

Austrian economics and the limits of markets

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Sagoff's recent criticisms of the shadow pricing of environmental goods deploy arguments from within the Austrian tradition of economics against market-mimicking approaches to public policy. His arguments against market mimicry by public authorities do not lead him to scepticism about markets. Rather, they form part of an Austrian argument for solutions to environmental problems within actual markets themselves. In this paper I argue that it is not only shadow pricing, but the use of actual markets that is open to Austrian forms of criticism. Hayek's epistemic arguments against central planning and in defence of market economies are more ambivalent than is often supposed. The paper examines the ways in which the premises in Hayek's own arguments point in the opposite direction—to the epistemic limits of markets and in particular their limitations for the resolution of environmental problems.

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1. Introduction

In this paper I consider Austrian arguments for the limits of markets. Specifically, I will look at some Austrian-based arguments for the limits of market-based approaches to the solution of environmental problems. While the arguments I develop here belong to a growing body of literature that has aimed to turn the premises of Austrian arguments against the conclusions that theorists in the Austrian tradition attempt to draw from them,¹ the topic

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¹ Otto Neurath, in his exchanges with Hayek in the 1940s, highlights their shared epistemic assumptions and the need to criticise Hayek from those assumptions, to 'over-Hayek Hayek' (Neurath, 1945A). In his review of *The Road to Serfdom* (Hayek, 1944) he comments, 'what would Professor Hayek answer if the tables were turned on him?' (Neurath, 1945C, p. 121). Similar immanent criticisms are developed in the responses from socialist thinkers such as Burczak (2006), Fleetwood (1995), Gamble (1996) and Wainwright (1994); see also O'Neill (1989, 1998). Elsewhere, parallels with Hayek are an occasion for

might look an odd one. The Austrian tradition, at least from the second generation onwards, is associated with the defence of market economies against both their socialist and ecological critics (O'Neill, 1998, chs 9–11, 2002A, 2004). It looks an unlikely starting point for arguments critical of market-based solutions to environmental problems. However, in one sense of the concept of a 'market-based solution' there may be less grounds for surprise. If the term 'market-based solutions' means the use of market-mimicking procedures by public authorities, such as shadow pricing for the purposes of cost-benefit analysis, then arguments against market-mimicking approaches to public policy generally and environmental policy in particular have a long history in the Austrian tradition. They can be traced back to the criticisms of the neoclassical models of market socialism of Lange, which relied upon a form of market mimicry. Austrian-based arguments have been deployed by Mark Sagoff in his more recent versions of his criticisms of the shadow pricing of environmental goods and harms. I will review Sagoff's argument and his recent appeal to Austrian arguments in Section 2. However, Sagoff's arguments against market mimicry by public authorities form part of a case for solutions to environmental problems within actual markets themselves rather than surrogate markets. It is this second claim that I will contest in this paper. My main purpose will be to argue that it is not only shadow pricing, but the use of actual markets themselves that is open to Austrian forms of criticism. In particular I will suggest that the strongest arguments employed against central planning and in defence of market economies, i.e. the epistemic arguments of Hayek, are much more ambivalent than is often supposed. I examine ways in which Hayek's own arguments point in the opposite direction—to the epistemic limits of markets and in particular their limitations for the resolution of environmental problems.

2. Mark Sagoff and Austrian criticisms of market mimicry²

Within the neoclassical tradition, the source of environmental problems is taken to be a matter of the absence of markets in environmental goods. Correspondingly, their solution is taken to require the extension of market prices to capture preferences for environmental goods. This might be done directly through the definition of property rights so that the goods can be traded in markets, or indirectly through the construction of shadow prices that track how much agents would be willing to pay at the margin for, or to accept the loss of, such goods were there a market for such goods. Those shadow prices can then enter into a cost-benefit analysis that captures fully the welfare gains and losses associated with different projects.³

a more embarrassed exercise in intellectual distancing. James Scott, whose *Seeing Like a State* contains arguments that he acknowledges have parallels those of Hayek (Scott, 1998, pp. 256, 344), in the introduction puts some distance between himself and Hayekian defenders of the market as follows: '[M]y bill of particulars against a certain kind of state is by no means a case for politically unfettered market coordination as urged by Friedrich Hayek . . . [T]he conclusions that can be drawn from the failures of modern projects of social engineering are as applicable to market-driven standardization as they are to bureaucratic homogeneity' (Scott, 1998, p. 8). The theme in Scott's response—that the epistemic arguments against centralised planning can be redeployed against the market—has its own history in the reception of Hayek. In addition to these immanent criticisms of Austrianism, the Austrians themselves did consider the limits of markets. For an excellent account of differing views of these limits among Austrian economists and the problems they raise, see Rodrigues (2010, chs 3 and 5).

² This section draws upon and develops arguments in O'Neill (2009).

³ Under the influence of public choice theory, a significant group of neoclassical economists have now rejected the view that governments should correct market failures through the construction of shadow prices (see, e.g., Zerbo and McCurdy, 1999; Barnett and Yandle, 2009). For a discussion of public choice criticism of standard neoclassical justifications of shadow pricing see O'Neill (1995, 1998, ch. 12, 2007, ch. 4).

One of the most influential critics of the shadow economic valuation of environmental goods has been Mark Sagoff. In the first edition of *The Economy of the Earth*, Sagoff (1988) argues that the attempt to place shadow prices on environmental goods for the purposes of cost–benefit analysis is founded on a series of errors. Public judgements about the good of a community are treated as if they were private preferences about personal welfare to be aggregated without reasoned debate. Moral and aesthetic judgements are conflated with consumer preferences. The values that represent what the individual believes to be good or right for the community are confused with the preferences the individual entertains about his or her consumption opportunities. The opposition of ideas are treated as akin to differences of interest. Political institutions and processes are conflated with market institutions and processes. The upshot of Sagoff’s argument is that environmental policy needs to answer to public deliberation. Political decisions about the environment should not attempt to mimic forms of valuation that belong to the market realm.

Sagoff’s criticisms of the neoclassical project for the monetary valuation of environmental goods have been influential on traditions of environmental thought that are critical of market-based approaches to environmental policy, whether this be through market mimicry or markets themselves (Martinez-Alier, 1987). In particular they have been influential in recent strands of more market-sceptical positions within political ecology and ecological economics. These positions have their origins in older socialist and ecological criticisms of markets that question more generally the degree to which unfettered markets are able to produce socially and environmentally benign outcomes. Within the tradition there are differences as to how far such scepticism should extend. On the one hand, there are those such as the logical empiricist Otto Neurath, who attempted to develop economic decision-making procedures that deal not in monetary measures but directly with physical, environmental and social measures of welfare, and who aimed at ultimately replacing markets with non-market economic institutions (Neurath, 1920, 1942, 1945A, 1945B, 1945C; for a discussion see O’Neill, 1999, 2004, 2007A). On the other hand, there are writers such as Karl Polanyi, who were critical not of markets, but of the disembedding of markets from the constraints of social and environmental norms (Polanyi, 1957; O’Neill, 2007B, ch. 1). The influence of both traditions can be ascertained in the work of founding figures in ecological economics, such as Kapp (Kapp, 1950; Martinez-Alier, 1987).⁴ While the more radical forms of market scepticism are, for better or worse, less prevalent in recent political ecology and ecological economics, their influence remains a significant source of the scepticism about neoclassical attempts at shadow pricing. They underpin arguments for the use of multicriteria and deliberative approaches to environmental decision making that do not attempt to capture environmental goods and bads in a single monetary measure (Martinez-Alier *et al.*, 1998). From this perspective, Sagoff looks a convivial ally.

However, as Sagoff has developed his own work, it has become increasingly clear that his own position departs radically from any such market scepticism. In the second edition of *The Economy of the Earth*, Sagoff (2008) appeals to the Austrian tradition to

⁴ On the relationship between Polanyi and Kapp, see Berger (2008). Kapp comments on the socialist-calculation debates: ‘the controversy initiated by O. Neurath, von Mises and Max Weber got side-tracked in various attempts to calculate the prices of productive factors by means of Walras’ and Cassel’s systems of equations and O. Lange’s later elaboration of a theoretical model of “competitive socialism” (Kapp, 1955, p. 682). See also his comments on Neurath, Weber and the limits of monetary calculation in the environmental domain in Kapp (1974, pp. 38–9).

ground his objections to shadow pricing. His position is far from sceptical of markets. Rather, his scepticism is directed at the capacity of politics to mimic market mechanisms. In doing so he picks up on a major theme within Austrian economics against neoclassical attempts to determine surrogate prices. In the absence of actual market exchanges between agents with well-defined property rights over goods, market prices had no meaning. Shadow prices are not prices at all. The only meaningful prices are the actual prices that are the result of actual market exchange and that coordinate the plans and actions of independent property-holding agents:

Economic calculation cannot comprehend things which are not sold and bought against money. There are things which are not for sale and for whose acquisition sacrifices other than money and money's worth must be expended . . . There are things which cannot at all be evaluated in money, and there are other things which can be appraised in money only with regard to a fraction of the value assigned to them. The appraisal of an old building must disregard its artistic and historical eminence as far as these qualities are not a source of proceeds in money or goods vendible . . . However, all this does not in the least impair the usefulness of economic calculation . . . All that acting man needs in order to make his choice is to contrast them with the total amount of costs their acquisition or preservation requires. (Mises, 1949, ch. 12.2; cf. Mises, 1920, pp. 98-101)

Political choices may have to be made about such non-market goods. However, political agents can know only the opportunity costs of a project and no more. Politics cannot second guess the market through market-mimicking procedures. Not market mimicry, but actual market exchanges offer the solution to environmental problems. The way that markets can best play their role in environmental policy is through the extension of property rights to environmental goods. They can then be assigned an actual market price. This Austrian scepticism about the possibility of market-mimicking procedures in politics had particular force in the later stages of the socialist calculation debates. The work of Lange and others within the neoclassical tradition had appealed to the possible use of such procedures by the state for the purposes of market socialist planning (Lange, 1956). However, the Austrian's opponents in the socialist calculation debates included not just market socialists, but also those such as Neurath (Hayek, 1941, 1942-44; Neurath, 1945A, 1945B, 1945C) and the precursors of ecological economics (Martinez-Alier, 1987) who aimed to either replace or supplement market prices with non-market measures of welfare.

In the second edition of *The Economy of the Earth*, Sagoff (2008) endorses this Austrian view that the only meaningful prices are those arrived at in actual markets. More specifically he defends the Hayekian view that the role of market prices is to coordinate the actions of agents, given the division of knowledge in society. The price mechanism solves the problem of the division of knowledge, i.e. the dispersal of local and practical knowledge among agents. Price, by serving as a measure of changes in the relation between the supply and demand for goods, communicates between actors that information which is required for the coordination of their activities. Price coordinates the plans and actions of agents. It is not a measure of the value of goods. Thus, Sagoff writes of the Austrian view:

According to this approach, the economic problem is one of *coordination* in relation to information implicit in prices, rather than one of *valuation* in relation to a conception of the good defining as WTP [willingness to pay] within economic science. The problem for economic theory is not to posit and then measure 'value' as an intrinsic quantity, whether as labor surplus (as Smith and Marx believed) or as consumer surplus (as is assumed today). It is 'to analyze how the spontaneous interaction of a number of people, each possessing only bits of knowledge, brings about

a state of affairs in which prices correspond to costs, etc. and which could be brought about by deliberate direction only by someone who possessed the combined knowledge of all those individuals'. [F. A. Hayek, *Individualism and Economic Order* (Chicago: Chicago University Press, 1948) p. 50]. (Sagoff, 2008, pp. 80–1)

Sagoff endorses this position and with it the Austrian account of the virtues of market economies:

I agree, then, with the Austrian school of thought that believes that economists should focus on two concerns. The first is to explain the nuances of Smith's Invisible Hand . . . To understand the Invisible Hand is to recognize that goods do not exist in fixed or static amounts to be allocated and consumed by those who 'value' them most. Instead, in the appropriate competitive conditions—conditions in which price signals convey information about such things as scarcity—economic activity is creative and dynamic. The second task is to throw cold water on utopian schemes by reminding their partisans how feckless, horrid, recalcitrant, truculent, exasperating, and depressing human nature truly is. (Sagoff, 2008, p. 93)

Correspondingly, Sagoff shares the Austrian scepticism not just of the shadow pricing of environmental goods, but also of non-market measures of the welfare values of different goods of the kinds advocated within the tradition of ecological economics. He is also sceptical of the claims made within the tradition of ecological economics about the physical constraints on economic development. Thus, while Sagoff is sympathetic to the view that increasing consumption might not be good for us, he rejects the view that there are physical and ecological limits to increasing consumption or to population growth (Sagoff, 2008, p. 132 ff). Resource and energy constraints are a function of technological development, and as technology advances so does the resources frontier. With technological development, as goods become lighter, smaller and less energy intensive, the apparent limits on resources can be expected to recede. A market economy that is released from the distortions of state subsidies can be expected to deliver such technologies (Sagoff, 2008, p. 125). This claim that the combination of markets and technological progress is the solution to environmental problems is one he shares with Hayek. I return to Hayek's views below.

Sagoff's scepticism of shadow pricing the welfare impacts of environmental goods and bads is not aimed, then, at markets as such, but rather at the assumption that political processes can mimic markets. He is equally sceptical of political procedures employing non-market measures. At the same time he holds that a market economy freed from the distortions of the state is central to the achievement of a less resource-intensive economy. In making these points, however, his position does not involve a retreat to a minimalist conception of the role of politics. The second edition of *The Economy of the Earth* retains the central claim of the first—that political institutions should serve as an arena in which citizens are able to articulate their public values and express those values in law. For this reason, while Sagoff is critical of environmental arguments that appeal to physical limits to economic growth, he endorses those that call upon ethical, spiritual and aesthetic values that are taken to be constitutive of a particular national community. Such values are not to be treated as consumer preferences, but rather as citizen judgements that are open to reasoned deliberation. As such they call upon the procedures of public deliberation rather than markets.

There are a variety of criticisms that might be raised about Sagoff's position here. First, there are questions about the internal coherence of the position. Sagoff's combination of a deliberative theory of politics with Austrian arguments for market

economies looks to be in tension with at least some strands of recent Austrian argument that have been sceptical of deliberative approaches to environmental policy on the basis of Hayekian arguments: deliberative procedures rely upon the assumption that all relevant knowledge and values can be articulated in propositional form and, hence, they exclude tacit knowledge and values embodied in practice (Pennington, 2001, 2003). However, just how far Sagoff's account of public deliberation is inconsistent with these Hayekian arguments depends upon what account is assumed about the nature and scope of deliberative procedures in politics. Hayek's position would be consistent with an account of deliberative politics that, on the one hand, is not limited to a Habermasian exchange of explicit propositional arguments but includes a role for tacit judgements and, on the other, has as its scope general laws rather than particular decisions. Hayek's account of legal deliberation and the judgements of common law might be said to have a deliberative moment in this sense (Hayek, 1973, ch. 4). So also might his constitutional arrangements for a second chamber: 'legislation proper . . . should not be governed by interests but by opinion, i.e. by views about what kind of action is right or wrong' (Hayek, 1979, ch. 17, p. 112). Lastly, there are also places in which he appeals to common values at the national level, although this is in tension with the more cosmopolitan threads in his thought (Hayek, 1960, p. 377).

Sagoff's own position may then raise the possibilities of a more deliberative version of Austrian political economy than is normally supposed. How far this position might be developed I will not pursue here. Rather, I want to consider the defensibility of Sagoff's claims that a suitably deregulated market will deliver technological solutions to problems of resource limits. There are again some standard reasons to be sceptical of the view that technological improvements in a market economy will deliver declines in material and greenhouse-energy intensity that will outstrip the growth in demand for materials and greenhouse energy. One reason is the familiar one about rebound effects, which goes back to Jevons' paradox (Jevons, 1866). Declining relative resource and carbon intensities of goods in a market economy will *ceteris paribus* lead to a relative cheapening of the goods, which will increase or displace demand, so potentially undoing the putative resource and energy savings. While the decline in carbon and material intensity is a necessary condition for absolute declines, it is not sufficient. I will leave these considerations aside here.⁵ What I want to focus on in the rest of the paper are internal difficulties in Sagoff's position. While Sagoff starts from Hayek's epistemic premises and shares with Hayek a belief that market-delivered technology will deliver the solutions to environmental problems, there are features of Hayek's position that make it much more ambivalent than is often supposed.

3. Hayek and forms of knowledge

Sagoff's criticisms of market mimicry in politics and his defence of market economies appeal to Hayek's epistemic arguments against planning and in defence of markets. The market offers a solution to problems of human ignorance and limits of reason that centrally planned economies cannot solve and which defenders of such economies fail to recognise. Hayek's argument starts from the 'division of knowledge' in society.

⁵ For a recent discussion see Jackson (2009).

Hayek's central point concerns not simply the dispersal of knowledge throughout different individuals and groups in society, but the nature of the knowledge that is thus dispersed that makes centralised planning inadequate as a response to the problem of coordinating such knowledge. In 'The Use of Knowledge in Society' (Hayek, 1945), in considering the question of the relative virtues of centralised planning and markets as means to coordinate dispersed knowledge, Hayek draws the distinction between different kinds of knowledge thus:

The answer to our question will therefore largely turn on the relative importance of the different kinds of knowledge: those more likely to be at the disposal of particular individuals and those which we should with greater confidence expect to find in the possession of an authority made up of suitably chosen experts. If it is today so widely assumed that the latter will be in a better position, this is because one kind of knowledge, namely, scientific knowledge, occupies now so prominent a place in public imagination that we tend to forget that it is not the only kind that is relevant. It may be admitted that, as far as scientific knowledge is concerned, a body of suitably chosen experts may be in the best position to command all the best knowledge available—though this is of course merely shifting the difficulty to the problem of selecting the experts. What I wish to point out is that, even assuming that this problem can be readily solved, it is only a small part of the wider problem. Today it is almost heresy to suggest that scientific knowledge is not the sum of all knowledge. But a little reflection will show that there is beyond question a body of very important but unorganized knowledge which cannot possibly be called scientific in the sense of knowledge of general rules: the knowledge of the particular circumstances of time and place. (Hayek, 1945, p. 521)

Hayek employs a set of related contrasts here. The knowledge of scientific 'experts' is contrasted with the knowledge at the disposal of 'particular individuals'. The former consists of the 'knowledge of general rules', the latter of knowledge of 'the particular circumstances of time and place'. The distinction is drawn later in a passage from *The Constitution of Liberty*, to which I will return below, in terms of a contrast between 'generic knowledge' and 'knowledge of special circumstances' (Hayek, 1960, p. 371). Knowledge of special circumstances cannot be stated in a form that allows it to be communicated to, and utilised by, a central planning agency in a way that will allow that agency to respond to rapidly changing local circumstances:

If we can agree that the economic problem of society is mainly one of rapid adaptation to changes in the particular circumstances of time and place, it would seem to follow that the ultimate decisions must be left to the people who are familiar with these circumstances, who know directly of the relevant changes and of the resources immediately available to meet them. We cannot expect that this problem will be solved by first communicating all this knowledge to a central board which, after integrating all knowledge, issues its orders. We must solve it by some form of decentralization. (Hayek, 1945, p. 524)

Alongside the contrast between 'generic knowledge' and 'knowledge of special circumstances', Hayek employs a second related, but distinct, contrast that places a still stronger set of limits on the communication of knowledge to a centralised planning agency: the distinction between practical knowledge embodied in skill and habits and theoretical knowledge that can be stated in propositional form. The contrast is drawn in Ryle's terms between 'knowledge how' and 'knowledge that' or in Polanyi's terms between 'tacit knowledge' and 'explicit knowledge' (Hayek, 1960, pp. 25–9, 1969, pp. 38–9). Not all practical knowledge can be articulated in general propositional form. Hence it is not the kind of knowledge that could be passed onto a single planning agency. Thus no such agency could in principle possess all the knowledge required for coordination of the activities of different economic actors.

The socialist project is taken to be based upon an illusion about the scope of human knowledge and reason. One form in which the illusion is exhibited is a form of scientism that takes the scientific expert's generic, explicit propositional knowledge of natural events to exhaust the domain of knowledge. The socialist project fails to acknowledge the particular, practical knowledge of actors in the social domain and hence of the limits in the knowledge that any particular board of experts can gather. The illusion is embodied in the figure of the social engineer. The belief in the possibility of a technical optimum is premised on the assumption that the social engineer could gather in one person or committee complete knowledge of society:

The application of the engineering technique to the whole of society requires . . . that the director possess the same complete knowledge of the whole society that the engineer possesses of his limited world. Central economic planning is nothing but such an application of engineering principles to the whole of society based on the assumption that such a complete concentration of all relevant knowledge is possible. (Hayek, 1942–44, p. 173)

Socialist planning is founded upon a mistaken belief in the omnipotence of reason—the belief Hayek variously terms 'rationalism', 'superrationalism' and 'Cartesian rationalism'. Against such rationalism 'it may . . . prove to be far the most difficult and not the least important task for human reason rationally to comprehend its own limitations' (Hayek, 1942–44, p. 162).

In contrast with centralised planning, the argument runs, the price mechanism does communicate between individuals that information that is required for the coordination of their economic activities, while allowing them to employ their own particular knowledge (Hayek, 1945, p. 526):

Though every party in [markets] will know only a small sector of all possible sources of supply, or of the uses of a commodity, yet directly or indirectly, the parties are so interconnected that the prices register the net results of all changes in demand or supply. It is as such an instrument for communicating to all those interested in a particular commodity the relevant information . . . that markets and prices must be seen. (Hayek, 1942–44, pp. 176–7, cf. 1937, 1945)

The central agent in the process of market coordination is the entrepreneur who is alert to new spatially and temporally local opportunities in the market place (Hayek, 1978A; Kirzner, 1985).

Hayek's epistemic arguments, at least in his papers in the 1930s and 1940s, turn then on the distinction between different kinds of knowledge—the universal, generic, explicit and propositional knowledge of the scientific expert or engineer, and the particular, local, tacit and practical knowledge of particular agents. An initial point to notice about Hayek's arguments in these early papers on knowledge and economics is that he does not question the kinds of claims the expert wants to make of their knowledge in their proper place. The picture of Hayek as some kind of postmodern thinker who questions the possibility of objective scientific knowledge (Burczak, 2006) is mistaken regarding his views throughout his writings, but it is particularly problematic when applied to his papers in the 1930s and 1940s. Here, he even allows that the engineer might have 'complete knowledge' in his limited domain (Hayek, 1942–44, p. 173). It is rather the refusal to recognise the limited scope of application of such knowledge and the failure to acknowledge other kinds of knowledge that is at the centre of Hayek's argument. Hayek's argument is one against scientism: the claim that the scope of knowledge is identical to the scope of science. His argument does not turn on sceptical claims about the nature of science itself.

Hayek's claims about science in his early writings contrast interestingly with one of his principal interlocutors in the debates about planning: Otto Neurath. Neurath, in his response to Hayek, attempted to make common ground with Hayek about the limits of expert knowledge: 'I should describe him as a research worker, who together with us physicalists, fights the pseudorationalism of our period, which tries to use science as a kind of idol, and scientists and quasi-scientists regarding as a kind of born leaders, who may direct our life according to so-called "tests". Who tests the testers?' (Neurath, 1945A). However, there are major differences between the grounds for these claims. Where Hayek's arguments concern different kinds of knowledge, Neurath's argument concerns not the limited scope of expert knowledge, but the pretensions to the certainty, completeness and predictability of that knowledge itself (O'Neill, 2004, 2006). Neurath's argument is that the experts do not have the kinds of knowledge they claim to have. The point to notice here is that the positivist logical empiricist Neurath, who is one of Hayek's main objects of criticism as a 'social engineer', is in this sense more radical in his account of the incompleteness and uncertainties associated with scientific knowledge than Hayek.

Hayek's assumptions about the nature of expert knowledge, at the point at which he wrote the scientism essay, are then surprisingly uncritical about the claims made to complete knowledge within the domain of natural science itself. It is a point that Hayek later acknowledges. Thus, in his Preface to *Studies in Philosophy, Politics and Economics* (1967) he distances himself from the 'tone of the discussion of the attitude which I then called "scientism"': 'Sir Karl Popper has taught me that natural scientists do not really do what most of them not only told us that they did but also urged the representatives of other disciplines to imitate' (Hayek, 1967, p. viii). The role that the concept of complexity comes to play in Hayek's later work also issues in claims about the limits of natural scientific claims themselves when applied to complex and open natural systems: 'in its endeavour to explain and predict particular events, which it does so successfully in the case of relatively simple phenomena (or where it can at least approximately isolate "closed systems" that are relatively simple), science encounters the same barrier of factual ignorance when it comes to apply its theories to very complex phenomena' (Hayek, 1973, p. 16). However, while Hayek's account of the nature of expert knowledge of the natural sciences underwent change, something of the earlier contrasts remains in his writings and gives rise to particular tensions within Hayek's arguments. One tension lies in Hayek's failure to apply his own strictures about ignorance and complexity to human abilities to know and control complex open systems in the natural world. The second lies in his ambivalence about the role of scientific as opposed to practical knowledge in public decision making.

4. Markets, technology and the limits of science

The first of these tensions has been noted recently by Andrew Gamble, who observes that Hayek's acknowledgement of the limits of knowledge and control of our social relations is coupled with a failure to recognise any such limits when applied to the natural world: '[Hayek] never extended to natural science and technology his critique of constructivist rationalism in social science. Although rationalism has retreated in the social sphere, it still has few restraints in its quest to master and control the natural world, posing increasingly serious questions for the civilization that Hayek so valued' (Gamble, 2006, p. 130). His treatment of the social world as a complex system that

cannot be surveyed by a single group of experts and hence for which there are limits in the possibility of conscious control stands in contrast to his treatment of the natural world as something for which such limits do not apply.

Hayek in particular assumes by way of an 'act of faith' that human knowledge will develop in ways that will enable us to find substitutes for any finite and exhaustible resource:

In a sense, of course, most consumption of irreplaceable resources rests on an act of faith. We are generally confident that, by the time the resource is exhausted, something new will have been discovered which will either satisfy the same need or at least compensate us for what we no longer have, so that we are, on the whole, as well off as before. (Hayek, 1960, p. 369)

When it comes to the natural world, Hayek abandons his acknowledgment of epistemic limits that he applies to the social. The progress of human welfare on the basis of scientific and technological progress offering an inexhaustible supply of substitutes for natural resources without limits is taken for granted.⁶ This act of faith in the absence of limits in knowledge and capacities to control the natural world is required by Hayek to defend the liberal market order that he advocates. However, they are difficult to sustain from Hayek's own assumptions.

The conflicts in Hayek's position are particularly noticeable in his Nobel Memorial Lecture, in which the limits in our ability to replace 'spontaneous processes by "conscious human control"' (Hayek, 1978B, p. 31) in the social world is combined with a denial of such limits with respect to the natural. While there may be good grounds for scepticism of the 1972 Club of Rome report (Meadows *et al.*, 1972), which is the particular object of Hayek's criticism in this lecture, his own epistemic arguments are at odds with his failure to acknowledge any possible limits to 'conscious human control' of the natural world. Part of the problem here lies in the image of the natural sciences that Hayek inherits from his earlier criticism of scientism. Something of the contrast that Hayek assumes in his scientism essay of an engineer who does possess 'complete knowledge . . . of his limited world' with the social engineer who cannot survey that knowledge survives into his later claims about the possibilities of control of the natural world.

5. Hayek, expertise and the dispersal of knowledge

There is, in addition to this problem concerning the differences he assumes between knowledge of the social and natural worlds, a second internal vulnerability in Hayek's argument for markets as the solution to the dispersal of knowledge. The internal vulnerability concerns the role of expert knowledge itself in public decision making. One central thread in Hayek's work is a variation on an old conservative theme that traces the ills of socialism back to the particular role of intellectuals in modern life. However, while Hayek is critical of a certain kind of intellectual pretension to knowledge (Hayek, 1949) and to the dangers of scientific experts acting and talking outside of their proper domain, he does not deny the value of scientific expertise in its place. As he puts it in his 1945 paper quoted above: 'It may be admitted that, as far as scientific knowledge is concerned, a body of suitably chosen experts may be in the best position to command all the best knowledge available' (Hayek, 1945, p. 521). The acknowledgement raises potential internal difficulties in his position. If when it comes to scientific knowledge

⁶ For criticism of the ideas of substitution and compensation that underpin approaches like Hayek's see O'Neill (2007B, chs 1 and 6) and O'Neill *et al.* (2008, ch. 11).

‘a body of suitably chosen experts may be in the best position to command all the best knowledge available’, then doesn’t it follow from his own assumptions that for some social decisions in which scientific knowledge is central, a centralised agency may be better placed to make social decisions than a decentralised market system?

The problem is one that Hayek himself acknowledges in a later discussion of resource conservation. In the course of the discussion, Hayek makes the following observation about the place of scientific expertise in public life.

It cannot be denied that there are some facts concerning probable future developments which the government is more likely to know than most of the individual owners of natural resources. Many the more recent achievements of science illustrate this. (Hayek, 1960, p. 371)

It might look as if, where there is good scientific knowledge about future resources and impacts that matter to public policy, there exist *prima facie* reasons to prefer a single planning agency of experts to the diffused knowledge coordinated by the decentralised mechanisms of the market. The point is particularly pressing in the environmental domain. Expert knowledge of climate change offers an obvious contemporary example. Hayek’s response is to suggest that while expert scientific knowledge matters, so also does the local knowledge of actors that no central authority can possess:

There will always exist, however, an even greater store of knowledge of special circumstances that ought to be taken into account in decisions about specific resources which only the individual owners will possess and which can never be concentrated within a single authority. Thus, if it is true that the government is likely to know some facts known to few others, it is equally true that government will be necessarily ignorant of an even greater number of relevant facts known to some others. We can bring together all the knowledge that is relevant to particular problems only dispersing downward the generic knowledge available to government, not by centralizing the special knowledge possessed by individuals. (Hayek, 1960, p. 371)

Given that the ‘number of relevant facts’ dispersed among market actors is greater than the number held by any group of experts, one cannot resolve the problem by centralising knowledge. The solution, Hayek suggests, lies rather in the dispersal of knowledge downwards, so that individuals can use the generic knowledge founded upon scientific expertise in addition to their own special local knowledge. Hayek is not advocating here the generalised dispersal of knowledge to all actors. He is explicitly critical of the aims of ‘rationalistic liberalism’ for a dispersion of knowledge through a general education (Hayek, 1960, pp. 377–8). However, he is claiming that generic knowledge can and should be dispersed to those economic actors for whom it is relevant. The coordinating action to the market subsequently will allow each individual to make decisions on the basis of knowledge thus dispersed. Thus goes the argument in outline. There are oddities in some of the premises. For example, even given that it is possible to quantify the ‘number of relevant facts’ so that we can compare across quantities of relevant ‘special’ and ‘generic’ knowledge, it is surely not the total amount of knowledge that matters, but rather its significance. However, there are also a number of internal problems with the solution that Hayek offers, given his own epistemic assumptions.

Hayek’s response to the problem of expert knowledge assumes that the limits of the centralisation of all ‘special’ knowledge on a single actor or authority do not apply to the dispersal of all ‘generic’ knowledge to each and every relevant individual actor. It

plays upon the distinction between generic and special knowledge that is at the heart of Hayek's early formulation of the epistemic problems of economics. However, there is good reason to assume that the dispersal of generic knowledge is as intractable as the centralisation of special knowledge. Hayek's argument against planning does not just rely on the distinction between generic and special knowledge, but on the distinction between knowledge that is articulated in propositional form and practical knowledge that cannot be thus articulated. However, as Hayek himself notes in accepting Michael Polanyi's account of the tacit dimension of scientific knowledge, there is more to any body of science than appears in propositional form in a scientific text. Expert knowledge, no less than everyday knowledge, involves practical knowledge that cannot be completely articulated in propositional form to be distributed downwards to relevant actors. Moreover, even given a propositional expression of generic knowledge, its very interpretation and understanding rely upon a background body of practical knowledge that can only be gained from training within a discipline. Faced with a body of scientific claims within the special sciences, most ordinary actors, consumers and citizens are not in a place to understand them, let alone to appraise their soundness or significance. Indeed, this is true not just of such actors, but of other scientists outside of their specialised sphere. Science itself relies upon a division of knowledge in which different specialists need to rely on the testimony of others. The attempt to resolve the problems of the division of scientific and expert knowledge in society by distributing it to individual market actors to use in their economic activities is, on Hayek's own assumptions, open to the same objections as the centralisation of all knowledge to a single planning authority. While Hayek is properly aware of the epistemic limits of centralised planning, he fails to acknowledge the epistemic limits of markets that potentially flow from the same assumptions.

Second, even if it was possible to articulate all the relevant knowledge in propositional form in which it could be dispersed to all relevant individuals so that they could employ it in their individual acts of exchange in the market, the solution would in any case place informational burdens on market actors that they could not be rationally expected to bear. The difficulties are apparent in a major weakness of recent market-based public policy, which, as an alternative to more traditional forms of public regulation, appeals to the choice of informed producers and consumers within the market place as a response to a variety of health, social and environmental problems. Through their choices in the market, consumers are able to protect their own interests and express their social and ethical concerns. A central problem with this account is the cognitive burdens the view places on individual economic actors. Consider, for example, the epistemic fatigue that the consumer faces when confronted with the informational burdens of prudential or ethical consumption. Each product carries with it an array of questions, each with its own informational demands. Hence some of the typical dilemmas faced by the ethical consumer. Take, for example, the environmental consumer. How does the carbon footprint of vegetables flown from East Africa compare with the carbon footprint of the same vegetables grown locally under heated greenhouses? Is local non-organic food environmentally less damaging than non-local organic food with its related air miles? Does buying from local decentralised producers really have a lower carbon impact than that from more centralised national and global distributional networks? The questions are all reasonable questions. What is not reasonable is that every act

of consumption becomes a research project. The standard response is to simplify the informational burden through measures such as labelling systems that include health, ethical and environmental criteria. However, such labelling systems themselves raise their own questions as to the forms of simplification involved in the measures that are employed to capture different criteria, and their reliability, trustworthiness and credibility, especially where the major actors involved have recognisable commercial interests. The interrogation of trustworthiness and credibility itself relies upon a deliberative sphere of civil society associations and the existence of independent sources of information. What is unclear is how far placing the burden of decisions on the partially informed and epistemically burdened economic actor resolves the problem. The problem requires forms of non-commercialised and public regulation informed by deliberation in civil society.

These problems of credibility and trustworthiness point to a final set of problems with the role of scientific expertise in the economic liberal project. The division of knowledge in society, the existence of a widespread dispersal of knowledge in society from which Hayek starts, is not new to epistemology. It appears in an older form under the heading of the problem of testimony (Coady, 1992; Lipton, 1998; O'Neill, 2002B, 2007B, ch. 10; Shapin, 1994; Uebel, 2005, 2009). Most of what we believe, we believe on the basis of the testimony of others. The division of knowledge in society entails that we have to trust the testimony of others. The fact that most knowledge claims can be evaluated only by those with the requisite training within some discipline entails that most will remain opaque to our best judgements. Hence it is the credibility of the sources of knowledge claims that is the object of appraisal, not those claims directly. Since we cannot confirm these claims themselves, we have to rely on judgements about the credibility and reliability of sources. The epistemic problem is this: given dispersed knowledge and reliance on the knowledge claims of others, what are the conditions in which it is rational to trust the testimony of others on claims I am not in a position to appraise for myself? In the modern world the answer to this question of credible testimony has an institutional and political focus. We live in a world in which testimony is offered to us by strangers, who call upon us to believe what they say on the basis of certification from institutions—academic, industrial, commercial and political. The question about the reliability of the testimony of others takes on a strong institutional dimension.⁷ What institutions deserve epistemological trust in what conditions? What is required as an answer is not a series of decision rules, but a political epistemology concerning conditions of trust, and a corresponding social and political theory about its institutional preconditions. These include in particular the existence of those associational spheres in science, universities and civil society that are independent of the state and the market. A central problem with the increasing reliance on market modes of governance of knowledge itself is that it is corrosive of just these associational spheres (O'Neill, 1998, pp. 168–78). The increasing commercialisation of knowledge, both through the privatisation of funding for science and the more radical treatment of knowledge itself as a commodity, potentially undermines the institutional conditions for trustworthiness in expert judgement. It associates knowledge claims with particular economic and political interests, which induces quite rational scepticism about their reliability.

⁷ For a discussion of the issues involved here see the final chapter of Shapin (1994).

Hayek's own relationship with this growing commercialisation of knowledge is a complex one. He was, like many others in the Austrian tradition, sceptical about the efficacy of intellectual property rights.⁸ Moreover, Hayek recognises the potential problems with the subversion of independent sources of knowledge. For example, he acknowledges 'the need for protecting institutions of learning from the cruder kind of interference by political or economic interests' (Hayek, 1960, p. 391). However, his subsequent account is rather one-eyed in its focus on independence from political interference as against that of commercial interests (Hayek, 1960, p. 392 ff). More importantly, Hayek fails to treat the central epistemic problems of credibility and trustworthiness. In his focus on market modes of coordination of knowledge and action, the place of testimony and its role in public deliberation largely disappears. The result is an absence of the critical tools for addressing the increasingly corrosive effects of the spread of the scope of markets on the conditions for the institutional trustworthiness of knowledge claims in the modern world. Here, as elsewhere, the epistemic virtues of the unrestricted market economy are much less clear cut than he supposes.

6. Regulation, planning and the limits of the market

When Hayek's epistemic arguments are considered in the context of environmental problems, his position is much more ambivalent than is normally supposed. On the one hand, Hayek fails to extend his account of the limits of knowledge and control of the social world to the acknowledgement of limits to the knowledge and control of the natural world. The consequence is a form of technological optimism and a belief in the ubiquitous substitutability of resources, which is echoed by Sagoff in the second edition of *The Economy of the Earth*. This optimism is founded on a picture of the completeness of scientific knowledge that is apparent in Hayek's earlier work, but which Hayek formally abandons for a more fallibilist account in his later writings. His optimism is at odds with his own epistemic assumptions. On the other hand, Hayek's own arguments about the necessary role of scientific knowledge in public decision making point to the limits of markets. Just as there is practical knowledge that is dispersed among agents that cannot be centralised onto a single planning agency, so there is scientific knowledge that is possessed by experts that cannot be dispersed among relevant market agents. Hayek acknowledges that 'there are some facts concerning probable future developments which the government is more likely to know than most of the individual owners of natural resources' (Hayek, 1960, pp. 371). His own solution through the dispersal of knowledge is inconsistent with his own assumptions about the nature of scientific knowledge.

⁸ Consider, for example, the following passage from Hayek: 'The problem of the prevention of monopoly and the preservation of competition is raised much more acutely in certain other fields to which the concept of property has been extended only in recent times. I am thinking here of the extension of the concept of property to such rights and privileges as patents for certain inventions, copyrights, trade-marks and the like. It seems to me beyond doubt that in these fields the slavish application of the concept of property as it has been developed for material things has done a great deal to foster the growth of monopoly and that drastic reforms are required if competition is to be made to work. In the field of industrial patents in particular we shall have seriously to examine whether the award of a monopoly privilege is really the most appropriate and effective form of reward for the kind of risk bearing which investment in scientific research involves' (Hayek, 1948, pp. 113–14).

What are the solutions to the problems? One solution that is consistent with Hayek's own assumptions, although not with his conclusions, is the regulation of productive activity. Thus while Hayek argues there is a presumptive case against the regulation of markets, he accepts that regulation is consistent with his epistemic arguments for market economies as long as they take the form of general rules rather than particular interventions:

[A] free system does not exclude on principle all those general regulations of economic activity which can be laid down in the form of general rules specifying conditions which everyone who engages in a certain activity must satisfy. They include, in particular, all regulations governing the techniques of production. (Hayek, 1960, p. 234)

Hayek goes on to suggest that 'there is a strong presumption against such measures' (Hayek, 1960, p. 235), since they raise the costs of production. However, his account does allow the following:

Building regulations, pure food laws, the certification of certain professions, the restrictions on the sale of certain dangerous goods (such as arms, explosives, poisons and drugs), as well as some safety and health regulations for the processes of production and the provision of such public institutions as theatres, sport grounds, etc., certainly assists intelligent choice and sometimes might be indispensable for it. That the goods offered for human consumption satisfy certain minimum standards of hygiene . . . or that somebody who describes himself by a term generally understood to imply a certain competence, such as a physician, really possesses that competence, will be most effectively assured by some general rules applying to all who supply such goods and services. (Hayek, 1979, p. 62; cf. Hayek, 1960, pp. 235 ff, 354 ff)

Environmental regulations on the production of goods do not appear in this list. However, there is nothing in principle in Hayek's position that rules out tight regulation of economic activity in response to scientifically determined environmental and resource limits to productive activity. Hayek's own epistemic arguments do not support the deregulated markets with which his own and later Austrian positions are associated.

However, a more general question arises about the problematic role that science plays in Hayek's arguments. Hayek's position is aimed at a particular kind of scientism he associates with both socialist and what would now be called ecological critics of capitalism. The socialist project itself is taken to be based on a scientific illusion about the scope of scientific knowledge and reason. Central planning is a form of social engineering grounded in an error about the omnipotence of scientific reason. These illusions Hayek claims are not confined to socialists. They are found also in the work of what would now be seen as precursors of ecological economics concerned with the physical preconditions and limits of economic life. In contrast, the defence of markets turns on the significance of practical and local knowledge that cannot be captured in scientific terms. Centralised planning is associated with the view that all knowledge takes the form of the generic propositional knowledge of science. As such it excludes local and practical knowledge dispersed among economic actors that cannot be stated in the generic propositional form to be passed onto a central planning board. The market is taken to allow actors to coordinate their plans and actions while using their particular local and practical forms of knowledge.

My central aim in this paper has been to turn this argument back against Hayek himself. Whatever the power of this defence of the market,⁹ the argument is vulnerable

⁹ I raise some critical problems elsewhere (O'Neill, 1989, 1998, chs 10–11).

to the objection that there still remain forms of scientific knowledge that matter to economic activity that is not dispersed or dispersible among different particular actors.¹⁰ Hayek acknowledges the problem at various points, but he does not resolve it. It opens the space not just for forms of regulation but also for planning and socialisation, which do not rely upon the centralisation of all knowledge.¹¹ It also raises problems about the democratic accountability of scientific expertise that Hayek never addresses. Again, it is Hayek's logical empiricist opponent, Otto Neurath, who raises and addresses the problem more clearly. The central problem concerning the role of science in public life is that, on the one hand, we need to rely on scientific expertise but, on the other, this expertise is open to proper scepticism about its limits: 'Our life is connected more and more with experts, but on the other hand, we are less prepared to accept other people's judgements, when making decisions' (Neurath, 1945D, p. 251). There is no permanent solution to such conflicts: while institutional conditions for social trust are important, scepticism of expertise is not something to be eliminated. Democracy is 'the continual struggle between the expert ... and the common man' (Neurath, 1945D, p. 251). Democratic deliberative processes are in part about ways of living with that conflict.¹²

In the context of the science of climate change, these problems have come to the centre of public policy. So also has the problematic place that science has within the political economy of economic liberalism. The dilemmas in Hayek's position shed some light, I think, on some otherwise peculiar features of recent debates on climate change. Public debates about climate change have a clear political dimension. Most of those who deny that anthropogenic climate change is taking place are economic liberals concerned to defend market economies from state interference.¹³ Many, although certainly not all, of the strongest defences of climate science tend to come from those more critical of market economies. At first sight this looks odd. Why should different answers to what is in the end an empirical question about the existence and causes of climate change be associated with different political positions? Part of the answer to this question will itself be about the relationship of different political positions to social and economic interests that are threatened by climate change policy. However, part of the answer will also turn on differences that have their root in longer-standing arguments about the relationship between science, markets and planning. Debates between defenders of market economies and their socialist critics turned on claims about the nature and proper scope of scientific knowledge in economic and social life. The clearest example is to be found in the epistemic arguments for markets and against planning developed by Hayek. The existence of scientific knowledge that cannot be dispersed amongst all actors creates particular problems for the liberal defences of markets. Correspondingly, one does not have to be committed to scientism or a form of centralised state planning to recognise the limitations in market mechanisms for the resolution of environmental problems. One of the tragedies of public policy on climate change is that the problem has taken on greatest significance just in a period

¹⁰ It is not only scientific knowledge that raises problems for Hayek's position. So also does the local and practical knowledge of weak and marginal actors in markets, such as peasants. I discuss the divergence of epistemic value and market value in more detail elsewhere (O'Neill, 1998, ch. 10).

¹¹ The points are central to the debates between Neurath and Hayek (see O'Neill, 2002A, 2004, 2006).

¹² For an exploration of some possible implications of the debates between Neurath and Hayek for more recent discussions of the relationship between scientific expertise and democracy see Greenwood (2010).

¹³ See, e.g., the discussion in Oreskes and Conway (2010).

of political economy in which alternatives to market modes of governance appear least available.

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