘constructions’ or ‘parallel realities’ rather than the result of isolating some causal factors that supposedly operate silently in the ‘real world’ is defended, among others, by Sugden (2000, 2009), Knuuttila (2009), and Grüne-Yanoff (2009).

- According to so-called ‘constructivists’, modelling in the field of economics is characterized by the *absence* of a derivation from the ‘real world’. All these authors suggest that modelling rather consists ‘in the construction of artificial systems that act as stands-ins for real-world objects or systems, and that are analyzed in their stead’ (Grüne-Yanoff, *op. cit.*).

The nature and role of modelling in Economics (X)

- Mäki (2009) has recently clarified that the goal of isolation is to 'close a system' by neutralizing the factors that are not included in the 'model' and that 'isolation is not just a matter of "peeling off" but involves whatever distortion is needed for accomplishing it, such as exaggerations of the included features' (*op. cit*., p. 31).

- That is, Mäki (2009) defines 'isolation' as the *product* of model building no matter how we do it and contrasts his account with Sugden's who views 'isolation' as the way models are built.

The nature and role of modelling in Economics (XI)

- Thus, according to Mäki (*op. cit*., p. 32), it is ‘not construction *rather than* isolation, but *both* construction *and* isolation that are involved in modelling.

- Both Mäki (2009) and Sugden (2009) admit that an important function of theoretical models is to let us acquire knowledge about the ‘real world’ by means of *inferences* from the former to the latter.

The nature and role of modelling in Economics (XII)

- For instance, Mäki (*op. cit*., p. 38) claims that models are not intended to explain *why* a certain observed phenomenon occurs but, rather, are intended to explain *how* such phenomenon 'may have come about' where the 'explanandum' is a typical event, general pattern, or empirical regularity.

- As Mäki explains (*op. cit*.), the model 'articulates a possible mechanism that could have produced (or more weakly: could have contributed to the production of) the aggregate outcome that is observed'.

The nature and role of modelling in Economics (XIII)

- Notably, Sugden (2009) holds a similar view in a discussion of a model of 'herd' behavior in financial markets:

'How can the model tell us anything, however speculative, about causation in the real world? The implicit argument, I suggest, is *abductive*. The effect of herding in the model world is similar to that of herding in the real world. From the similarity of effects, we are invited to infer the likelihood of similar causes… The essential structure of the argument is: from some similarities, infer others' (*op. cit.*, p. 10).

The nature and role of modelling in Economics (XIV)

- Elsewhere Sugden (*op. cit*., p. 7), an economic theorist himself, recognizes that economic modelers often seem to use this type of *abductive* inference (i.e., inferring ‘causes’ from ‘effects’) to make claims about the ‘real world’ by examining a model even though such claims are rarely explicit.

The nature and role of modelling in Economics (XV)

- In this respect, his notion of ‘credible worlds’ is an attempt to identify the requirements that such *abductive* inferences need to satisfy to be legitimate:

‘We perceive a model world as credible by being able to think of it as a world that *could be* real — not in the sense of assigning positive subjective probability to the event that it *is* real, but in the sense that it is compatible with what we know, or think we know, about the general laws governing events in the real world’ (*op. cit*., p. 18).

The nature and role of modelling in Economics (XVI)

- The idea that we can make inferences from a model to the 'real world' is subscribed by Grüne-Yanoff (2009) who, building on Sugden's 'credible worlds' thesis, proposes a different criterion for the acceptance of such inferences: that the economic model brings about a *justified change in the theorists' confidence in certain hypotheses about the real world* in the aftermath of the inferences about the latter (*op. cit.*, p. 85).