UNREALISTIC ASSUMPTIONS IN RATIONAL CHOICE THEORY[1]

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Abstract
The most common argument against the use of rational choice models outside economics is that they make unrealistic assumptions about individual behavior. We argue that whether the falsity of assumptions matters in a given model depends on which factors are explanatorily relevant. Since the explanatory factors may vary from application to application, effective criticism of economic model building should be based on model-specific arguments showing how the result really depends on the false assumptions. However, some modeling results in imperialistic applications are relatively robust with respect to unrealistic assumptions.

Keywords: unrealistic assumptions, economics imperialism, rational choice, as if, robustness

1   Introduction

Economics has become an imperialistic science. Economic methods are increasingly used for explaining phenomena in fields that have traditionally been occupied by other sciences. The term 'rational choice theory' has come to denote theories that apply economics to new fields of research.[2] Economics imperialism is thus a matter of extending theories based on rational individuals into new areas. Yet even economists used to argue that the homo oeconomicus assumption should not be used to model human behavior outside the domain of market institutions. However applicable the self-interest assumption is in economic domains, it seems to give a particularly poor account of individual motivation in other areas. Have people just become generally more rational, or are market institutions invading new areas of social life? If neither is the case, the assumptions of strict rationality and self-interest do not seem to be realistic in imperialistic applications of economic methods.

The accusation of unrealism is reflected in the common reactions against the use of economic models outside their traditional domain; people are not really 'selfish', social relations are more fundamental than economic relations, and imperialism thus puts the cart before the horse (see e.g., Zafirowski 1999). We find these arguments wanting, since they misconstrue the explanatory properties of rational choice models. Our objective in this paper is to analyze how unrealistic assumptions may or may not matter for particular explanatory enterprises. Our claim is that behavioral and psychological assumptions may have different kinds of explanatory roles in different rational choice models. Some applications rely on substantive psychological assumptions, whereas others require certain kinds of behavioral patterns, and some get by with only scant reference to the structure of the situation. Therefore, the legitimacy of imperialistic applications of economic theorizing has to be assessed on a case by case basis. What follows is an attempt to provide criteria according to which such assessments can be made. Our aim is thus not to offer a sweeping defense of rational choice, but to pinpoint the possible weaknesses upon which *effective* criticism can be based. Since the explanatory properties of many rational choice models rely crucially on the *robustness* of the modeling result with respect to problematic modeling assumptions, we especially emphasize the value of explicit robustness analysis in such criticism. We will argue that if a result is demonstrably robust with respect to the unrealistic psychological or behavioral assumptions, the falsity does not matter.

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[2] The traditional game and decision theories are, of course, also called theories of rational choice.

Since the assumption of self-interest has been considered particularly unrealistic in non-economic domains, and since this has been explicitly put forward as an argument against economic applications in other social sciences, our arguments are most relevant in terms of discussing the legitimacy of economics imperialism. Nevertheless, what we say about unrealistic assumptions is, in principle, applicable to any social science, including economics itself.

The structure of the paper is as follows. We start by providing an account of the role of microfoundations and folk-psychology in rational choice theory in section 2. We note that a literal intentional or psychological reading of rational choice models requires the mediation of real intentional processes. We will then argue that since the assumptions of expected utility maximizing behavior and self-interest are merely templates for constructing empirically interpretable rational choice models, appraising the realisticness of these assumptions makes sense only if the appraisal concerns the arguments used to operationalize these assumptions into a substantial model. It is pointless to criticize or approve of these assumptions in the abstract because they are empirically empty. Since it is clear that not all rational choice models can be interpreted literally as accounts of intentional actions of agents, we proceed in the next section to discuss the various ways of interpreting as-if clauses that often accompany rational choice models. As-if clauses are usually thought to refer to the use of unrealistic assumptions. We argue that this need not be the case, since assumptions can be *psychologically unrealistic* in that they attribute implausible thought processes to the agents, yet at the same time be *behaviorally realistic* in the sense of correctly describing individual behavior. The possibility that a rational choice model is behaviorally realistic even though psychologically unrealistic is particularly relevant for models in which the structural constraints rather than individual psychological processes are the causally most relevant factors. In section 4 we discuss the way in which it is possible to analyze which factors are really relevant in a model by providing an account of robustness analysis. We will thus look at ways in which the validity of a modeling result may be insensitive to false assumptions, and argue for the importance of explicit robustness analysis by discussing some well-known examples from rational choice theory. One largely overlooked reason for the success of rational choice models is the fact that they often provide explicit frameworks for evaluating the normative acceptability of various institutional arrangements. Section 5 discusses the role of unrealistic assumptions in such comparative institutional analyses. The sixth section concludes the paper.

2   Operationalizing folk psychology

Those who use economic methods in new fields of research often justify their approach by arguing that their contribution consists of providing *microfoundations*.[3] Generally speaking, microfoundations give an account of the individual behavior of the agents underlying the aggregate result in the institutional context under study. Insofar as rational choice theorists and economists present explicit requests for microfoundations, and they often do, they seem to be in the business of making theories *more* rather than less realistic. The perceived problem with them clearly lies in the fact that they are so intimately coupled with rational choice that they, in turn, seem to be unrealistic. If rational choice is taken to be based on ordinary intentional psychology, the corresponding charge of psychological unrealism is usually that it is too exacting or too narrow a formalization: rational choice models either assume unrealistically sophisticated cognitive capacities or leave out important psychological non-goal-oriented causes

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[3] However, the links between standard microeconomic consumer theory and methodological individualism in any substantial sense are strenuous. If there are any individuals to be found in micro-theory, virtually nothing follows from their utility maximization at the aggregate level. This is the content of the famous Sonnenschein-Mantel-Debreu results (Kirman 1989).

of action. In this section we discuss the most common accusation concerning the lack of realism: the consistent pursuit of selfish interests is not psychologically realistic.

Why could we not provide irrational microfoundations? The sociologist Raymond Boudon (1998; 2003) argues that if a phenomenon can be shown to derive from individuals' rational choices, there is nothing left to be explained. It is enough to show that it can be understood in terms of rational choice theory. John Harsanyi (1982a; 1982b; 1982c) goes even further in claiming that a normative theory of rationality is necessary even for explanations of irrational behavior. Behavior is thus always either simply correct or deviant. If the latter, a further explanation is needed. This perceived explanatory asymmetry becomes understandable if one thinks of rational choice theory as essentially a *formalization* of folk psychology. What is meant by 'folk psychology' depends largely on the discursive context. Sometimes the term is used to refer only to the abstract interpretive *schema* of beliefs and desires, sometimes to all pre-theoretical interpretive *practices,* and sometimes to a fully fledged pseudo-scientific folk *theory* of human cognition.[4] However, here we limit our use of the term to refer to pre-theoretical psychology based on intentional states of belief and desire, although other kinds of mental states, such as emotions, are also often included in the concept.

Thus conceived, rational choice theory would be nothing more than a formal way of analyzing purposeful, intentional action. This view is explicitly endorsed by prominent rational-choice-oriented political scientists such as John Ferejohn and Gary Cox (1999), and by the sociologist James Coleman (1990).[5] The supposedly inherent intelligibility of intentional action would also provide a good reason for stopping the micro-foundations project at the level of individual behavior because there would be no more black boxes left to be opened (Boudon 2003). Intentionality would be the rock bottom of social inquiry. If we adopt this interpretation of rational choice as a formalization of folk psychology, the question to ask about imperialistic applications is whether they attribute credible intentional states and processes to the agents.

If economics were a formalization of folk psychology, it would seem natural to say that folk-psychological and decision-theoretical notions have the following structural similarities: probabilities correspond to degrees of belief and preferences to desires. However, it is not altogether evident that economists themselves accept a folk-psychological interpretation of rational choice. Consider some historical changes in their self-understanding that took place some half a century ago. Lionel Robbins (1952) and Frank Knight (1994[1935]) were the last major figures in mainstream economics to argue that it was based on psychological notions, which in turn were based on introspection. In contrast, modern decision theory was founded on the idea that people's preferences could be elicited by observing their *choices* in experimental settings using the reference-lottery technique or a similar procedure (see e.g., Hirshleifer and Riley 1992). This means that, in principle at least, constructing von Neumann-Morgenstern (vNM) utilities does not involve any mental attribution to the subjects. In fact, if the epistemic credibility of individual preferences in a given model is based on nothing else than folk-psychological reasoning, the model will not be acceptable to economists. Consider economists' attitudes towards interpersonal comparisons of utilities. Introspection and empathetic identification are the primary means of making empirical interpersonal comparisons. However, economists strongly argue against the use of interpersonal comparisons of utilities in economic

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[4] We are indifferent between simulation theory and the theory theory of folk psychology, and in general wish to avoid commitment to specific philosophical positions concerning the nature of intentional states.

[5] Alexander Rosenberg (Rosenberg; 1992, see also 1980) argued some fifteen years ago that economics should be conceived of as a formalization of folk psychology. He also claimed that it was doomed to stagnation because we cannot obtain better and better information on people's desires and beliefs.

models because there are no choices comparable to those made in a reference lottery experiment from which we could construct a scale of interpersonally valid utility numbers.[6]

The formal machinery of expected utility theory and revealed preference theory form the content of *rationality as consistency* (or 'thin rationality') (Sen 1985). In principle, rational choice theory need not appeal to any kind of psychological factors because it relies on a purely formal account of consistent choice behavior. However, although rational choice models explain by invoking people's preferences and beliefs, the theorists hardly ever even try to obtain information on individuals' real preferences, conceived of as pure behavioral dispositions. Instead, economic applications of rational choice usually seem to rely on general intuitions and concepts (such as incentives) that are at least extensions of folk-psychological notions. Similarly, insofar as games are considered useful in describing, explaining or predicting some real-world phenomena, there has to be some way in which the payoffs are related to real people's payoffs (see Blackburn 1995; 1998). The basis for constructing a payoff structure for a game is usually the theorists' judgment, which in turn may well be based on identification with real subjects in some real situation (see Rubinstein 1991; Binmore 1994, pp. 98, 165). Here, knowledge of psychological factors such as the players' intentions and goals becomes important for determining their payoffs (Mueller 2004). Therefore, even though the theorists do not always admit it, *specific applications* of rational choice often rely on psychological assumptions, the credibility of which is crucial in ensuring the credibility of a specific model.

In contrast to formal consistency, *rationality as self-interest* (or 'thick rationality') (Sen 1985) provides a substantial account of what motivates real people. It is not best viewed as a *normative* account of what should motivate people. Indeed, as Sen (1987, p. 16) pointed out, it would be absurd to say that self-interest is a requirement of rationality. Rationality as self-interest is rather an *assumption* in empirical models that *specifies* what is assumed to motivate the individuals concerned. The assumption of self-interest takes many different forms. It is *operationalized*[7] in a fairly weak manner in the traditional microeconomic theory of market demand for commodities, because consumers are merely assumed to prefer having more rather than fewer (e.g. Hausman and McPherson 1996). Sometimes an economic rational choice model is able to provide an explanation or a prediction by merely describing the agents' economic incentives in a very broad way.[8] Examples of such models include the market for lemons (Akerlof 1970) and job-market signaling (Spence 1973). The plausibility of rational choice in economics is therefore, to a large extent, grounded on the relatively straightforward and non-controversial operationalization of thin rationality into thick rationality. Folk-psychological intuitions seem to be an important resource in assessing the realisticness of modeling assumptions for both advocates and critics of rational choice theory. The first crucial issue in the assessment of imperialistic applications is thus the psychological plausibility of the operationalization of self-interest.

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[6] Myerson (1985) makes this argument most forcefully, but it dates back at least to Roy Harrod (1938). Harrod also links it with the scientific respectability of economics. '[M]arshall says in the principles that the marginal utility of two pence is greater in the case of a poorer man than in that of a richer … It may be urged that the economist hereby goes outside his proper "scientific" field … Whether the *n*th unit of X has greater or less utility to a given individual may be made the subject of test. He can be given the choice. But there are no scientific means of deciding whether the *n*th of X has greater or less utility to individual P than the *m*th of Y has to another individual Q. The choice can never be put' (pp. 395-396).

[7] We use the term 'operationalization' as referring generally to the process of providing empirical content for the assumptions of self-interest and utility maximization. We do not mean to suggest that this is necessarily related with making theoretical concepts *measurable*.

[8] Myerson (1999) characterizes the whole of economics as the science of incentives.

What rational choice means in a given model depends crucially on the operationalization of self-interest, i.e. on the content of the preferences or payoffs and the structure of the choice situation. The assumptions of (expected) utility-maximizing behavior and self-interest, if abstracted from an institutional context, are merely *templates,* not proper targets for criticism or advocacy. More generally, the assumption of rationality does not imply much without auxiliary assumptions concerning the exact shape of the relevant individuals' utility functions and beliefs, and most importantly what they take to be the choice alternatives (Simon 1985; Kavka 1991). Consequently, non-specific criticism of these assumptions does not make much sense because few would be willing to seriously argue that there are no rational choice models with reasonably realistic assumptions. Hence, the arguments used in operationalizing the utility maximization or the homo oeconomicus assumption into an empirically specified hypothesis of individuals' behavior are the proper targets of critical discussion and model-independent empirical assessment.[9]

Let us now consider an example of a theory, Niskanen's (1971; 1975) model of the budget-maximizing bureaucrat, in order to illustrate the relevance of the arguments made above. Niskanen's model was designed to explain the growth of the public sector. The basic model is based on two important assumptions. First, bureaucrats are assumed to maximize the size of the budget, and second, the relationship between the bureau and the 'sponsor' is one of bilateral monopoly. The sponsor represents the relevant legislative committee, the whole legislature, or better yet, the whole population. The main conclusion is that the public bureau produces more than the sponsor wants.

This conclusion cannot be derived from the model if the bureaucrats do not maximize the budget. The credibility of the model is thus crucially dependent on the operationalization of self-interest. Furthermore, it is the weakness of such arguments that has led to the widespread suspicion that Niskanen's budget-maximization hypothesis is not particularly compelling. Assuming that bureaucrats maximize *utility* is not sufficient for predicting their behavior since here utility maximization really means the rational pursuit of one's goals, and in order to predict what officials will do, we must know their goals (Downs 1967, p. 82). The bureaucrat in Niskanen's model is supposed to intentionally maximize the budget. In support of this assumption, Niskanen (1971, p. 38) postulated that a bureaucrat's 'salary, perquisites of office, public reputation, power [and] patronage' were all positively related to the size of the bureau. This is an example of an operationalization argument for a particular application of the self-interest assumption. Whether the desire for these goods overrides other, presumably more 'altruistic' goals is difficult to determine. However, there are also several empirically more tractable reasons why budget maximization is not a convincing operationalization of self-interest. First, the budget-maximizing hypothesis is only sustainable if it can be shown that the bureaucrats *can influence* the size of the budget in the first place (Udehn 1996, p. 75), but it is, in fact, the sponsor who holds the purse strings (Mueller 1989, p. 259). Secondly, the easiest way for top managers to increase their salaries is to be promoted to another bureau, and getting promotion may require slashing rather than maximizing the budget of the current bureau (Margolis 1975). This case clearly shows that assessing whether an account of action is adequate in a model also requires evaluating whether the institutional structure is specified in the correct way. Evaluating such institutional factors is thus part and parcel of the analyzing the empirical operationalizing assumptions.

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[9] In fact, such arguments have been subject to criticism even within economics. It was argued during the marginalist controversy in the 1940's that corporate profit maximization was not consistent with individual utility maximization by firm managers.

If a rational choice model relies on substantial intentional attribution, the successful derivation of the explanandum from some set of reasonably operationalized preferences and a suitable solution concept is not sufficient for a successful explanation. Explanation relying on folk-psychological notions requires the mediation of practical reasoning as the explanatory mechanism. If, as is often the case, the idea that agents would consciously perform complex valuations between innumerable trade-offs is blatantly implausible, a literal intentional reading of rational choice is not possible. Rational choice theorists often justify attributions of seemingly unrealistic cognitive powers by claiming that individual errors in reasoning cancel out in the aggregate. The problem with this argument is that there is overwhelming empirical evidence suggesting that people have many kinds of cognitive *biases,* and that they therefore deviate *systematically* from the predictions given in a purely 'rational' model (see e.g. Camerer 1995; Shafir and LeBoeuf 2002 for recent reviews). The validity of the canceling-out argument cannot be determined without explicitly evaluating whether the systematic irrationality implies systematic consequences in the model, although the burden of proof might be said to lie with the user of demonstrably unrealistic assumptions. Curiously enough, there are disappointingly few models that show how systematic violations of rational prescriptions affect the aggregate-level conclusion of a model outside the domain of traditional economics (but see Quattrone and Tversky 1988)[10], but the recent rise in popularity of behavioral economics shows that this may change in the near future.

An extreme case in point of a model that cannot be taken seriously when interpreted psychologically is the Beckerian theory of rational addiction, according to which present drug use is a rational investment decision in which the constantly increasing enjoyment provided by the drug consumption is weighed against the inevitable social and medical costs (Becker and Murphy 1988). In this case it is not even the cognitive limitations of the agents that make the model implausible, it is the obvious empirical misspecification of the causal factors in drug consumption, that renders it absurd (Rogeberg 2004). Calling every possible factor influencing the agents' behavior incentives or changes in the budget constraint is at best only metaphorical, and often confusing and misleading. Accordingly, it is often the case that the straightforward folk-psychological reading of a rational choice model is not the most sensible one in the first place, and that criticisms of psychological unrealism would therefore fall on deaf ears.

3   Behavioral realism and as-if methodology

Standard decision theory starts from the premise that if a person's preferences satisfy a set of axioms, his or her actions can be described *as if* he or she were maximizing a vNM utility function. Notice that it would be a category mistake to say that a person's actions could be described as maximizing a vNM utility function without the 'as-if' clause, since such a function is only a *representation* of a person's preferences (or choices). vNM utility functions are not unique, and can be determined only up to an affine transformation. This means that if a person's choices can be described as if she were maximizing a vNM utility function U, they could also be described as if she were maximizing the transformation $V=aU+b$ (a>0). We might choose to assign a higher utility number to some choice alternative x under function U rather than under function V $(U(x)>V(x))$, but this obviously does not mean that the person has a stronger preference for x when his or her actions are described by U than when they are described by V.[11] This is why using the 'as-if' clause, when employed in an expected utility model, implies nothing about whether or not it is reasonable or realistic to assume that a person's actions can be

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[10] There are, however, some experimental results suggesting that cognitive biases do matter at the aggregate level (see e.g., Camerer 1995; 1998).
[11] Luce and Raiffa's (1957) classic book remains one of the clearest expositions of these issues.

described according to a utility maximization model. Whether it is realistic to use such a description depends merely on whether the person's choices satisfy the axioms.

On the other hand, the 'as-if' clause is often used in economic methodology specifically to refer to the adoption of unrealistic assumptions. Milton Friedman (1953) is famous for promoting as-if methodology. He argues that even though expert billiard players do not intentionally make complicated mathematical calculations for predicting the trajectories of the balls, their actions can be described as if they made such calculations using physical theory. To put this more precisely, *if we wish to explain the trajectories of the balls*, calculations provided by physical theory provide us with more useful information than the players' intentions do. The players' probably just think along the lines of, 'If I use light force with a little top-spin, I will have a good cue-ball position for the next shot over there.' On the other hand, accounting for the trajectories requires a minimal attribution of goals: the players must be assumed to desire to pot the balls.[12] It is perfectly possible, at least in principle, that the assumption that the players behave as if they had calculated the trajectories of the balls using physical theory is a realistic one. It may be realistic in the sense that it accurately accounts for the realized trajectories, but it is obviously unrealistic in terms of describing the players' mental states. Let us say that a theory containing an 'as-if' clause is *behaviorally realistic* if it allows for describing human behavior in a realistic way, and let us say that it is *psychologically (or intentionally) realistic* if the mental processes it evokes can be truthfully attributed to the agents.[13]

If a rational description of micro-behavior is at least roughly realistic in its behavioral assumptions, a model based on such a description could be used to explain or predict some interesting aspects of macro phenomena. As Uskali Mäki (1998) pointed out, whether the use of an as-if clause is truly instrumentalist depends on the explanatory set-up in question. Friedman's argument could thus be seen first and foremost as an argument against the necessity of finding out what the players' real thought processes are. It is an argument against 'verstehen' methodology, because it is based on the futility of finding out players' intentional states. Fritz Machlup puts it as follows:

> The 'extreme difficulty of calculating', the fact that 'it would be utterly impractical' to attempt to work out and ascertain the exact magnitudes of the variables which the theorist alleges to be significant, show merely that the *explanation* of an action must often include steps of reasoning which the acting individual himself does not *consciously* perform (because the action has become routine) and which perhaps he would never be *able* to perform in scientific exactness (because such exactness is not necessary in everyday life). To call, on these grounds, the theory 'invalid', 'unrealistic' or 'inapplicable' is to reveal failure to understand the basic methodological constitution of most social sciences. (Machlup 1946, p. 534)

For some purposes, the best description of people's behavior need not be in terms of their conscious intentional states. Machlup goes to great lengths to show that the profit-maximization assumption is, in fact, behaviorally realistic for the explanatory purposes of the theory of the firm, even though it is not psychologically realistic.

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[12] Friedman also gives an example in which no goals need to be attributed to the 'agents'. The leaves of a tree position themselves as if they were seeking the maximum amount of sunlight.

[13] Our main aim is not to interpret what Friedman really said or meant. We just found it convenient to use his well-known views to introduce the distinction between behavioral and psychological realisticness.

Even if a rational choice model apparently attributes unrealistic psychological capabilities to the agents, this psychological unrealism may not matter if the resulting behavior is plausible, at least in the aggregate, for some other reason. The problem with arguments that promote the use of 'as-if' clauses for the purpose of making unrealistic assumptions about the intentional processes of individuals is that they provoke the need for additional arguments to find out the range of models or phenomena for which an 'as-if' clause is even behaviorally realistic. In the case of the billiard players, the assumption of trajectory-calculating behavior was further justified in the idea that the players would not be *expert* players if they did not hit the balls approximately as predicted by the physical theory. Friedman ultimately uses an evolutionary-selection argument to support the claim that *firms* always maximize profits but he does not present such an argument for *individual* rationality. Satz and Ferejohn (1994) suggest that rational choice theory is *best applicable* in circumstances in which selective pressures force *individuals* into utility-maximizing behavior. Even though they provide an otherwise structuralist account of rational choice theory, this particular argument seems to imply that players do have to behave rationally for rational choice theory to be applicable. We agree with Satz and Ferejohn that selective pressures are relevant for delineating the applicability of rational choice models, but the abstract argument in itself does not tell us when they are applicable and when they are not.[14]

Even though the idea that rational choice is formalized folk psychology seems to contradict the idea that rational choices are products of structural constraints, both are endorsed by many prominent rational-choice-oriented political scientists such as John Ferejohn (1975; 1991; 2002) and Gary Cox (1999). However, accusations of incoherence are premature here, since we claim that both legitimizations of rational choice modeling may be valid given that different models explain different kinds of things in different ways. Although it may not make much sense to claim simultaneously that a particular model can be used because individual errors in *reasoning* cancel each other out, *and* that the structural constraints allow us to ignore psychological assumptions altogether, both kinds of claims can quite reasonably be made in different modeling situations. However, appeals to structural explanation via markets or selection ring hollow in cases in which there are no market institutions and no adequate selection pressures.

An example of a selection argument for maximizing behavior that is at least initially plausible is the market account of the supply of religious services, especially in such a little regulated and relatively diverse region as the US (see e.g. Finke 1997; Iannaccone 1997). Not every preacher, sect leader or cultist needs to be a cynical exploiter, nor indeed a perfectly honest but economically calculating entrepreneur. However, in an environment in which new 'religious firms' are constantly being established, and in which each one has to live on the donations of its members, the demand for religious services has to be met as efficiently as possible for a particular church to survive.[15] In this case, talk of a market is not totally devoid of substance, and there indeed seems to be competition creating selection pressure that could structurally account for the apparently rational behavior of religious firms.

So far we have argued that the utility numbers in rational choice models are practically never actually elicited from choice behavior for the purposes of explaining particular real-world phenomena. The main reason for this is that it is notoriously difficult to obtain accurate and reliable information on individual utilities and beliefs, and practically impossible to use such

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[14] Money-pump arguments have often been coupled with selection pressures. See, however, Cubitt and Sugden (2001) for a critical account of such arguments.

[15] In this case, the more interesting results of the theory concern the instruments used to keep customers loyal to a particular firm and to avoid free-riding in the religious collective.

information for directly predicting or explaining behavior in particular situations.[16] The operationalization of self-interest thus usually relies on folk-psychological intuitions and postulated institutional structure. However, these assumptions are empirical in the end, and should receive much more *model-independent* empirical attention than they usually do.[17] Nevertheless, unrealistic psychological or even behavioral assumptions sometimes do not need excuses in the first place, since they may not have any real explanatory role in a model. We explore this possibility further in the next section.

4   Explaining without preferences

If economic models are used beyond the traditional boundaries of economics, it would seem natural to assume that the assumption of self-interest is difficult to apply because people would seem to act in a more self-interested manner in markets than in matters of politics, family, crime, or religion. However, it is possible that it has virtually no explanatory role in these models regardless of the manner of operationalization. As noted above, one way to account for this is to say that it is really the structural constraints on people's behavior rather than self-interest that are the most crucial causal factors. The assumption of self-interest is not explanatorily important in a model if it can be replaced with another behavioral assumption without changing the analytical results. If it can thus be replaced, the model is *robust with respect to the behavioral assumption*.

Herbert Simon is famous for emphasizing the need to take the role of information into account in the study of individual behavioral dispositions and calculative capabilities. However, it is worth noting that Simon is commonly taken to entertain the view that explaining individual behavior is the goal of rational choice theory (e.g. Langlois 1986), while most rational choice theorists and economists explicitly argue that the theory is designed for explaining aggregate-level phenomena. It is generally agreed that satisficing is a more realistic theory of individual behavior than maximizing, but as long as the modeling results are not affected by this difference, the fact that maximizing is analytically more convenient suffices to explain why Simon's theory is not widely applied. Instead of having a major causal role, constraints on possible preferences are often more important in the *derivation* of the results. Correspondingly, the formal properties of preferences (e.g., transitivity) are often more important than the assumption of self-interest. This is because they ensure the analytical tractability of the equilibrium, which is seen as necessary for any understanding of the aggregate macrobehavior of interest.

In analytic model building, robustness has a primarily epistemic role in providing support for the claim that a *modeling result* (an equilibrium allocation or a dependency between variables derived from comparative statics) is not a mere artifact of particular modeling assumptions. Robustness in this epistemic sense is a measure of reliability with respect to erroneous assumptions and is therefore first and foremost a property of models, not of a phenomenon or a process (see Wimsatt 1981). In contrast, explanation requires dependence on rather than

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[16] Mosteller and Nogee (1951) were the first to try, and the first to fail, to do this.

[17] Many rational choice theorists subscribe to some version of the hypothetico-deductive view of theory testing. One version of this doctrine is usually attributed to Friedman (1953). He emphasizes that the realisticness of the assumptions does not matter because the empirical testing of predictions derived from a theory is the only ultimate arbiter for evaluating them, and that assumptions cannot be tested independently. Whatever plausibility this view has with respect to models or theories that really allow for deriving testable predictions, it is mere window-dressing when the theories are not in fact tested. We agree in broad terms (but only in broad terms, see e.g., Monroe (1997)) with Green and Shapiro's (1994) assessment that rational choice theorists have had only limited success in terms of empirically tested and verified theories. These issues concerning testing are relevant to the topic of this paper, but we cannot delve too deeply into them here because they are broad enough to deserve much more comprehensive treatment.

independence of the modeling result over some other features of the model, and that the dependence actually corresponds to a (causal) relation in the world (Woodward 2003). We are thus able to identify the explanatory relationships in a model or a family of models by examining how hypothetical changes in the values of the variables or parameters would change the analytical results, and what these changes would leave intact. For example, if in a particular model a dependency between the institutional setting and a resource allocation is robust with respect to various behavioral assumptions, the model could be used to structurally explain empirical phenomena (allocations) even if the behavioral assumptions are unrealistic.[18] As we will show, robust results often correspond to very general and resilient systemic properties of processes or mechanisms, but this empirical resilience has to be distinguished from robustness in the epistemic sense used here.

Let us now consider a few examples from economics and the social sciences in order to see the relevance of robustness considerations. It is often claimed that the predictions of neoclassical microeconomics are best borne out in situations of anonymous and essentially non-strategic market exchange. This good fit holds even in controlled behavioral experiments. However, this in itself does not yet show that actual self-regarding calculation or even consistent maximizing behavior is necessary for market outcomes. Gary Becker (1962) shows how the main results of standard demand theory can be derived even if people are assumed to try to stick to whatever choices they made previously or choose randomly. Becker's insights are vividly demonstrated by Gode and Sunder's (1993) computerized market experiments, in which "zero-intelligence" computer sub-programs submit random bids and offers in a double auction resulting in aggregate allocative efficiency. In these exercises it is really the budget constraint rather than any behavioral assumption that is the explanatory factor responsible for the appearance of rational exchange.

Thomas Schelling's (1978) famous 'checkerboard' serves as a non-market example of a model that can explain macrophenomena with only very weak constraints on the agents' preferences. It is a paradigm of explanation according to 'the logic of the situation'. It can explain racial segregation even if the preferences concerning the racial make-up of one's neighborhood are extremely weak: for non-intended segregation to emerge, it is sufficient that people prefer not to live in a neighborhood in which the substantial majority of inhabitants belong to another race. Here the preferences do matter, since total indifference to the racial make-up of one's neighborhood would not lead to segregation. Nevertheless, it is the logic of the situation that is responsible for the amplification of even mild aversion towards being in the racial minority to clear-cut aggregate segregation. The segregation result comes about with a wide range of preferences for living in a neighborhood with at least some other members of the same race. The modeling result is thus quite, although not completely, robust with respect to behavioral assumptions.

Duverger's (1954) *law* states that the plurality rule with one elected representative per electoral district (first-past-the-post) leads to a 'two-party system'. More precisely, such electoral rules lead to a distribution of votes with two large parties in parliament. This result is robust with respect to different specifications of individual behavior because it may come about through the so-called *mechanical effect*: a larger-than-proportional share of the seats automatically goes to the two large parties under the plurality rule. Again, however, the strength of the result depends on individual behavior through the so-called *psychological effect* (see e.g. Riker 1982; Fey

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[18] In a loose sense, the institutional setting "programs for" the allocation (Jackson and Pettit 1992). However, we prefer not to limit our discussion on robustness to cases in which the possible micro*behaviors* constitute the explanatorily relevant macrofeature.

1997). If voters who would vote for a small party realize that their candidate has no chance of winning, they may vote strategically for one of the major parties rather than waste their vote on a hopeless case. Such behavior obviously strengthens Duverger's law.

Anthony Downs (1957) argued that parties choose policies in order to obtain votes in elections, rather than obtain votes in order to formulate policies (p. 28). He showed that this followed from applying the assumption of self-interest to party politics. Party officials are assumed to be interested in obtaining power, i.e. in getting into government. Once they do so, they want to remain there. He then showed that if we assume that party positions can be represented as a one-dimensional continuum (from left to right), the two positions will converge in the middle of the distribution of voters (pp. 115-117). The reasoning behind this is that each party loses almost[19] no voters by moving toward the centre, but gains some votes from the other party.

Since the fact that the major party positions are located close to each other was well-known before Downs, his main contribution was not in making this observation, but rather in showing that this would be the outcome of rational behavior on the part of the parties (p. 93). Although the model is so familiar by now that it seems obvious, Downs had to derive the consequences of rational choice so that we could see how the logic of party positions works. We can thus see, once again, that the assumption of self-interest does not imply all that much in itself.

Paul MacDonald (2003) argues that a scientific realist should insist on the realisticness of behavioral assumptions since realism assumes that real processes are at work in successful scientific endeavors. However, if the structural constraints are the primary explanatory factors in a rational choice model, and if the model is robust with respect to behavioral assumptions, its causally relevant assumptions do not concern them. It is thus perfectly possible to be a scientific realist and acknowledge the scientific value of models with unrealistic behavioral assumptions if the results are robust. MacDonald's argument would be plausible only if realists did not accept *any* kind of unrealistic assumptions. This, however, is just blatantly false about the realist position. Mäki (1989; 1992), a well-known realist engaged in the philosophy of economics, has emphasized the distinction between realism as an attribute of a theory's assumptions, and realism as a general philosophical doctrine.

This brings us to a related issue. As some authors have remarked, although it is possible to judge whether an assumption is intuitively realistic in isolation, it is not possible to determine in isolation whether the lack of realism matters for the explanatory purpose in question (cf. Friedman 1996). For example, an assumption may be realistic for one level of aggregation or explanatory purpose, but unrealistic for another (Levins 1993). Hence, in order to evaluate whether the problematic assumptions really matter for a particular explanatory purpose, judgments of psychological or behavioral realism should always be specified in terms of a *contrast*, i.e., an alternative psychological or behavioral assumption. Since an explicit robustness analysis always provides a contrast, analysis of a model's robustness with respect to the behavioral assumptions is a necessary part of all assessments of model validity. As with appeals to as-if utility maximizing, appeals to robustness should be backed up by additional arguments or, preferably, demonstrations of robustness. Since problematic assumptions are included in a model in order to ensure its analytic tractability in the first place, demonstrating that a modeling result is robust with respect to unrealistic behavioral assumptions is usually easier said than done. Robustness analysis is thus often exceedingly difficult, or downright impossible, to carry out with analytical models.

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[19] The qualifier 'almost' derives from the fact that the parties lose those who are too alienated to vote at all.

It would seem to follow from these considerations that proper assessment of whether behavioral assumptions are realistic requires a fairly thorough understanding of the particular model under investigation. For better or worse, vague appeals to the idea that assuming self-interest is intuitively unrealistic in matters of family, politics, and crime, for example, have not convinced and will not convince rational choice theorists, who have repeated ad nauseam that 'you cannot beat something with nothing'. If this metaphorical claim implies that a critic of rational choice assumptions is always responsible for presenting a fully-fledged alternative model, we cannot say we agree. It would be quite bizarre if the only acceptable way of criticizing the assumptions of a rational choice model would imply taking part in the rational choice enterprise. Nevertheless, the possibility of robustness with respect to a behavioral assumption implies that the opponent of rational choice ought to provide some kind of alternative account of what would happen in the situation in question if the problematic assumptions were changed.

For example, Akerlof and Yellen (1985) present a robustness analysis of some cases in economics in their well-known paper. They show that in some models the punishment incurred by agents for irrational behavior is mild to the point of being non-existent, but the consequences of the model change dramatically due to such 'near rational' behavior. The reception given to this paper shows that if a model demonstrably lacks robustness with respect to problematic behavioral assumptions, rational choice theorists will take the criticism seriously. However, we think that the burden of proof should again lie on those insisting on using blatantly unrealistic behavioral assumptions in the first place.

5 Unrealistic assumptions and comparative institutional analysis

Let us now discuss an altogether different class of models and arguments for their use. Our aim is to provide an account of the role of judgments concerning unrealistic assumptions in designing institutions. An important function of the social sciences is to provide guidance for decision-makers about how various institutions function. We believe that the success of rational choice theory is at least partly attributable to the fact that it has provided a framework for analyzing the *welfare implications* of various institutional arrangements. Such exercises are obviously valuable even though normative evaluation is not strictly speaking an empirical scientific endeavor.

The structure of the framework is the following. It is assumed that there is a set of individuals with a fixed set of preferences, i.e., they are described in terms of a *preference profile*[20]. Rational choice models are then focused on deriving the aggregate-level consequences or outcomes of the different behaviors that the various institutions induce. These outcomes may then be evaluated in terms of the preference profile. The framework is thus able to assist in institutional design by providing results that have the following form: institution X fares better than institution Y with respect to problem P because X satisfies individual preferences better than Y in situations relevant to P. Let us now consider how unrealistic assumptions concerning the preference profile (rather than the motivational basis) could be justified in such analysis by taking voting theory as an example.

It is often convenient to compare various different institutional arrangements by assuming that the individual preferences are randomly generated. For example, there is a tradition in voting

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[20] The preference profile is, roughly speaking, a collection of all individuals' preferences, i.e. it contains one preference ordering for each individual.

theory to study the performance of different voting rules by randomly generating a profile of individual preferences. The voting rules are then evaluated on the basis of how often they select the best candidate, which is defined on the basis of those random preferences (see e.g. Merrill 1984; 1988). There seems to be complete unanimity among voting theorists that randomly generated preference profiles do not resemble real electorates even remotely. Nevertheless, this assumption is considered adequate for comparing *different* voting rules. It is obviously not adequate for comparing *voting qua institution* to other possible institutions such as markets or demand-revealing mechanisms. The idea behind this argument is fairly simple. It makes sense to use a random preference profile rather than one that endeavors to imitate real profiles because the analyst is mainly interested in comparing how different voting rules can cope with some particular problems such as path-dependence or excessive power of the agenda-setter, and random profiles are known to create the maximum amount of problems in voting rules (see e.g. Tsetlin, Regenwetter and Grofman 2003). Using a *deliberate* distortion of reality, a caricature (Gibbard and Varian 1978), allows for examining how different voting institutions deal with *particular* problems. Using unrealistic assumptions may thus have a reasonable methodological function even if we know how to describe reality in a more realistic way (i.e., if we know what kind of a distribution truthfully describes real electorates). It is also obviously necessary to keep the preference profile fixed in the different voting rules because otherwise the outcomes could not be compared.

The role of judgments concerning the realisticness of assumptions in institutional design is the following. Voting rules (and many other institutions) can be evaluated according to different criteria. Since the ultimate verdict on the acceptability of a given institution depends not merely on how the institution fares with respect to various criteria, but also on how these criteria are *weighed*, the results of a comparative institutional study using random profiles may be misleading if the selected criteria are not very important. It becomes necessary to assess the realisticness of the random profile assumption when we need to formulate an *overall judgment* concerning different voting rules in order to make policy decisions.

There is also an important argument for promoting interdisciplinary integration that is based on behavioral rather than formal consistency across various fields in the social sciences. Public choice theorists, in particular James Buchanan (1972; 1986, pp. 36-38; 1989, pp. 29, 64f), have argued that individuals should be assumed to act in a self-interested manner in analyses of political institutions, because otherwise the results from such analyses could not be compared to those that can be obtained through market institutions. Buchanan argues that consistency is particularly important in the normative comparison of market versus public organizations (Buchanan 1986, p. 32-38; see also Diermeier and Krehbiel 2003). These arguments could be seen as applications of the general idea presented above: in order to compare institutional arrangements, we need to keep some admittedly unrealistic assumptions fixed across those institutions. Similarly, if the assumption of self-interest is unrealistic, but we design institutions assuming that individuals are self-interested, the institutions will be badly designed because they will be responsive to irrelevant issues (cf. e.g. Frey 1994; Hausman 1998).

6   Conclusions

Economics and rational choice theory have traditionally been viewed as epitomes of methodological individualism. The explanatory schema that would seem to follow from this conception is the following. The rational choice theorist begins with a set of preferences. He or she then formulates a model by specifying an institutional context and the individuals' possible strategies in this context. By solving the model for equilibrium he or she derives an explanation or prediction for some question of interest. This rough schema is otherwise correct, but it

provides a misleading picture of the role of preferences in rational choice theory. The rational choice theorist does not begin with a set of preferences in the sense that he would go out and try to find out what the real preferences are. Neither does he start with data on preferences that someone else has collected. It is rather that, in order to explain an aggregate or macrolevel phenomenon, he postulates or argues that the preferences must have such and such properties because of folk-psychological or institutional considerations. Whether unrealistic assumptions concerning the properties of preferences really matter depends on where the explanatory power in the model in question resides.

Some imperialistic models offer explanations by aggregating interdependent intentional action. The crucial issue is the plausibility of the way in which self-interest is operationalized. Assessing the operationalization arguments includes formulating a judgment about the plausibility of the intentional states (beliefs and desires) attributed to the agents and of the psychological possibility of the practical reasoning required by the solution, and also of the way in which the institutional background is included in the model. If the rationality is alleged to be of the as-if kind, the crucial question to ask is whether the structural features allegedly guaranteeing the rationality of individual behavior are indeed in place. Finally, the result of an imperialistic model may be claimed to be fully or partly robust with respect to the unrealistic assumptions, and in such cases it usually corresponds to a very general and abstract systemic property. In any case, the most effective (theoretical) way of criticizing an imperialistic model would be to demonstrate that unrealistic psychological or institutional assumptions actually matter in terms of the conclusions, although we agree that the burden of proof should in principle lie upon those using the unrealistic assumptions in the first place. Explicit robustness analysis would thus be a valuable theoretical means of assessing the merits of economic models applied outside the traditional field of economics.

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