

7 Realism, commonsensibles, and economics

The case of contemporary revealed preference theory¹

D. Wade Hands

Because economics is concerned with familiar phenomena of everyday life,... economists have for the most part to content themselves with terms that are already in current use in ordinary discourse. There is some gain to this. Words borrowed from common language are, as Whewell points out, 'understood after a very short explanation, and retained in the memory without effort.' But, at the same time, the problem of definition is made more difficult. For if we use the terms of common language, we must also endeavour to keep tolerably near to the sense in which they are customarily employed.

(John Neville Keynes 1890: 160)

1 Introduction

Uskali Mäki has been the most consistent defender of philosophical realism among those contributing to the literature on economic methodology during the last twenty or so years.² There are others who have written extensively about realism, such as Tony Lawson (1997, 2003), but, unlike Mäki, Lawson, and others have tended to focus on just one particular version of realism – in Lawson's case critical realism – rather than examining the broader set of questions associated with a realist account of economic science.³

One of the main themes in Mäki's work has been the discipline-sensitivity of his approach: a scientific realism that is 'responsive to empirical and local discoveries about peculiar features' (Mäki 2009: 70) of economic science. An important finding of what he calls this 'bottom-up' approach has been that many of the questions raised by realism in the philosophy of economics are quite different than the long-standing questions associated with realism in the philosophy of physics. One of the main realist concerns regarding physics has been the ontological status of the various non-observable entities posited by physical theory: electrons, photons, and so on. These entities are not among the givens of common sense realism – they are not part of the ontic furniture of everyday life such as tables and taxicabs – and therefore seem to pose serious challenges to any scientific realist account of physics. Are electrons real in the sense that a table is real? Mäki has consistently argued that economics – and a realist interpretation of economic science – does not face *this particular* problem. Like

Keynes in the above quote, Mäki argues that the entities and relationships involved in economic theory are not new, but rather are part of the 'common-sense furniture of the human world: costs and benefits, tastes and choices, firms and households, money and the market' (Mäki 2002: 95). He coined the term 'commonsensibles' for these common sense or folk entities and argues that much of economic theorizing simply involves the manipulation and rearrangement of these commonsensibles (isolation, idealization, etc.).

This chapter will challenge Mäki's argument about commonsensibles by offering a case study from contemporary microeconomics – contemporary revealed preference theory (hereafter CRPT) – where terms like 'preference', 'utility', and to some extent 'choice', are radical departures from the common sense meanings of these terms. Although this argument challenges the claim that economics is inhabited solely by commonsensibles, it is not inconsistent with such folk notions being quite common in economic theory. The position taken here is similar to that of Kevin Hoover in his examination of non-commonsensibles in macroeconomics: that Mäki's ontological common sense realism is 'more persuasive for some parts of economics than others' (Hoover 2001: 230). In the end it will be argued that CRPT's radical departure from our common sense notions of preference and related features of our everyday world reflects much more negatively on CRPT than it does on Mäki's research on realism and economics; in fact, by providing examples of a questions 'that would be more difficult or impossible to answer without recourse to realism', (Mäki 2000: 110) the case study provides support for Mäki's broader thesis regarding the importance of realism in economics.

The chapter is arranged in the following way. Section 1 will examine Mäki's position on commonsensibles and situate it within his broader defense of philosophical realism as a framework for describing and understanding economic science. Section 2 will present CRPT and emphasize the particular aspects of this approach that are most relevant to commonsensibles and to common sense realism. Section 3 will tie the first two sections together by demonstrating the un-commonsensibility of CRPT and by using various aspects of Mäki's work on realism to help us evaluate the methodology of CRPT. Section 4 briefly summarizes the argument.

2 Realism, commonsensibles, and economics

There is an extensive literature on various aspects of the debate between realism and instrumentalism/anti-realism within the philosophy of science, and the vast majority of it focuses on physical science.⁴ There are of course many different versions of (even scientific) realism,⁵ but a minimal condition for a realist account seems to be that the entities or properties involved in science (or a particular science) are real, i.e., they exist (or could exist), and that what science says about them is (or at least could be) true. Even such a weak characterization of realism presents numerous challenges for a realist interpretation of physical science.

One problem – primarily the result of work in the history of science by Thomas Kuhn and others – has come to be called ‘pessimistic induction.’ Since the history of (even great) science involves numerous episodes of revolutionary theory change, it seems reasonable to believe that our current and future science will have the same fate, which is problematic because such revolutionary changes are very difficult to reconcile with most versions of realism. As the philosopher Barry Gower explains:

That history is, indeed, punctuated by episodes in which earlier beliefs, including the most fundamental of beliefs about the kind of world we live in, are set aside in favor of new beliefs, sometimes of a revolutionary character. Typically, the failure of past scientific theories derives from the fact that their central explanatory concepts are empty: there are no crystalline spheres; there is no such thing as phlogiston; or caloric; there is no aether; there are no electric or magnetic fluids; etc. The implications are that a realist would be unable to explain the past success of the theories employing such concepts, and that the success of a currently accepted theory should not be taken as indicative that their central explanatory concepts are referential or even approximately referential.

(2000: 72–73)

A related challenge, and the one that will be the main focus here, is the problem of unobservables. Since empirical evidence is essential to answering questions about whether theoretical entities exist, whether scientific terms actually refer, and/or whether various scientific propositions are true, the non-observability of scientific terms like electrons and photons has been seen as a perennial problem for realist accounts of physical science. As noted above, Mäki’s response to this issue has been the argument that unlike the physical sciences, the observability problem does not plague realist approaches to economics because the terms used and the causal relations emphasized in economic theory are grounded in our everyday common sense folk reality: they are commonsensibles. As he explains:

commonsensibles are more broadly characterized in terms of common-sense frameworks and experiences. Thus, while preferences and expectations are not observables in a narrow sense, they are commonsensibles since they are part of the ontic furniture of common-sense psychology, which we all employ in our daily lives regardless of whether we have an academic degree in psychology. ... There is no ontological departure from the world occupied by commonsensibles in economics (that is, in ‘scientific economics’ in contrast to ‘folk economics’). The situation is different in scientific physics, where brown tables and soft chairs and other commonsensibles (subject matter of ‘folk physics’) are replaced with subatomic particles and forces in fields.

(Mäki 2000: 111)

Given the commonsensible ontology of scientific economics, ontological realism (existence) and referential realism (whither the scientific terms refer) should not be problematic in economics in the same way they are in physics.

Economic theories speak about objects that are confronted in our ordinary experience about economic matters – business firms and households, their aims and expectations, money and goods and their prices, land and labor and capital, wages and profits and taxes. Therefore, the existence of objects of the scientific realm should not be a major issue in economics. The referential real-isticness of the fundamental elements of economic theories is more often than not beyond doubt: since the terms of economic theories seem to refer to entities with which economists and others are familiar on the basis of ordinary experience, the referential status of these terms should not be taken as suspect.

(Mäki 1996: 434)

Notice that the argument is not that everything in economics is observable. It is obvious that many of most important theoretical terms in economic theory – for example ‘utility’ and ‘preference’ – are associated with unobservables.⁶ It is not that everything in economic theory is observable; it is that unobservability is not a problem for economics as it is for physics. Being unobservable is a problem for physics – it makes such entities ‘suspect’ – because of the (exclusively empirical) way that questions about existence and reference are settled within the physical sciences. The argument is that economic science clearly involves a wide range of unobservables, but they are not a problem – they are not ‘suspect’ – because they are associated with things that are well known from (known to exist in) everyday life. In the words of Lionel Robbins so many years ago: ‘they are so much the stuff of our everyday experience that they have only to be stated to be recognized as obvious’ (Robbins 1952: 79).

Even if one accepts this argument about commonsensibles in economics and how it ties economic theorizing inexorably to our common sense ontology, one might still take the position of the radical skeptic and doubt the existence of our common sense world. Although it is always possible to doubt whether familiar things like ‘profit’ and ‘taxes’ really exist, such doubts would have nothing to do with – nor do they undermine the realist interpretation of – economic science. If economic science introduces no entities or causal forces that are not familiar from our common sense ontology, then the only existential threat to the ontology of economic science would involve a wider threat to common sense (such as radical skepticism). Such radical doubt obviously raises important philosophical questions, but they are not questions for *the philosophy of economics*.

So if economics raises no issues about existence or reference, then what questions are raised by a realist account of economics? If economists do not introduce new entities and causal mechanisms, then what exactly differentiates economic science from unscientific folk economics? Mäki’s argument is that the important issues for economics – and those things which differentiate scientific economics from both folk economics and the other social sciences – is *representation*:

how these common sense entities and causal forces are represented in various economic theories. We are misallocating our intellectual resources to focus on existence and reference – concerns of the philosophy of physics – because:

The relevant issues lies elsewhere, namely in how the ordinary objects are represented in economic theories. Even if the referents of ordinary experience and economic theories are pretty much the same, the ways in which they are represented often dramatically diverge.

(Mäki 1996: 434)

The key to understanding economics for Mäki is to recognize that economists systematically rearrange and/or modify the discipline's common sense starting material in a variety of – often quite complex and mathematically sophisticated – ways. The two main ways that theoretical representations deviate from common sense representations 'are *modification* and *rearrangement*' (ibid.). How different economists and different economic research programs theorize and practice – including how particular conceptions of the causal mechanisms responsible for 'the way the world works' (Mäki 2001) constrain and condition scientific research – and thus how successful any particular set of economic ideas turns out to be relative to its competitors, rests primarily with the details of these alternative patterns of modification and rearrangement. A few of the many methods of modification economists regularly employ are isolation, abstraction, idealization, simplification, and aggregation (Mäki 1996, 1998a, 2009). Since some of these modifying activities will be discussed below, it is not necessary to explain them all here, but for example, isolations assume some factor is not present or some parameter has a zero value (e.g., the assumption of no international trade in a macro model or only two goods in consumer choice theory) and abstractions capture common features of a number of different particulars (labor in general as opposed to the labor of a particular worker).

Theorizing in economics is largely a matter of isolation and abstraction, idealization and simplification among commonsensibles, rather than postulation of unobservable entities. While physics departs from the common sense by postulating new entities such as photons and quarks, economics proceeds by modifying the common-sense picture by excluding, idealizing and recombining ... familiar elements in the common-sense picture. Thus, instead of the ordinary notion of preference in contexts such as preferring an apple to an orange in a choice situation, economists entertain the idea of 'well defined' preferences, with properties such as completeness and transitivity.

(Mäki 2000: 111–112)

Before moving on to the next section where a particular economic theory will be examined in detail, it is important to point out that Mäki is not alone among philosophers in taking the position that the existence of the entities and forces

discussed in economic science are not radical departures from the ontology of everyday life (although the term 'commonsensibles' is his). In a protracted debate over realism and economics (Hausman 1998, 1999, 2000a; Lawson 1999, and Mäki 2000), Daniel Hausman fundamentally agreed with Mäki on this point (although disagreeing with what it means for the role of realism in economic methodology). In Hausman's words:

Anti-realists seek to draw a line between the relatively unproblematic claims of everyday life and the problematic theoretical posits of science. Physics postulates new unobservables, to whose existence common sense realism does not commit us. Although economics refers to unobservables, it does not, in contrast to physics, postulate new ones. Its unobservables – beliefs, preferences, and the like are venerable. They have been a part of common sense understanding of the world for millennia.

(1998: 197–198)

The difference is that for Hausman this is one of the reasons that realism is not important to understanding economics. Since the existence of the things discussed in economic theory is no more of a philosophical question than the existence of common sense features of the world like tables and chairs, realism is 'largely irrelevant to economics' (ibid.: 185). As there 'is no issue concerning realism versus anti-realism in economics that is not simultaneously an issue concerning the everyday understanding of the world' (ibid.: 198), to be an anti-realist about economics would be equivalent to being an anti-realist about the everyday world, i.e., to be a radical skeptic (ibid.). Again, there may be such skeptics, but their position has nothing to do with economics and therefore, according to Hausman, there is nothing to be learned from a realist account of economics. This is of course quite different from Mäki's view of the relationship between realism and economic science. Hausman's position will be discussed in more detail below because he has written extensively on revealed preference theory – the topic to which we now turn.

3 Contemporary revealed preference theory

A revealed preference theorist walks into a bar
and the bartender asks:

'So what would you like?'

'Whatever I ordered' replies the economist.

This section discusses a part of contemporary economic theory that I argue conflicts with the commonsensibles interpretation. The majority of the analysis will be contained in Section 4; this section focuses primarily on the theory itself. The theory in question is one approach to the theory of consumer choice: the part of economic science that deals with individual consumers choosing particular commodities to purchase/consume. The economists working on this approach, as

well as those who are using it as the primary theoretical tool in their applied research, generally call it ‘revealed preference theory’, but I will give it a narrower label. I will call it *contemporary revealed preference theory* (CRPT) in order to differentiate this particular version from various other members of the broader revealed preference family.

The revealed preference research program began in earnest with the publication of Paul Samuelson’s paper ‘A Note on the Pure Theory of Consumer’s Behaviour’ in 1938, but over the years it has grown into a rather large, and diverse, family of ideas. All of the members bear a strong family resemblance, but there is also quite a bit of intra-programmatic variation.⁷ It is also useful to note that while some members of the family have died off – for example the subprogram that imposed revealed preference restrictions (the so-called weak axiom of revealed preference WARP) on aggregate excess demand functions in Walrasian general equilibrium models in order to guarantee the stability and uniqueness of the equilibrium price vector⁸ – multiple versions still remain, and co-exist, in economics today. The CRPT subprogram of concern here is just one of these contemporary subprograms, although it seems to be one that is gaining the most strength, and in certain circles of economists – particularly among game theorists – it now seems to be exclusively what practitioners mean by ‘revealed preference.’ In fact, for many defenders/users of CRPT, it is not only coextensive with ‘revealed preference theory’, it is also coextensive with textbook microeconomics. For example, Douglas Bernheim and Antonio Rangel (2008) refer to CRPT as ‘standard economics’ and Ken Binmore calls it ‘an official doctrine of neoclassical economics, enshrined in all respectable textbooks’ (2009: 20). If one wants to develop a ‘discipline-sensitive’ realist account of contemporary economics – as Mäki seems to be interested in doing – then CRPT will need to be included in the story. The main sources I will use for CRPT will be Bernheim and Rangel (2008, 2009) and Binmore (2009), but this is only because they provide some of the clearest statements of the position.⁹

The intuition behind Samuelson original suggestion – the WARP – was that if a consumer can afford a particular bundle of goods, say x^1 , at a particular set of prices p^0 , but instead chooses the bundle x^0 , then the consumer has revealed a preference for bundle x^0 over bundle x^1 . If at a different set of prices p^1 , the individual chooses x^1 , then it must have been the case that (the revealed preferred) bundle x^0 was no longer affordable. There are a variety of different ways such a condition can be formally represented, but Samuelson’s original version (1938: 66) remains the most straightforward:

$$\sum_{i=1}^n p_i^0 x_i^1 \leq \sum_{i=1}^n p_i^0 x_i^0 \Rightarrow \sum_{i=1}^n p_i^1 x_i^0 > \sum_{i=1}^n p_i^1 x_i^1.$$

Figure 7.1 Samuelson’s weak axiom of revealed preference (WARP).

Samuelson’s original paper was an attempt to drop ‘off the last vestiges of utility analysis’ (ibid.: 62) and develop a thoroughly observational and behaviorist theory of consumer choice: a theory even more observationally grounded than the ordinal utility theory of Hicks and Allen (1934), Slutsky (1915), and others. Since the goal was to eliminate ‘utility’ and/or ‘preference’, Samuelson took individual demand functions – ‘empirically determinable under ideal conditions’ (1938: 62) – as the primitives for his analysis. The main result of the 1938 paper was to show that demand functions¹⁰ that satisfied WARP also satisfied all of the standard restrictions on demand functions implied by ordinal utility theory (all, that is, except integrability/Slutsky-symmetry). Samuelson did not use the term ‘revealed preference’ his original paper, and for good reason, since the purpose of the theory was to *eliminate* preference and/or utility from consumer choice theory. Later, in his 1948 paper, Samuelson did use the term and also moved the theory sharply in the direction of actually being a theory that revealed preferences by showing, at least in two dimensions, that WARP could be used to derive individual indifference curves. In his 1950 paper on integrability, Samuelson also connected revealed preference up with Slutsky-symmetry (integrability), the one demand restriction that had been missing in his earlier paper.¹¹

The next major development within the revealed preference research program was Hendrik Houthakker’s ‘strong axiom of revealed preference’ (SARP): a stronger condition that implied all of the demand restrictions of ordinal utility theory (including integrability). These two papers, Samuelson (1950) and Houthakker (1950), essentially closed the circle on the relationship between revealed preference-based theories and ordinal utility-based theories of consumer choice by demonstrating conditions under which they would be equivalent. The WARP and SARP results were extended and given more sophisticated mathematical foundations in a series of later papers – Kihlstrom *et al.* 1976; Richter 1966; and a number of papers in Chipman *et al.* 1971, for example – but the theoretical focus remained to connect revealed preference with the traditional restrictions on demand functions. The bottom line is that despite its somewhat radical behaviorist origins in Samuelson (1938), by the 1960s revealed preference theory was simply another way of thinking about the standard ordinal utility-maximizing theory of consumer choice and demand. The strongest versions of the two theories were equivalent in the sense that they implied the exact same restrictions on consumer demand functions, and both were based on the idea that consumer choice was the result of consumers choosing the most preferred bundle – i.e., maximizing utility – given the constraints they faced. The two approaches shared the same basic conception of consumer choice; they simply emphasized different sets of mathematical restrictions.

Since most of the revealed preference literature started from continuous demand functions rather than (finite) choice data, and emphasized demand restrictions rather than estimating preferences or utility functions, the 1967 paper by Sidney Afriat which started from finite choice data and focused on the construction of utility functions was an important development (and a significant change) within the revealed preference research program. As Hal Varian explains:

He started with a *finite* set of observed prices and choices and asked how to actually construct a utility function that would be consistent with these choices ... Afriat's approach ... was truly constructive, offering an explicit algorithm to calculate a utility function consistent with the finite amount of data, whereas the other arguments were just existence proofs. This makes Afriat's approach much more suitable as a basis for empirical analysis.

(2006: 101)

Afriat's results led to the 'generalized axiom of revealed preference' (GARP) – see Varian (1982) – and encouraged the development of a more choice data-based literature on empirical revealed preference theory (see Blundell 2005 for example). This more empirical literature has been key to the development of CRPT.

CRPT starts from *choice data* – that is observed prices and quantities, and the associated opportunity sets – and uses a version of revealed preference (usually GARP-based) to estimate a utility function consistent with the existing data. Then the constructed utility function is used to estimate quantities for different parameter values and to extend information to other choice sets. This process is explained in detail by Douglas Bernheim and Antonio Rangel (note X^D is the observed choice set and X is wider set to which the choice data is to be extended):

Usually choice data are not available for all elements of X , but rather for elements of some restricted set $X^D \subset X$. The objective of positive economic analysis is to extend the choice correspondence C from observations on X^D to the entire set X . This task is usually accomplished by defining a parameterized set of utility functions (preferences) defined over X , estimating the utility parameters with choice data for the opportunity sets in X^D , and using these estimated utility functions to infer choice for opportunity sets in X/X^D (by maximizing that function for each $x \in X/X^D$).

(2008: 159)

CRPT thus uses revealed preference theory to test for the consistency of given data – consistency, that is, with respect to constrained ordinal utility maximization – and also to estimate a utility function that (when maximized) can be used to infer choices for other parameter values. The authors call the result of such exercises 'positive economic analysis' (ibid.) or 'standard economics' (ibid.: 163).

So how are we to make methodological sense of CRPT-based exercises? If one thinks in terms of the traditional ordinal utility-based theory of consumer choice, it seems natural to interpret the estimated utility functions as one interprets most 'estimates' in economics: as an attempt to measure the underlying forces that cause the phenomena in question, in this case the preferences that cause the consumer's initial choices. Such estimates can then – assuming some implicit principle of the uniformity of nature (or at least of the uniformity of

individual behavior) – be used to predict future behavior where the consumer faces different parameters and constraints. This interpretation is not only consistent with traditional ordinal utility-based demand theory, it is also consistent with our common sense folk-psychological views about individual choice.¹² People have preferences (desires) over various affordable bundles and act rationally (in an instrumentally rational way) by choosing the most preferred bundle from the affordable set. Thinking in such terms, CRPT could be just an attempt to empirically estimate the causal mechanism that is behind the consumer's choices and to make (hopefully, empirically reliable) predictions about the choices these same mechanisms will cause the consumer to make under different prices and constraints. On this interpretation CRPT is more of a measurement, or econometric, technique than a fundamentally different theory of consumer choice and as such is quite consistent with our common sense and folk-psychological interpretations of consumer choice.

The problem with this rather traditional interpretation of CRPT is that it is not the way that the relevant economists characterize their own theorizing. Those engaged in CRPT view it as simply a way of extending the information contained in the original data set to additional (out of sample) data sets and as such it says nothing about the causal mechanisms behind consumer choice. Preferences are not what cause the consumer to choose a particular bundle; rather, the act of choosing it is what makes a particular bundle preferred. As Ken Binmore explains, CRPT 'makes a virtue of assuming *nothing whatever* about the psychological causes of our choice behavior'; it simply 'assumes that we already know what people choose in some situations, and uses this data to deduce what they will choose in other situations' (2009: 8–9). The primitives of the theory are neither demand functions (as they were for much of early revealed preference literature), nor are they the underlying preferences (that are 'revealed' in the consumer's choices); rather, the 'primitives of the theory are the *choices*' (ibid.: 20) that the consumer makes. Again, a quote from Bernheim and Rangel is useful:

Though we often speak as if choices are derived from preferences, the opposite is actually the case. Standard economics makes no assumptions about how choices are actually made; preferences are merely constructs that summarize choices. Accordingly, meaningful assumptions pertain to choices, not to preferences. ... Though the terminology suggests a model of decision making in which preferences drive choices, it is important to remember that the standard framework does not embrace that suggestion; instead, R is simply a summary of what the individual chooses in a wide range of situations.

(2008: 158)

Although this sounds like a complete reversal of the common sense relationship between preference and choice – common sense in both 'everyday folk-psychological' sense, and the 'consistent with the traditional interpretation of

demand theory' sense – perhaps the authors are really less serious about the reversal than it sounds. Perhaps the subtle 'as if' suggests that it is not really that preference plays no causal role in choice, and that preference is just another word for choice (or, to be more strictly behavioral, doings or acts), but rather that certain mental states, i.e., preferences, really do cause choices, but since such mental states are unobservable, our strict empiricist scruples only allow us to talk in hypothetical 'as if' terms. This type of argument has been applied to some of the economists responsible for the ordinal revolution; it has been argued that Pareto and others still believed that real consumers were buying goods in ways that would give them the most hedonistic satisfaction, but *for the purposes of scientific demand theory* all they were allowed to assume were ordinal preferences.¹³ Perhaps in the same way, CRPT theorists do view preferences (as a class of mental states) as the cause of consumer choices, but simply do not allow themselves to speculate about such unobservables when doing scientific economics.

Perhaps this is the case, but the evidence is strongly to the contrary. The evidence is that defenders of CRPT are very serious about the reversal of the common sense relationship between preference and choice. They argue that those who see choice in the traditional way are simply guilty of a logical fallacy: *The Causal Utility Fallacy*.

In revealed-preference theory it isn't true that Pandora chooses b rather than a because the utility of b exceeds the utility of a. This is the Causal Utility Fallacy. It isn't even true that Pandora chooses b rather than a because she prefers b to a. On the contrary, it is because Pandora chooses b rather than a that we say that Pandora prefers b to a, and assign b a larger utility.

(Binmore 2009: 19)

According to CRPT anyone who believes that preferences cause choice is guilty of more than an epistemic impropriety, they are guilty of deeply fallacious reasoning. It should also be noted that philosophers are particularly subject to this logical confusion since 'most accounts of rational decision theory in the philosophical literature fall headlong into the Causal Utility Fallacy' (ibid.: 21). For CRPT, the idea that our preferences – a particular type of mental state – cause our choices is simply a fallacy; we observe what people have chosen for a particular set of data and we use various revealed preference techniques to extend the same structural pattern of behavior to other choice sets (full stop). Preference is just choice and no causes are involved in consumer choice theory.

4 Realism, commonsensibles and CRPT

Mäki repeatedly notes that 'preferences' (and related concepts of utility, desires, etc.) are clear examples of commonsensibles in economics (Mäki 1996: 431, 436; 1998a: 306; 2000: 111–112; 2002: 95; 2005: 249; 2009: 87), and his argument seems quite reasonable. We all know what it means to say

that we prefer apples to oranges, or that we prefer that party A is elected rather than party B. We also know the difference between what we would prefer and what is in fact the case: the difference between preferring a world in which polar bears are not threatened with extinction and actually being in a world in which polar bears are not so threatened. In the same way, we know what it means to prefer something that will never happen, like preferring to be a great athlete or to have all of our students be brilliant. We also understand preference in others: we know what it means to say that someone else prefers good x to good y (if that were not the case, gift shopping would be random). The view that people have preferences, that those preferences are mental states, that we can have some knowledge of preferences (our own and others) even though they are not directly observable, that what is preferred is not always what happens, and that the combination of preferences and our beliefs about what does and does not satisfy those preferences causally influences (and often determines) the actual choices we make is woven into the folk-psychological fabric of our everyday lives (and our sense of self, our ethical codes, the law, etc.). Of course one could doubt the existence of beliefs and desires,¹⁴ but it would be equivalent to doubting a substantial portion of our common sense social world, and as noted above, that is a broader philosophical issue that is independent of economic science.

Of course the preferences that we can agree exist in the everyday world are not exactly the same as the complete, reflexive, and transitive preference orderings defined over some subset of \mathcal{R}^n that one encounters in standard microeconomics textbooks. However, Mäki argues that the differences between folk preferences and the abstract preferences of scientific economics do not raise philosophical issues about existence or reference; the issues raised by the match or mismatch between folk and scientific preferences are questions about reference. Now of course there are serious questions – and, because of recent developments in behavioral and experimental economics, much heated debate – about whether the standard textbook characterization of preferences adequately *represents* the preferences of real human agents, but such questions are not about whether preferences exist. Reference questions concern the particular ways that economic theorizing and model-building modifies and/or rearranges the initial commonsensibles. As Mäki explains:

take the folk psychological notion of preference. The preferences of consumers are represented by the axioms of standard neoclassical theory as complete ... reflexive ... and transitive. ... It would be a mistake to conclude that if consumers do not have preferences with these characteristics, they do not have preferences at all. There may be other reasons to doubt the reality of preferences (along with the rest of the folk psychological realm), but, say, the intransitivity of preferences should not be one such reason. The axioms of consumer theory may refer to real entities irrespective of how these entities are represented.

(1996: 436)

Hausman makes a very similar argument:

Nothing in folk psychology corresponds exactly to the economist's (or decision theorist's) notion of a preference ranking. ... But are preference rankings ... new entities postulated by ... utility theory, in the same way that physicists postulate the existence of subatomic particles, or are preference rankings ... merely idealized variations on familiar notions of desire and belief?

I hold the latter view. ... These considerations do not, of course, establish that claims about preferences and beliefs are observable. Nor are they intended to. What they establish is that there are no principled epistemological divide between the beliefs and desires or everyday life and the subjective probabilities and utilities of economics.

(1998: 199)

Not only does Mäki use preferences and related concepts as paradigmatic commonsensibles, the concept of preference – at least the traditional concept of preference as a mental state that causes choice behavior – also seems to fit nicely into his discussion of how realist economics works, how it has traditionally worked, and ostensibly how it should work. Mäki argues that the explanatory practices of economists ‘typically involve theoretical modeling, and theoretical modeling is typically a matter of isolating causal mechanisms’ (Mäki 2009: 85). The mechanism is represented in a theoretical model by an input (I) and output (O) system, and ‘economists not only convey knowledge *that* the input and the output are connected, they also conjecture *how* the input, together with the mechanism, produces the output’ since ‘answering such *how* questions enables economists also to be more assured *that* there is a causal mechanism between I and O, thereby establishing a causal relationship where there appeared to be mere correlations or empirical regularity’ (ibid.). In the process of modeling and modifying models the initial commonsensibles are rearranged and modified in ways that are designed to provide a deeper scientific understanding of the relevant underlying causal mechanisms.

Rearrangement amounts to revising the commonsense understanding and replacing it by a theoretical picture of the causal structure of the world. A commonsense picture is replaced with a scientific picture that economists hope will get the causal and other dependencies right.

(Mäki 2009: 88)

This story certainly fits most of the history of economic theorizing about consumer choice and demand. It starts with folk-psychological notions of human action on the basis of desires (preferences) and beliefs, and then uses various modeling strategies to refine – modify and rearrange – these initial ideas in an attempt to better get at the underlying causal mechanism of constrained preference satisfaction-based choice. The inputs are preferences and beliefs, and the

outputs are choices; ‘choosing the most preferred bundle’ or ‘utility maximization’ provides the *how*, and thus the causal mechanism connects the inputs to the output. Of course, this is not to say – nor is it necessary to say in Mäki's realist framework – that the budget-constrained ordinal preference maximizing model the economics profession has developed does in fact uncover the relevant underlying causal mechanism of consumer choice (i.e., that the theory is true or approximately true), but it does seem to capture, at least in broad outline, the explanatory strategy of traditional consumer choice theory and does so in a way that is consistent with a realist account. If revealed preference theory is interpreted, as it has been for most of its history, as simply another way – perhaps a more sophisticated or a more epistemically satisfactory way – of characterizing the traditional story of constrained preference-caused consumer choice, then *that* type of revealed preference theory fits Mäki's realist story as well.

The problem is of course – and it should be pretty clear where the argument is going by now – that CRPT *has none of these features*. Choice and preference are connected because – unlike our folk intuitions where preferences cause choices – all that preference is, is choice. Preferences are not mental states that give rise to, cause, or even influence, choice behavior; they are simply a different way – a more restricted way, since only choices that are consistent with some version of revealed preference theory count – of summarizing the empirical information contained in the initial choice data. CRPT only says *that* the input (preferences) and the output (choices) are connected – and they are connected by definition – and says nothing whatsoever about *how* they are connected. Preferences are just mappings that carry structural relationships from a restricted subset of the original choice data into data sets with different parameter values. When one reads that according to CRPT ‘standard (positive) theory identifies choice parameters from past behavior and relates these parameters to future behavior’ (Gul and Pesendorfer 2008: 8) the natural inclination is to think that CRPT theorists must have some underlying causal story in mind about why the patterns (again, not just any patterns, but WARP, SARP, or GARP-pruned patterns) that were found in the original choice data could credibly, or reliably, or justifiably, be extended to other data sets – why the patterns in the consumer's future choices should exhibit the same structural relationships as those found in (the pruned) past choices – but there really is no such story (explicit or implicit).¹⁵ CRPT is not just mindless economics (economics that is not concerned with the neurological processes that cause choice behavior): it is causeless economics.

CRPT clearly seems to be a case – and remember, advocates consider it to be the same as textbook neoclassical theory – where the key theoretical term ‘preference’ and its cognates cannot be given a commonsensible interpretation. We are all comfortable that preferences exist, but they are mental states that exist independently of, and cause, the choices we make. This folk-psychological view is the common sense view and for most of modern economics it could rightly be said that such a ‘folk-psychological view of choices as determined jointly by beliefs and preferences lies at the foundation of economics’ (Hausman 2008: 138), but that is not the case for CRPT. For CRPT the view of preference and

choice in both common sense and traditional economic theory are plagued by the Causal Utility Fallacy. According to CRPT, we have reason to believe that preferences exist and the word preference refers, not because of the intuitions of our fallacy-ridden common sense, but because choices are observable and in economics, ‘prefers’ just means ‘chose.’¹⁶ According to Mäki, the ‘prominent issues of realism in the “science of commonsensibles” ... deal with the existence of causal relations, and with the truth of causal hypotheses phrased in terms of theoretically modified commonsensibles’ (Mäki 2005: 250) and this doesn’t describe CRPT at all.

Although CRPT is an economic theory that is not grounded in commonsensibles and also seems to be at odds with Mäki’s realist framework for describing how modeling and theorizing proceeds in economics, in another sense it supports Mäki’s general argument about the importance of realist philosophy in economics, and more specifically it provides a defense of his position against Hausman’s claim that realism ‘is largely irrelevant to economics’ (1998a: 185). The reason is that Hausman has been an outspoken critic of revealed preference theory (2000b, 2008), and although his points seem to hit home, they only hit home against more traditional versions of revealed preference that are in some way trying to explain the causes of consumer choice (or are linked, or equivalent, to ordinal utility theory). Hausman’s criticisms leave CRPT untouched because CRPT is in no way an attempt to explain the causes of consumer choice. On the other hand, Mäki’s view of how realist economic theories work gives us a much better understanding of the possible difficulties with CRPT, which corroborates Mäki’s claim that realism matters for our understanding of economic science.

In order to see this, let us look at one of the many criticisms Hausman has raised against revealed preference theory.¹⁷ The traditional argument *for* some version of revealed preference – relevant to almost every member of the revealed preference family other than CRPT – is that ‘choice’ can be used to *infer* ‘preference.’ Since ‘choices’ are observable and ‘preferences’ are not, the argument has traditionally been that the scientific standing of consumer choice theory can be improved by moving from a utility-based to a revealed preference-based theory (even if the two are mathematically equivalent). One of the serious problems with such a revealed preference theory is that choices do not – thinking now in folk-psychological terms as preferences being mental states that cause choices – depend only on preferences, but also the consumer’s beliefs. If one knows all of the relevant beliefs and what is chosen, then preference might be determined, but choices alone cannot reveal preferences.¹⁸

According to ‘folk psychology’ (the theory people employ in everyday life to predict and explain actions), an agent’s desires or preferences, like an agent’s beliefs and expectations, are mental states that constitute reasons for their actions and causes their actions. ... Beliefs and preferences, unlike ‘actions’, are subjective, and they are distinct from the actions they give rise to, explain, and justify. Within folk psychology, one cannot infer preferences

from choices alone, because choices depend on both belief and preference. To explain why an investor purchases one stock rather than another, one needs to know not only her preferences (for larger returns), but also her beliefs (that the returns on the first were higher). ... Choice cannot reveal preference, since one cannot infer preferences from choices without premises concerning beliefs.

(Hausman 2000b: 103–104)

If preferences cannot be inferred from choices then revealed preference theory – at least one that attempts to use one of the revealed preference axioms (WARP, SARP, GARP, etc.) to uncover the preferences that cause consumer choices – fails as a scientific explanation for what a consumer chooses.

The bottom line is that economists generate predictions of choices and give explanations of choices by deriving choices ... from preferences and beliefs. Subjective preferences combine with beliefs to cause actions. Revealed preferences do not. Neither actual nor hypothetical revealed preferences will do the jobs that preferences do in economics.

(Hausman 2008: 138)

This seems to be a very compelling argument against revealed preference theories that attempt to uncover the preferences that cause choices – revealed preference theories that are in the same broad causal research program as standard utility-based demand theory – and that constitute (historically) the vast majority of what has been written about revealed preference. Nevertheless, it is an argument that leaves CRPT entirely untouched. CRPT makes no attempt to explain what causes choice, and as such is immune to any criticism – no matter how accurate – that it fails to do so. CRPT – despite frequent use of terms like ‘prefer’, ‘choose’, and even ‘would choose’ – is not an attempt to provide a causal explanation of choice: it is a technique for projecting certain structural patterns from one set of data onto another.

Hausman would obviously say that there is a serious problem with CRPT, but it cannot be the problem he outlines in the above quotations since it is not a theory designed to explain what causes consumer choices. The most obvious conclusion seems to be that CRPT fails because a theory of consumer ‘choice’ *should be* a theory about what causes choices. One gets the idea that this is the argument that Hausman wants to make – and one that many of us would agree with – but his arguments are not very effective in clarifying the problem. As he says:

economists cannot function without a subjective notion of preference, which does not and cannot stand in any one-to-one relationship with choices. Once economists are convinced of this conclusion, they will have no reason to speak of ‘revealed preference’ and excellent reason to avoid this misleading terminology.

(Hausman 2008: 132)

But defenders of CRPT *do function without a subjective notion of preference* and the preferences they employ in their models *do stand in a one-to-one relationship with choices*. Not only does CRPT-based economic science function in this way, its defenders argue (although I would say not very persuasively) that the resulting theory of consumer choice is just ‘standard economics.’ It seems that this is a case where Mäki’s broader program in realism and economics might shed some light on a methodological problem. Let me just give two examples of how Mäki’s efforts to develop a bottoms-up realist account of economics gives us some insight into why CRPT might be problematic.

The first comes from Mäki’s discussion of manifest image, of say a table, and the scientific image of it (2005: 247–248). The physicist image of a table is entirely different than the common sense image: ‘The remarkable thing about the scientific table is that it is no more a table: the tablehood of the common-sense table has been removed’ (ibid.: 247). If one wants ‘to study tables *qua* tables’ then the common sense tablehood needs to be retained (ibid.). The theory of consumer choice is similar. A theory of consumer choice *qua* consumer choice must not entirely remove the folk-psychological common sense qualities of either consumerhood or choice. A scientific theory of consumer choice will modify, rearrange, and perhaps involve substantial mathematical formalism of these common sense notions, but consumer choice *qua* consumer choice needs to retain an element of common sense characterization. This seems to be one of the things that CRPT fails to do. The notions of preference (and choice) are such a radical departure from our common sense notions that CRPT is not a theory of consumer choice *qua* consumer choice at all.

The second example comes from his discussion of ‘how-possibly’ and ‘how-actually’ explanations in Mäki (2009). The argument is that realist economics would proceed by:

attempting to answer the question, ‘What mechanism could have generated this pattern?’ Such a model gives a possible (partial) explanation for the pattern by isolating a possible mechanism that could be causally responsible for, or could have significantly contributed to, the pattern. Much of economic modeling aims at *inference to a possible explanation* – rather than inference to the best explanation. A scientific realist should find such *how-possibly explanations* perfectly appropriate stages in an intellectual process towards *how-actually explanations* that describe the mechanisms and processes that actually have brought about the *explandandum* phenomenon. But if how-possibly explanation appears to be the final destination rather than a phase on the way toward a how-actually explanation, the realist will raise questions about whether the exercise is leaning too much toward examining mere substitute systems.

(Mäki 2009: 86)

CRPT certainly seems be stuck in the realm of how-possibly and never gets to (or makes any effort to get to) how-actually, and as a result ends up ‘leaning too

much toward examining mere substitute systems’. This seems to be a serious problem for CRPT and it is a problem that Mäki’s realist account helps us recognize. If, as is the case for other versions of revealed preference, there is an attempt to link the how-possibly with the how-actually, then all of Hausman’s criticisms come into effect, but if there is no such effort – and in CRPT there isn’t – then Mäki gives us an additional realist-based argument for why the approach is problematic.

So although CRPT does seem to be in conflict with the argument that economics exclusively involves commonsensibles, upon further investigation it becomes clear that Mäki’s realist account of economics sheds some useful light on the methodological issues (in this case difficulties) with the CRPT approach. The fact that CRPT’s concept of preference is not a commonsensible ends up being a problem for CRPT rather than a problem for Mäki’s realist approach to economics.

5 Conclusion

I will simply conclude by summarizing the argument contained in the previous three sections. I used a particular case study in contemporary economics – CRPT – to explore a number of different aspects of Mäki’s realist philosophical research program in economic methodology. Section 1 explored Mäki’s arguments about commonsensibles in economics and how this makes the concerns of a realist approach to the economics different from a realist approach to physics. Section 2 discussed the evolution of revealed preference theory from Samuelson (1938) to CRPT, paying particular attention to the relationship between revealed preference and the standard ordinal utility theory-based theory of consumer choice. Section 3 brought commonsensibles and CRPT together and demonstrated that the notion of preference in CRPT is radically at odds with our folk-psychological and common sense notion of preference. In the end it was argued that although CRPT demonstrates that there are economic theories that conflict with our common sense ontology, in this particular case it reflects more poorly on the economic theory in question than on Mäki’s realist approach.

Notes

- 1 I would like to thank Bruce Caldwell, John Davis, Don Ross, and the editors for helpful comments on earlier versions of this paper. Errors and omissions of course remain solely my own.
- 2 The works that will be most important in the following discussion are Mäki (1996, 1998a, 2000, 2002, 2005, 2009).
- 3 See Hausman (1998), Hodge (2008) or Hands (2001: 320–334) for more a detailed discussion of the differences between these various views.
- 4 See Chapter 6 of Nagel (1961) for a classical discussion.
- 5 See Hausman (1998), Nola (1988), Psillos (2000), or Mäki (1998b) for a sample of papers that attempt to clarify and organize the various forms of realism in a useful way.
- 6 ‘It seems absurd to maintain that economics does not refer to unobservables. Surely the preferences and expectations that explain and predict choices are unobservable. Who has ever seen or smelt a preference? Who has ever tasted a belief?’ (Hausman 1998: 196).

- 7 I have argued elsewhere (Hands 2006a, 2008) – as have Houthakker (1983), Wong (2006), and others – that Samuelson's original argument (1938) was quite different from his later contributions to the revealed preference literature (1947, 1948, 1950), but the variation within the revealed preference family is not restricted to Samuelson's own work. It is also exhibited among other key contributions to the research program, such as Afriat (1967), Houthakker (1950), Kihlstrom *et al.* (1976), Little (1949), Richter (1966), and Varian (1982). See Grüne-Yanoff (2004), Hausman (2000b, 2008), Mas-Colell (1982), and Varian (2006) for discussions of the revealed preference literature that emphasize variation within the family.
- 8 This subprogram had its origins in Wald (1951) – actually before Samuelson's original paper since Wald's paper was originally published in 1936 – and includes some of the seminal papers in mid-twentieth century Walrasian general equilibrium theory, such as Arrow *et al.* (1959). See chapters 9, 11, and 12 of Arrow and Hahn (1971) for discussion.
- 9 Gul and Pesendorfer (2008) and Ross (2005) also provide examples of recent research where revealed preference theory is presented (and defended) as 'standard' or 'neo-classical' economics, and the revealed preference theory presented often sounds like CRPT.
- 10 In the original paper individual demand functions were assumed to be continuous, locally invertible, homogeneous of degree zero, and satisfy the standard linear budget constraint, although it was later recognized that not all of these restrictions were required.
- 11 See Hands (2006b) for a detailed discussion of Samuelson and integrability.
- 12 See Hands (2001: 165–171, 334–341) for a general discussion of 'folk psychology' and some of the issues raised by such belief, action, and desire (BAD) explanations. Folk psychology and related issues will be discussed in more detail in the next section.
- 13 Michael Mandler (1999: 110–115) calls this the difference between 'cardinality' and 'cardinal measurability'; the argument is that for many of the early founders of ordinal utility theory, it was cardinal hedonistic utility (thus cardinality) that actually drove individual choice, but science, and thus demand theory, needed to be restricted to that which is strictly observable and measurable (thus the rejection of cardinal measurability).
- 14 This is the view, for example, of the eliminative materialist position within the philosophy of mind. See Hands (2001: 165–171) for a discussion of eliminative materialism and Rosenberg (1992) for its application to economics.
- 15 Given the language of patterns and structure used here it should be noted that the most philosophically sophisticated attempt to provide a realist account of CRPT is the structural realist account of Don Ross (1995, 2000, 2005, 2008). Ross uses Daniel Dennett's notion of a 'real pattern' (Dennett 1991) and 'ontic structural realism' (Gower 2000; Ladyman 1998; Ross and Spurrett 2007) to explain the patterns identified in CRPT and their associated mathematical structures in realist terms. I have criticized the application of Ross' argument to historical figures such as Robbins and Samuelson (Hands 2008, 2009), but it remains an open question how effectively it can provide a realist account of CRPT. This approach was not discussed here because it raises a host of issues that go well beyond the scope of the current chapter.
- 16 It should also be noted that CRPT raises questions about 'choice' as much as 'preference.' We do not observe choice: we observe behavior or action. To know a 'choice' was behind a particular action would require us to make the distinction between what is intentional and what is not: between a 'wink' and a 'blink'. The choice data of CRPT is consistent with brainwashing, hypnotism, coercion, and a variety of other things that our common sense ontology would not view as leading to choice. As Hausman notes: 'Economists are interested in choices, which are intentional human actions, not unintentional movements; and to draw this distinction requires the notion

- of subjective preference that revealed-preference theorists disavow' (2000b: 113). Since the various issues associated with 'choice' in CRPT really warrant a separate paper, the discussion here will continue to focus on preference.
- 17 The critical literature on the revealed preference tradition in choice theory is extensive. A sample might also include Grüne-Yanoff (2004), Hansson and Grüne-Yanoff (2006), Lewin (1996), Little (1949), Rosenberg (1992), Sen (1973), and Wong (2006).
- 18 A similar point was made by Grüne-Yanoff (2004), Hansson and Grüne-Yanoff (2006), and Rosenberg (1992).

References

- Afriat, S.N. (1967) 'The Construction of Utility Functions from Expenditure Data', *International Economic Review*, 8: 67–77.
- Arrow, K.J., Block, H.D., and Hurwicz, L. (1959) 'On the Stability of the Competitive Equilibrium II', *Econometrica*, 27: 82–109.
- Arrow, K.J. and Hahn, F.H. (1971) *General Competitive Analysis*, San Francisco: Holden-Day.
- Bernheim, D. and Rangel, A. (2008) 'Choice-Theoretic Foundations for Behavioral Welfare Economics', in A. Caplin and A. Schotter (eds). *The Foundations of Positive and Normative Economics: A Handbook*, Oxford: Oxford University Press, 155–192.
- Bernheim, D. and Rangel, A. (2009) 'Beyond Revealed Preference: Choice-Theoretic Foundations for Behavioral Welfare Economics', *Quarterly Journal of Economics*, 124: 51–104.
- Binmore, K. (2009) *Rational Decisions*, Princeton, NJ: Princeton University Press.
- Blundell, R. (2005), 'How Revealing is Revealed Preference?' *Journal of the European Economic Association*, 3: 211–235.
- Chipman, J.S., Hurwicz, L., Richter, M., and Sonnenschein, H.F. (eds). (1971) *Preferences, Utility, and Demand: A Minnesota Symposium*, New York: Harcourt Brace Jovanovich.
- Dennett, D. (1991) 'Real Patterns', *The Journal of Philosophy*, 88: 27–51.
- Gower, B. (2000) 'Cassirer, Schlick and 'Structural' Realism: The Philosophy of the Exact Sciences in the Background to Early Logical Empiricism', *British Journal for the History of Philosophy*, 8: 71–106.
- Grüne-Yanoff, T. (2004) 'The Problems of Testing Preference Axioms with Revealed Preference Theory', *Analyse & Kritik*, 26: 382–397.
- Gul, F. and Pesendorfer, W. (2008) 'The Case for Mindless Economics', in A. Caplin and A. Schotter (eds). *The Foundations of Positive and Normative Economics: A Handbook*, Oxford: Oxford University Press, pp. 3–39.
- Hands, D.W. (2001), *Reflection Without Rules: Economic Methodology and Contemporary Science Theory*, Cambridge: Cambridge University Press.
- Hands, D.W. (2006a) 'Individual Psychology, Rational Choice, and Demand: Some Remarks on Three Recent Studies', *Revue de Philosophie Economique*, 13: 3–48.
- Hands, D.W. (2006b) 'Integrability, Rationalizability, and Path-Dependency in the History of Demand Theory', in P. Mirowski and D.W. Hands (eds). *Agreement on Demand: Consumer Theory in the Twentieth Century*, Durham, NC: Duke University Press [Annual Supplement to Volume 38 of *History of Political Economy*], pp. 153–185.
- Hands, D.W. (2008) 'Introspection, Revealed Preference and Neoclassical Economics: A Critical Response to Don Ross on the Robbins-Samuelson Argument Pattern', *Journal of the History of Economic Thought*, 30: 1–26.

- Hands, D.W. (2009) 'Rejoinder to Ross: More On the Robbins-Samuelson Argument Pattern', *Journal of the History of Economic Thought*, 31: 105–114.
- Hansson, S.O. and Grüne-Yanoff, T. (2006) 'Preferences', in E.N. Zalta (ed.). *The Stanford Encyclopedia of Philosophy (Spring 2009 Edition)*, Available at <http://plato.stanford.edu/entries/preferences/>.
- Hausman, D. (1998) 'Problems with Realism in Economics', *Economics and Philosophy*, 14: 185–213.
- Hausman, D. (1999) 'Ontological and Methodology in Economics', *Economics and Philosophy*, 15: 283–288.
- Hausman, D. (2000a) 'Realist Philosophy and Methodology of Economics: What is it?' *The Journal of Economic Methodology*, 7: 127–133.
- Hausman, D. (2000b) 'Revealed Preference, Belief, and Game Theory', *Economics and Philosophy*, 16: 99–115.
- Hausman, D. (2008) 'Mindless or Mindful Economics: A Methodological Evaluation', in A. Caplin and A. Schotter (eds). *The Foundations of Positive and Normative Economics: A Handbook*, Oxford: Oxford University Press, pp. 125–151.
- Hicks, J.R. and Allen, R.G.D. (1934) 'A Reconsideration of the Theory of Value, Parts I and II', *Economica*, 2: 52–76, 196–219.
- Hodge, D. (2008) 'Economics, Realism and Reality: A Comparison of Mäki and Lawson', *Cambridge Journal of Economics*, 32: 163–202.
- Hoover, K.D. (2001) 'Is Macroeconomics for Real?' in U. Mäki (ed.). *The Economic World View: Studies in the Ontology of Economics*, Cambridge: Cambridge University Press, pp. 225–245.
- Houthakker, H.S. (1950) 'Revealed Preference and the Utility Function', *Economica*, 17: 159–174.
- Houthakker, H.S. (1983) 'On Consumption Theory', in E.C. Brown and R.M. Solow (eds). *Paul Samuelson and Modern Economic Theory*, New York: McGraw Hill, pp. 57–68.
- Keynes, J.N. (1917), *The Scope and Method of Political Economy*, 4th edition, London: Macmillan. [1st edition 1890, Augustus M. Kelley reprint 1986.]
- Kihlstrom, R., Mas-Colell, A., and Sonnenschein, H. (1976) 'The Demand Theory of the Weak Axiom of Revealed Preference', *Econometrica*, 44: 971–978.
- Ladyman, J. (1998) 'What Is Structural Realism?' *Studies in the History and Philosophy of Science*, 29: 409–24.
- Lawson, Tony (1997) *Economics and Reality*, London: Routledge.
- Lawson, Tony (1999) 'What Has Realism Got To Do with It?', *Economics and Philosophy*, 15: 269–282.
- Lawson, Tony (2003) *Reorienting Economics: Economics as Social Theory*, London: Routledge.
- Lewin, S.B. (1996) 'Economics and Psychology: Lessons from Our Own Day from the Early Twentieth Century', *Journal of Economic Literature*, 34: 1293–1323.
- Little, I.M.D. (1949), 'A Reformulation of the Theory of Consumer's Behaviour', *Oxford Economic Papers*, 1: 9–99.
- Mäki, U. (1996) 'Scientific Realism and Some Peculiarities of Economics', in R.S. Cohen, R.S. Hilpinen, and Q. Ren-Zong (eds). *Realism and Anti-Realism in the Philosophy of Science*, Dordrecht, NL: Kluwer Academic, pp. 427–447.
- Mäki, U. (1998a) 'Aspects of Realism About Economics', *Theoria*, 13: 301–319.
- Mäki, U. (1998b) 'Realism', in J.B. Davis, D.W. Hands, and U. Mäki (eds). *The Handbook of Economic Methodology*, Cheltenham: Edward Elgar, pp. 404–409.

- Mäki, U. (2000) 'Reclaiming Relevant Realism', *The Journal of Economic Methodology*, 7: 109–125.
- Mäki, U. (2001), 'The Way the World Works (www): Towards an Ontology of Theory Choice', in U. Mäki (ed.). *The Economic World View: Studies in the Ontology of Economics*, Cambridge: Cambridge University Press, pp. 369–389.
- Mäki, U. (2002) 'Some Nonreasons for Nonrealism About Economics', in U. Mäki (ed.). *Fact and Fiction in Economics: Models, Realism, and Social Construction*, Cambridge: Cambridge University Press, pp. 90–104.
- Mäki, U. (2005) 'Reglobalizing Realism by Going Local, or (How) Should our Formulations of Scientific Realism be Informed About the Sciences', *Erkenntnis*, 63: 231–251.
- Mäki, U. (2009) 'Realistic Realism About Unrealistic Models', in H. Kincaid and D. Ross (eds). *The Oxford Handbook of Philosophy of Economics*, New York: Oxford University Press, pp. 68–98.
- Mandler, M. (1999) *Dilemmas in Economic Theory: Persisting Foundational Problems of Microeconomics*, Oxford: Oxford University Press.
- Mas-Colell, A. (1982) 'Revealed Preference Theory After Samuelson', in G.R. Feiwel (ed.). *Samuelson and Neoclassical Economics*, Boston: Kluwer, pp. 72–82.
- Nagel, E. (1961) *The Structure of Science: Problems in the Logic of Scientific Explanation*, New York: Harcourt, Brace & World.
- Nola, R. (1988) 'Introduction: Some Issues Concerning Realism and Relativism in Science', in R. Nola (ed.). *Relativism and Realism*, Dordrecht: Kluwer Academic, pp. 1–35.
- Psillos, S. (2000) 'The Present State of the Scientific Realism Debate', *British Journal for the Philosophy of Science*, 51: 705–728.
- Richter, M.K. (1966) 'Revealed Preference Theory', *Econometrica*, 34: 635–645.
- Robbins, L. (1952) *An Essay on the Nature and Significance of Economic Science*, 2nd edition, London: Macmillan [2nd edition first published in 1935].
- Rosenberg, A. (1992), *Economics – Mathematical Politics or Science of Diminishing Returns?*, Chicago: University of Chicago Press.
- Ross, D. (1995) 'Real Patterns and the Ontological Foundations of Microeconomics', *Economics and Philosophy*, 11: 113–136.
- Ross, D. (2000) 'Rainforest Realism: A Dennettian Theory of Existence', In D. Ross, A. Brook, and D. Thompson (eds). *Dennett's Philosophy: A Comprehensive Assessment*, Cambridge, MA: MIT Press, pp. 147–168.
- Ross, D. (2005) *Economic Theory and Cognitive Science: Microexplanation*, Cambridge, MA: MIT Press.
- Ross, D. (2008) 'Ontic Structural Realism and Economics', *Philosophy of Science*, 75: 732–743.
- Ross, D. and Spurrett, D. (2007), 'Notions of Cause: Russell's Thesis Revisited', *British Journal for the Philosophy of Science*, 58, 45–76.
- Samuelson, P.A. (1938) 'A Note on the Pure Theory of Consumer's Behaviour', *Economica*, 5: 61–71.
- Samuelson, P.A. (1947) *Foundations of Economic Analysis*, Cambridge, MA: Harvard University Press.
- Samuelson, P.A. (1948) 'Consumption Theory in Terms of Revealed Preference', *Economica*, 15: 243–253.
- Samuelson, P.A. (1950) 'The Problem of Integrability in Utility Theory', *Economica*, 17: 355–385.
- Sen, A.K. (1973) 'Behaviour and the Concept of Preference', *Economica*, 40: 241–259.

- Slutsky, E.E. (1915) 'Sulla Teoria del Bilancio del Consonatore', *Giornale degli Economisti*, 51: 1–26; translated in G. J. Stigler and K. E. Boulding (eds). (1952) *Readings in Price Theory*, Homewood, IL: Richard D. Irwin, pp. 27–56.
- Varian, H. (1982) 'Nonparametric Test of Models of Consumer Behavior', *Review of Economic Studies*, 50: 99–110.
- Varian, H. (2006) 'Revealed Preference', in M. Szenberg, L. Ramrattan, and A.A. Gotesman (eds). *Samuelsonian Economics and the Twenty-First Century*, Oxford: Oxford University Press, pp. 99–115.
- Wald, A. (1951) 'On Some Systems of Equations of Equations of Mathematical Economics', *Econometrica*, 19: 368–403 [translation of 1936 article in *Zeitschrift für Nationalökonomie*].
- Wong, S. (2006), *The Foundations of Paul Samuelson's Revealed Preference Theory*, London: Routledge [originally published in 1978].

Part III

The proper domain of economics