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## **Hayek on the wisdom of prices: a reassessment**

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**Abstract:** This paper re-examines Hayek's insights into the problem of knowledge in markets, and argues that his analysis remains pertinent but has serious flaws. His central thesis—that the market price system is essential for communicating information and coordinating transactions wherever knowledge is dispersed and innovation renders the future uncertain—remains a potent explanation for the failures of central economic planning. His analysis that aggregate statistics necessarily abstract from contextual and tacit knowledge has important but widely ignored implications for the contemporary use of statistics in financial risk models. The recent financial crisis, however, shows that market prices can give very misleading signals for long periods, and it represents a key example of ways in which Hayek's thesis is incomplete. In particular, Hayek's analysis falls short by ignoring the role of dominant narratives, analytical monocultures, self-reinforcing emotions, feedback loops, information asymmetries and market power in distorting the wisdom of prices.

**Keywords:** F. A. Hayek, prices, knowledge, uncertainty, narratives, aggregate statistics

**JEL Classification:** A1, B31, B4, B5, D8

This paper re-examines Hayek's argument for what I call "the wisdom of prices". His thesis, that the market price system has a unique capacity to solve the problem of knowledge faced by economic agents, has always been provocative and contentious. Initially, this was because it challenged the very possibility of the central planning that was a central tenet of both socialist thought and policy practice in most western war-time economies. On this score, history has been kind to Hayek. But his thesis remains contentious today: first, because it throws doubt on the knowledge assumptions of the efficient markets and rational

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expectations hypotheses, and suggests important problems with the use of statistics by credit rating agencies and the risk management departments of financial institutions; and, secondly, because faith in the “wisdom of prices” has been seriously challenged by the misleading signals given by prices in financial markets over the last decade or more.

In his famous paper “The use of knowledge in society”, Hayek attempted nothing less than to recast the central problem of economics as one of knowledge—of how society can make use of “knowledge which is not given to anyone in its totality” (Hayek 1948b [1945], 78). In a nutshell, he argued that the problem of economics had been miscast as how to achieve the efficient allocation of *given* factors on the basis of *given* data, with the corollary implication that correct foresight is at least theoretically feasible. This had in turn led to the mistaken belief that governments with superior aggregate statistics at their disposal could plan or intervene successfully to improve economic and social outcomes. In fact, Hayek argued, it is only through the unimpaired operation of the market and the signalling of the price system that we can discover the information about preferences, costs, requirements and market opportunities that we need to make good decisions. Such knowledge is otherwise often irremediably dispersed, subjective and tacit; or it may remain as yet undiscovered by anyone. Hayek invented one of the great metaphors of economics to explain the role of the price system in solving the problem of knowledge: he described “the price system as a kind of machinery for registering change, or a system of telecommunications which enables individual producers to watch merely the movement of a few pointers”; and he continued:

The marvel is that in a case like that of a scarcity of one raw material, without an order being issued, without more than perhaps a handful of people knowing the cause, tens of thousands of people whose identity could not be ascertained by months of investigation, are made to use the material or its products more sparingly; that is, they move in the right direction (1948b [1945], 87).

This argument for the wisdom of prices, and for the associated “*epistemological impossibility*” of socialist planning (Gray 1998, 40), is Hayek’s greatest achievement; and it is one that was thoroughly vindicated by the fate of the Soviet and Comecon systems, which manifestly failed to solve economic and social problems by planning in the absence of a market price system. As this paper will show, many of

Hayek's arguments for refocusing economics around the problem of knowledge and avoiding the misuse of aggregate statistics also remain highly pertinent to understanding contemporary failures in standard economic analysis and financial risk modelling.

Despite these crucial insights, however, the 2008 financial crisis highlights a need to re-assess Hayek's thinking and to consider the limits of its applicability. The crisis, and the years leading up to it, have revealed that the price system, even in a relatively free and liquid set of markets, can give profoundly distorted signals over a long period, and that market movements can themselves be deeply destabilising. Given the central importance of financial markets in the modern economy, and their strong association with free-market faith in the wisdom of prices, the financial crisis presents a serious challenge to Hayek's theory. We owe it to ourselves, and to Hayek's memory, to understand why his theory of knowledge and the epistemological role of prices has proved deficient in relation to modern financial markets despite its earlier prescient analysis of why planned economies cannot work. Some of the reasons highlighted in this paper for the failure of the price mechanism in the lead-up to the 2008 crisis are fairly specific to the operation of modern financial markets. But, I shall argue that other reasons discussed here represent more general qualifications to the applicability or validity of Hayek's theory. In particular, I shall argue that in conditions of uncertainty all markets are prone to being unduly influenced by homogenous group narratives that undermine the ability of market prices to reflect decentralised cognition in the way Hayek envisaged. My broader contention is that a series of lacunae in Hayek's thinking explain his failure to foresee how, in these and certain other circumstances, a belief in the wisdom of prices may prove misleading, or even self-defeating.

### **KNOWLEDGE AS THE CENTRAL PROBLEM OF ECONOMICS**

When Hayek claimed that the central problem of economics is the "*division of knowledge*" (Hayek 1948a [1937], 50), he was consciously aping Adam Smith's analogous focus—the division of labour. Hayek's dialectical target, though, was the focus in contemporary mainstream economics on finding solutions to the problem of optimising among *given* preferences on the basis of *given* data. This, he argued, "is emphatically *not* the economic problem which society faces" (Hayek 1948b [1945], 77). The mainstream assumption that key data is

“given”—“at the command of everybody”—“disregards the fact that the method by which such knowledge can be made as widely available as possible is precisely the problem to which we have to find an answer” (Hayek 1948b [1945], 81). Hayek did not doubt the value of markets in achieving benign coordination, but for him the question was how this is achieved when economic agents are each operating with very little overall knowledge (Caldwell 2004, 336). Standard economics simply assumes away or ignores the central problem of knowledge. As Hayek put it:

The peculiar character of the problem of a rational economic order is determined precisely by the fact that the knowledge of the circumstances of which we must make use never exists in concentrated or integrated form but solely as the dispersed bits of incomplete and frequently contradictory knowledge which all the separate individuals possess (1948b [1945], 77).

Hayek’s point here is more profound than the obvious truth that crucial information is dispersed across many individuals. Although difficult to solve in practice before the computer age, the challenge of the dispersion (or even quantity) of information presents few insuperable obstacles, in theory, to adequate and centralised knowledge. Instead, the main problems of knowledge in economics relate, in Hayek’s view, to the fact that the knowledge used by social agents is subjective (as well as dispersed) and often also tacit and subject to constant change.

Hayek gave a brilliant dissection of the confused term “given data”—a term still widely employed in economics. He pointed to an ambiguity between data in the sense of “objective real facts, as the observing economist is supposed to know them” and data, “in the subjective sense, as things known to the persons whose behaviour we try to explain” (Hayek 1948a [1937], 39). Hayek was in no doubt that the facts that matter in the social sciences are the opinions or “views held by the people whose actions we study” (Hayek 2010 [1952], 91). In other words, the data of the social sciences are “subjective” in the ontological sense that they “deal in the first instance with the phenomena of individual minds”—with opinions and perspectives that are necessarily incomplete and inconsistent; and it is these very opinions that constitute social reality by motivating action (Hayek 2010 [1952], 92, 99f).

Hayek was steeped in the Kantian tradition of seeing human knowledge as inevitably structured by mental concepts and categories that we furnish (Gamble 2006, 119). But we can, I think, discern three further steps in his argument that are more or less explicit in his use of the slippery term “subjective” in his discussion of knowledge. First, he inherited from Menger and others in the Austrian School a subjective theory of value, where “value is conferred on resources by the subjective preferences of agents and cannot be explained as an inherent property of any asset or resource” (Gray 1998, 16). This is important because only the individual concerned has full access to the value she places on goods or to her assessment of the opportunity cost of investments she makes. Secondly, since reality is multifaceted and complex, it cannot be grasped with any one central over-arching perspective: our views of the world are inescapably incomplete, perspectival and diverse. For Hayek, the term “subjective” is not a synonym for “erroneous”. Rather, he sees the illusion of objective and complete knowledge as what inevitably leads to error (Hayek 2010 [1952], 93). And thirdly, given his understanding of the subjective nature of value and the partial and perspectival nature of all knowledge, Hayek bought into the post-Kantian view that it is our particular interpretations and opinions that guide behaviour and (in part at least) construct social reality in their own image. Such is the stuff of economics.

The dispersed, subjective and perspectival aspects of knowledge are only part of the problem Hayek identifies. Equally important is that much of our knowledge is necessarily contextual and tacit—impossible to extract from “the particular circumstances of time and place” (Hayek 1948b [1945], 80). Tacit knowledge is the localized knowledge of *how* to do things, and it is knowledge that cannot easily be articulated and passed on to others in explicit and codified form, nor “processed by a committee or by a computer” (Hodgson 1999, 47, 60). Moreover, tacit knowledge implies, for Hayek, necessary limits to the reach of theory. As Gray (1998, 15) puts it: “theory is for him only the visible tip of the vast submerged fund of tacit knowledge, much of which is entirely beyond our powers of articulation”.

Finally, implicit in much of Hayek’s work is an acknowledgement of a yet more fundamental aspect of the problem of knowledge facing economic actors deciding how to act or invest for the future. Hayek viewed the market as a “discovery procedure”, but what actors need to discover is not limited to existing localized and tacit knowledge

available only to individuals. Buchanan and Vanberg (1994 [1991], 323, 328) point out that Hayek's language of discovery is somewhat unfortunate in that it might seem misleadingly to imply that the future—future alternatives, opportunities, costs, preferences and so on—is already “out there”, waiting to be discovered. Instead, they argue that the market is a “creative process”, characterized by constant innovation and novelty, and that the future does not exist ahead of its creation by the transformative power of this innovation and novelty. In other words, innovation implies a radical ontological limit to knowledge about the future. Shackle (1979, 52f) explained this perfectly, when he spoke of our “own original, ungoverned novelties of imagination [...] injecting, in some respect *ex nihilo*, the unforeknowable arrangement of elements”. The future, that is, cannot be known *ex ante* because it is still to be created by how “we imagine, will and choose it to be” (Bronk 2009, 219); and this first order uncertainty implied by innovation and our imagining of new possibilities is “compounded by uncertainty about the second-order creative reactions of others” (Bronk 2011, 9). In several passages, Hayek appears to grasp this most corrosive aspect of the problem of knowledge. For example, he speaks of much knowledge being “by no means ‘in existence’” in ready-made form, adding: “Most of it consists in a technique of thought which enables the individual engineer to find new solutions rapidly as he is confronted with new constellations of circumstances” (Hayek 1997a [1935], 95).

#### **THE IMPOSSIBILITY OF CENTRAL PLANNING AND THE DANGERS OF AGGREGATE STATISTICS**

These limits to knowledge form the core of Hayek's arguments against central planning. For him, the problem goes far beyond the manifest difficulties of amassing the required volume of existing dispersed information or making the requisite calculations to arrive at an optimal outcome, without the help of the market price mechanism. It follows from his analysis reviewed above that there are several interlocking reasons why successful central planning is impossible, and why even the advent of computer processing power could not save command economies (Hodgson 1999, 52-54). First, much of the required knowledge is tacit and cannot be made readily available in codified form to planners. Secondly, it is impossible for the knowledge generation capacities of all the divergent and incommensurable perspectives of the myriad market players in a complex and multi-faceted world to be

replicated by any *one* perspective or theoretical framework, however smart. Thirdly, it is impossible for the planner to know the subjective values that people, in all their variety, place on economic goods. But the killer fact, as Hayek stresses, is that we live in a world of constant flux. Our subjective “tastes change from moment to moment”; and our technical possibilities are constantly altering as we innovate and “discover” technical improvements in the face of new challenges. A centrally planned economy would not only have to allocate *existing* resources efficiently; it would also have to rival the knowledge generation and *discovery* capacities of the decentralised operation of the market mechanism. This would be difficult, since it is market competition itself that provides most of the incentives to adapt and innovate: “profits as an inducement to change cannot be dispensed with” (Hayek 1997a [1935], 95f, 108).

Hayek was singularly unimpressed with Lange’s attempt to counter these arguments by suggesting that the state could ape the price mechanism by acting the role of the Walrasian auctioneer and setting prices centrally by trial and error. Hayek argued that this proposal arose from an “excessive preoccupation with problems of the pure theory of stationary equilibrium”, and an under-appreciation of the need for interminable adjustments to new situations, new needs and new opinions. He continued:

With given and constant data such a state of equilibrium could indeed be approached by the method of trial and error. But this is far from being the situation in the real world, where constant change is the rule. Whether and how far anything approaching the desirable equilibrium is ever reached depends entirely on the speed with which the adjustments can be made (Hayek 1997b [1940], 123).

Perhaps the most topical aspect of Hayek’s criticism of the epistemological claims of socialists and central planners relates to their heavy use of aggregate statistics. There are two key elements to Hayek’s thinking on the misuse of statistics. First, he argued that the “blind transfer of the striving for quantitative measurements” from the natural sciences to the study of human relations—on the grounds that it is somehow more scientific than qualitative analysis—is “probably responsible for the worst aberrations and absurdities produced by scientism in the social sciences” (Hayek 2010 [1952], 114). Such an approach tends to ignore anything not easily measurable, abstracts from

differences between subjective assessments, and homogenises frames of reference—with a consequent inevitable loss of analytical and interpretive texture. It also abstracts from local contextual factors and any tacit knowledge that cannot be codified in data, “lumping together [...] items which differ as regards location, quality, and other particulars, in a way which may be very significant for the specific decision” (Hayek 1948b [1945], 83). As well as these perils of quantification, Hayek was also very wary of *aggregate* analysis in general and statistical *averages* in particular, arguing that they tend to obscure micro-level dynamics and give a misleading impression of greater stability in relationships over time than in fact exists.

This distrust of the knowledge content of aggregate statistics made Hayek almost as critical of macroeconomics as a discipline—and especially Keynesianism—as he was of central planning (Hayek 1967a [1962], 262). Hayek thought that attempts to use models relying on aggregate inputs to predict and manage demand in the economy tend to assume, as Gray (1998, 88f) puts it, “more in the way of concrete knowledge of the real relationships which govern the economy than any administrator could conceivably acquire”. It is fair to surmise that Hayek would have been equally critical of the modern risk management industry and credit rating agencies, had he lived to see them dominate financial markets and public policy. The way in which rating agencies aggregate information on corporate and national entities operating in complex dynamic situations to provide a centralised assessment of risk that can replace decentralised market cognition can be seen as analogous to the efforts of central planning bureaux that Hayek so despised. Similarly, the fact that large banks seek to codify, quantify and aggregate the variables they face in an uncertain environment and in a myriad of different contexts, and reduce these to summary Value at Risk metrics, runs counter to Hayek’s strictures on the dangers of abstracting from the localised, tacit and constantly changing knowledge of individual agents. The financial crisis has shown that both these attempts at aggregating information tend to give an illusion of control, while failing to reflect key factors in dynamic situations.

### **THE WISDOM OF PRICES AND THE MARVEL OF MARKET COORDINATION**

If central agency statisticians cannot solve the problem of knowledge, how does the free market either solve it or, alternatively, sidestep the need to do so? As Hayek points out, it cannot solve it simply by

devolving decisions to individuals with access to their own subjective, local and tacit knowledge. There also needs to be a mechanism that allows the person on the spot to acquire enough information about the requirements, subjective beliefs and expectations of others to be able to coordinate her actions with everyone else's. This is where the wisdom of prices comes in: it is prices that "act to co-ordinate the separate actions of different people"; and they do so because the price system acts as "a mechanism for communicating information", a role it performs with great epistemological economy (Hayek 1948b [1945], 84-86). As Hayek wrote:

The most significant fact about this system is the economy of knowledge with which it operates, or how little the individual participants need to know in order to be able to take the right action. In abbreviated form, by a kind of symbol, only the most essential information is passed on and passed on only to those concerned (1948b [1945], 86).

In this very special sense then, a kind of knowledge—which can be shared in summary form by anyone who needs it—is an emergent phenomenon from the continuous process of market interaction. Thanks to the information conveyed by prices, individual agents can act with the benefit of a type of wisdom that is digestible and yet more comprehensive than they alone could otherwise acquire or even understand. This wisdom of prices is a product of the myriad of coordinated pricing decisions by individuals, where each decision is made by individuals combining their own contextual and subjective knowledge with the outline messages they glean about the views of others as expressed by the prices they in turn are willing to accept or pay. In this way, as Vernon Smith (2008, 105) puts it, prices are "both the carriers of information and the result of that message exchange".

We will come back to some reservations about the knowledge content of market prices later in the paper, but at this stage it is worth exploring further how Hayek envisages the price system operating. First, he argues that prices do more than convey key information about the beliefs of others; they also direct our attention "to what is worth finding out about market offers" (1978a [1968], 182). That is, price movements may grab our attention and alert us to areas that others find of interest or concern, prompting further research of our own (Shiller 2005, 171). Secondly, it is from prices that we discover the existence of innovative

new developments. By way of example, Hayek argues that cost curves are not “objectively given facts”. Rather, the cheapest method is something “which has to be discovered, and to be discovered anew sometimes almost from day to day”; and it is the price system that acts to communicate the discovery because new ideas announce themselves by innovators competitively undercutting the prices of established producers (Hayek 1997b [1940], 130). It is exactly this sort of informational role that prices are only able to perform when the market is not impaired by government intervention. In *The road to serfdom*, Hayek argues:

Any attempt to control prices or quantities of particular commodities deprives competition of its power of bringing about an effective co-ordination of individual efforts, because price changes then cease to register all the relevant changes in circumstances and no longer provide a reliable guide for the individual’s actions (1944, 27).

This analysis has largely been vindicated by the negative experiences of those economies that have grossly interfered with the price system by using price controls or rationing. But, as we shall see, Hayek mistakenly ignored the possibility that there might be endogenous market influences that could similarly undermine the wisdom of prices without government interference playing a deciding role.

### **HAYEK’S CHALLENGE TO STANDARD ECONOMICS AND THE ROLE OF GOVERNMENT**

Despite Hayek’s argument for the wisdom of prices and his paeon of praise for free markets, several aspects of his writings make him a distinctly uncomfortable figure for mainstream economists. In the first place, Hayek became increasingly critical of the emphasis in economic models on a static conception of efficiency, and indeed of the very notion of an optimal equilibrium (Hayek 1997b [1940], 123; Gamble 1996, 69). As Hayek wrote:

Economists usually ascribe the order which competition produces as an equilibrium—a somewhat unfortunate term, because such an equilibrium presupposes that the facts have already all been discovered and competition therefore has ceased (1978a[1968], 184).

Hayek may have argued that prices reflect key information and register relevant changes in circumstances, but there is much in his

writings to suggest that he would have been dismissive of modern variants of the efficient markets hypothesis. As well as downplaying the notion of optimal equilibrium, he never argued that prices themselves could reflect *all* relevant information. For Hayek the role of prices was to *supplement* each agent's particular cognition (and local knowledge) with a summary reflection of all the market decisions that others have made in the light of their respective particular perspectives and circumstances. Hayek would have been equally critical of the rational expectations hypothesis and its central assumption that, thanks to the competitive elimination of systematic errors, the representative agent internalises the correct theory of the economy (Frydman and Goldberg 2011, 67, 91). There can be no representative agent in the Hayekian world of radically decentralised knowledge, diverse perspectives and subjective valuations; there can be no single theory that encapsulates tacit and contextual knowledge and all the relevant aspects of our complex world; and there is no single future optimal equilibrium 'out there' on which all rational expectations must converge. Instead, the future we face has yet to be created by discoveries we may *ex ante* not even know we need.

In many ways, Hayek's work prefigures modern complexity theory in its epistemological challenge to standard economics. While he lacked the sophisticated non-linear mathematics and agent based modelling employed by many complexity theorists today; and while he sometimes appears to have confused complex in the sense of 'complicated' (i.e., a large number of variables and aspects) with the more technical sense of the dynamic emergence of novel outcomes; there is something very radical in Hayek's conception of the market as a "spontaneous order" or "catallaxy" that emerges in an unplanned way from the interaction of heterogeneous agents (each endowed with only partial knowledge) following abstract rules that determine only general patterns of behaviour (Hayek 1967b [1964], 27; Hayek 1967c [1965], 92; Hayek 1978a [1968], 183). The most challenging element of Hayek's theory of markets as "complex phenomena" is his insistence that their complexity renders precise prediction impossible. In contrast to Friedman's insistence that economics should be a positive science, judged by the "precision" and "scope" of its falsifiable predictions (Friedman 1994 [1953], 181), Hayek argued that economists should be content with a lower degree of explanation and a lower 'degree of falsifiability'. And, rather than attempt precise predictions, they should engage merely in

“explanations of the principle” and “pattern prediction”. In other words, they should use a scientific method more like that employed by evolutionary biologists than by astro-physicists (Hayek 1967b [1964], 22-31).

Once economists renounce the assumption that agents can optimise on the basis of *given* factors and correct foresight (an assumption which allows precise prediction); and once they acknowledge that we operate in complex and dynamic systems where we can never know “all the circumstances which will determine the outcome”; they are forced to accept limits to prediction (Hayek 1978b [1974], 24, 27). And with limits to prediction come limits to our ability to control outcomes by using theory-based knowledge. As Hayek said in his Nobel address, “to entrust to science—or to deliberate control according to scientific principles—more than scientific models can achieve may have deplorable effects” (1978b [1974], 30). It is likely that many of today’s market participants, faced with the serial failure of economists to predict outcomes with any precision, would acknowledge Hayek’s insights on the limits to prediction. It is less clear how far they or the body politic have accepted the corollary limits to control, and acknowledged the dangers, for example, of expecting central banks and governments to engineer a smooth glide path to recovery on the basis of economic models. There is little doubt that, if alive, Hayek would have laid some of the blame for the recent financial crisis on repeated interventions by the Federal Reserve to limit asset price corrections from 1998 onwards—the so-called “Greenspan put”—which had the unintended consequence of fuelling an unsustainable boom in credit; and little doubt, too, that he would have been queasy about current quantitative easing policies.

Hayek acknowledged that market prices alone do not provide market agents with all the information they need; and, indeed, he recognised a greater role than most modern economists do (outside the Institutionalist school) for rules of conduct and institutions as carriers of both tacit knowledge and the wisdom generated from the trials and errors of the past. Such rules are “the product of a slow process of evolution in the course of which much more experience and knowledge has been precipitated in them than any one person can fully know” (Hayek 1967c [1965], 92). For Hayek, the great error of the modern age was to assume that we could do without these evolved rules or traditions, and instead use rational (economic) models to engineer a better future.

### MISSING ELEMENTS: THE ROLE OF NARRATIVES AND EMOTIONS

At this point in the lecture on which this paper is based, I sensed some in my audience becoming restive. Surely, they might reasonably have objected, it is precisely a Hayekian belief in the wisdom of market prices that is responsible for the economic and financial mess in which we have found ourselves since 2008. Is it not belief in the epistemic and other virtues of an unimpeded market mechanism that led to the thirty-year experiment with deregulation which has, paradoxically, swept away the very traditional rules and institutional repositories of wisdom that Hayek valued (Gray 1998, 153-155)? And, when it comes to the credit crunch, is it not clear that prices gave grossly misleading signals of value for a considerable period and failed to alert relevant actors to the problems brewing until too late? It is time, therefore, to examine some of the main factors that caused financial market prices to be so distorted, and to assess how far these suggest general qualifications to Hayek's theory and link to broader problems in his conception of the wisdom of prices.

For all his "epistemological pessimism" (Gamble 2006, 118), Hayek underestimated the degree of radical uncertainty we face and oversimplified the way we cope with it. As Keynes (1936, 149) argued: "The outstanding fact is the extreme precariousness of the basis of knowledge on which our estimates of prospective yield have to be made". But even Keynes did not theorise fully about the various causes of uncertainty and its crucial link to innovation and new ideas (Bronk 2009, 215; Dunn 2003, 177). This was left to Shackle, who noted: "What does not yet exist cannot now be known. [...] [We] cannot claim Knowledge, so long as we acknowledge Novelty" (1992 [1972], 3, 26). It is precisely because the market is a machine for generating innovation and novel ideas that we face deep "ontological uncertainty" (Bronk 2011, 8f).<sup>1</sup> Moreover, this is not a problem of dispersed information but one of

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<sup>1</sup> Under the umbrella of Keynesian uncertainty, an important distinction can be made between "epistemological uncertainty", where relevant probabilities are in practice unknown (because of the difficulty of computing all relevant parameters), and "ontological uncertainty", where probabilities are *ex ante* logically unknowable (because of an indeterminacy at the level of reality implied by innovation and novelty) (Bronk 2011, 8-11; Skidelsky 2009, 88). While limited progress can be made in reducing epistemological uncertainty, ontological uncertainty presents intractable barriers to knowledge: it may be simply impossible to know even the categories or entities that will comprise future reality since many of them have yet to be invented (Bronk 2013).

“symmetric ignorance” (Skidelsky 2009, 45): the inventor of a novel product may know a little more than others about its potential, but even he is largely unaware of the implications of its adoption by other innovative and resourceful agents.

When faced with ontological uncertainty, everyone is feeling his way forward with little firm indication of what the future will bring. With no single correct version of the future out there to anchor expectations, and a vast space of possible outcomes, prices reflect not so much our decentralised *knowledge* as the way we *imagine* or *hope* the future will be: “Valuation is expectation and expectation is imagination”, as Shackle (1992 [1972], 8) epigrammatically expressed it. Crucially, these imaginings generally take the form of narratives, which provide us with scripts that “keep ontological uncertainty at bay” (Lane and Maxfield 2005, 4). It is the stories we tell ourselves that help us to chart our way through the unknown future and interpret the constant flow of new information, and that provide us with “rationales to support action” (Tuckett 2011, 160). It is stories that “provide parameters for decision-making [...] *despite* the uncertainty” we face (Beckert 2011, 5), and thereby help us decide the prices we are willing to pay. In consequence, as Tuckett (2011, 24) shows in his empirical findings, the valuation of assets “is inextricably linked with the stories people tell about their futures”, and the emotions that attach to these narratives.

This vital role for imagination and narratives in conditions of uncertainty does not in itself invalidate Hayek’s faith in the (relative) wisdom of prices. So long as prices are a function of *heterogeneous* perspectives and the multiple imaginings, dreams and narratives of all market participants, they may still help us spot emerging patterns better than we otherwise could (Bronk 2013). But, as Keynes reminded us, in conditions of uncertainty investors normally resort to “conventional” methods of valuation, and are affected by “mass psychology” and “waves of optimistic and pessimistic sentiment” (Keynes 1936, 152-154). In other words, in conditions of uncertainty, prices tend not to reflect the *decentralised* cognition that Hayek believed to be the main epistemic advantage of the price system, but rather *group* emotions and *shared* conventions or narratives.

It is a feature of human beings that peer pressure affects the way we assess evidence (Cassidy 2009, 188f); and that, because we are social animals, we tend to think similarly and to be influenced—however independent we believe our outlooks to be—by “a *Zeitgeist*, a spirit of

the times” (Shiller 2005, 157). Each period of history tends to be marked by what Foucault called “totalising discourses” or Lyotard “grand narratives” (Drolet 2004, 20, 25). And, when faced with the uncertainty caused by innovation, we are prone to cope by adopting shared “new era stories” that inspire confidence and replace the “stories of the past” (Akerlof and Shiller 2009, 55). The resulting homogeneity of narratives and beliefs, and related tendency to “*groupfeel*”, undermines the cognitive diversity essential to healthy markets (Tuckett 2011, 19). Because any single narrative, model or perspective shines a light only on certain aspects of what is going on, reliance on one narrative may induce blindness to factors which are unforeseen or ignored by that narrative. And whenever we *all* rely on *one* perspective—on a *single* dominant narrative, modelling framework or gut instinct—we all tend to focus on the *same* aspects of what is going on and to share the *same* cognitive myopia (Bronk 2011, 14f). When that happens, we can expect prices to reflect our collective bias and to become detached from any fundamentals that our shared perspective ignores.

This argument for the cognitive and price distortion effects of homogenous new-era stories and group emotions is potentially germane to any market where innovation causes widespread uncertainty—the information technology sector being a good example. This article, though, focuses on the argument’s obvious relevance to explaining why market prices proved misleading before the 2008 financial crisis.<sup>2</sup> The decade leading up to the crisis was characterised by massive financial and policy innovation, which led to high levels of ontological uncertainty (Bronk 2011, 11). In such conditions, investors duly relied on convention and new era stories, which in turn engendered widespread confidence. As Power (2007, viii, 74f) argues, financial markets became structured by a “world-level grand narrative of risk management”, which fostered an illusion of control by confusing radical ontological uncertainty with measurable risk; and nearly all players saw it as best practice to use Value at Risk models to assess the risks they were running. Indeed, as Haldane (2009, 4) notes, the pervasive rhetoric was that we had entered a new era of “simultaneously higher return and lower risk” as a result of

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<sup>2</sup> I am assuming it is accepted that market prices were misleading before the 2008 market crash: they could only have been a good reflection of fundamentals at both pre- and post- crash market levels on an extreme view that the huge price changes reflected only random exogenous shocks that could not *ex ante* have reasonably been anticipated or spotted by anyone.

“a shift in the technological frontier of risk management”. Such an analytical monoculture, combined with an overlapping narrative of efficient markets (where prices reflect all available information), caused most players to be over-confident and to miss or ignore warning signs that in retrospect were obvious. Worse still, the risk modelling monoculture (and certain exogenously determined global regulatory frameworks) led most players to share similar beliefs; and since beliefs structure action, this caused very high correlations in behaviour (Bronk 2011, 15). Prices responded accordingly and the wisdom of prices was hopelessly compromised.

Hayek would not, I think, have expected this to happen. In part, that is because his “intransigent methodological individualism” (Skidelsky 2006, 95), and his attack on “methodological collectivism”, made him unduly wary of explanations at the level of group dynamics or “social phenomena” (Hayek 2010 [1952], 117f). Perhaps for this reason, his subjective account of knowledge largely ignores the all-important *inter-subjective* or *social* construction of motivating beliefs. It is true that Hayek was well aware that individual cognition is structured by language, institutions and abstract rules. But in his analysis these are not short or medium-term contingent social factors but the product of a long-term process of social evolution that winnows out misleading rules and ensures they are superior aids to cognition rather than potentially misleading frames (Gamble 1996, 54; Gray 1998, 41, 141).

There are two weaknesses in Hayek’s evolutionary conception of institutions: first, it assumes that the fitness landscape of tomorrow will be similar to that of yesterday despite radical innovations in the way we operate; and secondly, it ignores the social power of apparent confirmation of an ultimately flawed narrative or rule by any medium-term success it has in creating reality in its own image. In other words, we should not assume that group narratives that will ultimately prove misleading are selected out by competitive markets, since future challenges to the validity of a narrative or theory may be different from those of the past or present; and, over the medium-term horizon on which we operate, there is a strong tendency for belief in a narrative (that may in the long-run be flawed) to be reinforced by the impact on market prices of many players adopting that narrative. Let us consider such endogenous mechanisms for self-reinforcing error further.

## FINANCIAL MARKET MECHANISMS FOR SELF-REINFORCING COGNITIVE HOMOGENEITY AND ERROR

In conditions of uncertainty, markets become “markets in stories”—markets in competing interpretative narratives (Tuckett 2011, 159). There are always several plausible narratives about the future yet to be created by innovative agents, and the outcome of this competition in interpretive narratives is indeterminate and partly a function of intentional strategy and rhetoric. Competing narratives are also needed to help make sense of the movement of prices, since prices themselves usually require interpretation before they can be used to make decisions. This ambiguity in the meaning of prices is partly due to their being at best only an economical symbol of existing tacit and decentralised knowledge and judgements;<sup>3</sup> and partly because prices reflect the shifting group narratives with which we interpret our uncertain future predicament. Traders often ask, for example, what a move in the oil price means, and look for a narrative that makes sense of unusual movements. When they have found one they like, and acted accordingly, a self-reinforcing dynamic may take hold if the traders then try to convince others to adopt their preferred narrative, in order to validate their market decisions and investments. Policy-makers are another intentional source of shared narratives, as they seek to guide our expectations. Holmes (2009, 385f) argues, for example, that a key part of a central bank’s armoury is the use of persuasive and “skilfully composed narratives” that “serve as an analytical bridge to the near future” and align expectations with an inflation or growth target. This strategic use of narratives is often very effective because, at least to some extent, the narratives and models we use are “performative”—that is, they succeed in shaping reality in their own image by structuring the beliefs that motivate action. As Beckert (2011, 8) puts it: “If a sufficient number of investors believe in the fictional depiction it becomes a self-fulfilling prophecy”.

This performative attribute of narratives or models may, however, create an additional problem of knowledge, for market participants and

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<sup>3</sup> Hayek saw the very economy of the information provided by prices as a virtue; but it is also a weakness. Prices abstract from nuances of interpretation, giving only a headline reading of the supply and demand that is generated in the light of decentralized knowledge and social narratives. As Westbrook (2004, 51) puts it provocatively: “Money is structurally incapable of transferring much information, as a language composed of a single word would be”. Holmes (2009, 410) argues that, consequently, we need to supply narratives that identify “what the act of pricing discards or suppresses”.

economist alike. To the extent that (for social, strategic or rhetorical reasons) a narrative becomes dominant and governs the beliefs and therefore the actions of most agents, prices respond accordingly; and this price response may (if sufficiently in line with the narrative) reinforce confidence in the veracity of the narrative, with a further knock-on impact on prices—an example of what Soros (2010, 14) calls “reflexive feedback loops”. But such reflexive lock-in happens despite the fact that most narratives or models have weaknesses and miss some aspects of what is taking place. The difficulty is that we cannot know *ex ante* whether the apparent short or medium-term confirmation of a narrative by price movements reflects genuine fulfilment of the narrative’s script or instead masks underlying problems with the narrative that have yet to become apparent. This new problem of knowledge caused by the performativity of dominant narratives would be easier to solve if most market practitioners retained access to the “generative friction” of using “multiple evaluative principles” and so remained receptive to anomalies that challenged their preferred narrative or interpretation of events (Stark 2009, 16f). But it is exactly this cognitive diversity and receptiveness that is compromised when a market as a whole is governed by an analytical monoculture—whether this monoculture is caused by a general conviction that there is one best practice (Bronk 2011, 17) or by a particular market narrative becoming dominant thanks to reflexive reinforcement by corroborating medium-term price movements.

Several social and technical features of markets can help reinforce such homogeneity of belief and increase the dangers of self-reinforcing error. First, as Akerlof and Shiller (2009, 56) argue, stories and the emotions of confidence and pessimism that attach to them spread “like viruses”; and, indeed, their transmission can best be modelled with the techniques of epidemiology. Market panic (or confidence) and associated narratives are self-reinforcing; and their spread (like that of epidemics) is unpredictable and given to sudden threshold effects. Secondly, Beunza and Stark (2012, 383-413) show that some traders have developed “reflexive modelling” that infers the views of other traders from the prices they pay in order to use these inferred views “as inputs to their own decision-making”. Beunza and Stark argue that this technique may aid “distributed cognition” and the “interplay of internal and external estimates” so long as the opinions and perspectives so inferred are heterogeneous, but that the same technique may lead to a

dangerous form of “cognitive interdependence” and serve to reconfirm error if most players initially share the same faulty analytical frame. A third factor—in this case exogenously determined by regulators—is the increasingly widespread international use of “mark to market accounting”, which requires that changes in prices be immediately reflected in balance sheet values. This leads to the danger of a “loss-spiral” if banks are forced to off-load other assets to make up for any loss before they would otherwise have needed to (Cassidy 2009, 309f). Such self-reinforcing price movements can be very destabilising. Even if the initial price signal is valid, there is a danger that, as a result of a shared accounting convention, correlations in the reactions to this price movement are unnecessarily high, and prices move far beyond the level that fundamentals would otherwise imply.

Another dynamic in financial markets that can lead to self-reinforcing errors was first articulated by Keynes (1936, 156) in his analogy of financial markets to a beauty contest where the prize goes to whoever correctly anticipates “what average opinion expects the average opinion to be”. In part, this dynamic is caused by the fact that, when the future is uncertain, there is an incentive for an investor to second-guess the opinions of others, not for their imputed informational value, but because opinions are reflected in prices with the result that short or medium-term market movements can be predicted (and a fortune made) by correctly anticipating the trend of average opinion. It is also, as Keynes (1936, 157f) wrote, because it is usually safer in career terms to be successful in such short-term momentum trades, or else to “fail conventionally”, than to risk an unconventional approach. For, an unconventional approach often implies short-term losses and may not be profitable for the investor before doubting clients or employers have terminated her career.

Orléan (2012, 316f, 331) takes Keynes’s argument a stage further, arguing that a financial market acts as a cognitive machine for producing “a reference opinion”—“an expression of ‘what the market thinks’”; and that this market opinion is a by-product of the self-referential process identified by Keynes, which renders agents “extremely attentive to the way in which the collective opinion is formed”, that is, to salient models and dominant narratives. Here then is a self-reinforcing market mechanism that drives the serial emergence of widely held market opinions or market-wide conventions. When this happens, I would argue, Hayek’s reasons for favouring the price system

as a generator of knowledge are threatened: market practitioners may no longer rely primarily on their diverse independent perspectives and interpretations of events or prices but may instead continually second-guess, and then rely exclusively on, emerging average opinion about what prices signal and the future holds—average opinion which may turn out to be misguided in the long run.

What is particularly paradoxical for Hayek's theory is that market practitioners often behave in this way, not merely to anticipate market moves speculatively, but because they have internalised a simplified version of Hayek's own message about the wisdom of prices. Largely under the auxiliary influence of the (non-Hayekian) efficient markets hypothesis that prices reflect *all* available information, a generalised belief in the wisdom of prices has become divorced from Hayek's insistence on each agent complementing the message from prices with his own (decentralised) cognition and local knowledge. In other words, while Hayek's central argument was that the price system is *necessary* for wisdom, market participants have come to believe the stronger claim that the information gleaned from prices is *sufficient* for wisdom—a view Hayek never shared. When they adopt this stronger claim, market actors believe it is rational to economise on their own analysis and follow the judgement of the herd as expressed in market prices, on the assumption that market prices give correct signals; and such an unqualified belief in market opinion may eventually cause persistent mispricing.

This perverse dynamic is similar to the phenomenon known as an “information cascade”, where people with limited knowledge follow the decisions of others rather than make independent judgements, on the frequently false assumption that the herd is likely to be right, and consequently end up converging on bad outcomes (Cassidy 2009, 189-191; Surowiecki 2004, 53f). A generalised belief in the wisdom of prices may be self-defeating if it encourages market participants to substitute emergent market opinion for their own independent judgments and to free ride on the wisdom of others as reflected in prices. When that happens, the price system no longer reflects the cognitive diversity and localised knowledge of all market agents, and instead it becomes an unstable product of reflexive interaction and social learning. Nor is this only a phenomenon in financial markets. Widespread belief that the wisdom of prices is sufficient (like widespread belief in the “wisdom of

crowds”<sup>4</sup>) may encourage in any market a tendency that at group level is self-defeating—a tendency for individuals to assume they can economise on their own localised knowledge and cognitive effort, thereby depriving the price system of much of its informational input.

### **MARKET POWER, INFORMATION ASYMMETRY, EXTERNALITIES AND THE QUALITY OF PRICES**

Most of the mechanisms for entrenching cognitive homogeneity and self-reinforcing error considered above are particularly damaging to the wisdom of prices in the conditions of ontological uncertainty that are especially (though not exclusively) associated with rampant financial market innovation. There are, though, other factors that frequently impinge on the validity of Hayek’s argument for the epistemic value of the price system even in more stable environments and in non-financial markets.

The first is the distortion implied by gross inequalities of wealth and market power. Hayek’s assumption that key implications of decentralised knowledge and the full variety of subjective assessments are reflected in market prices (and that this is the main reason for the superiority of markets over central planning) ignores the problems implied by such inequalities. The degree of influence that any player has on market prices is a function of their market power and wealth; and this means that if those who possess some key decentralised knowledge have very little wealth or market power, and are outbid by those ignorant of the facts, the true picture may not be well reflected in prices. It is usually large players that, regardless of the superiority (or otherwise) of their knowledge, control the market prices on which others base their strategy. Market success often goes to the wealthy rather than the wise. Of course, inequalities in wealth and market power compromise more than the epistemic role of the price mechanism: they also compromise its moral claim to reflect the various subjective preferences and valuations of all market participants. Hayek argued that an advantage of the market mechanism is that, unlike central planning,

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<sup>4</sup> Surowiecki’s argument (2004) for the “wisdom of crowds” resembles Hayek’s for the wisdom of prices. Surowiecki argues that crowd decisions are wise when they aggregate a diverse set of decentralised and independent judgements. But Surowiecki (2004, 43f) also points out that generalised belief in the wisdom of crowds can be self-defeating: “[If] the group usually knows best (as I’ve argued it often does), then following the group is a sensible strategy. The catch is that if too many people adopt that strategy, it stops being sensible and the group stops being smart”.

it does not impose a single scale of values but instead reflects the full variety of preferences found in a free society (Hayek 1997b [1940], 138). But if wealth or market power is too concentrated then market prices largely reflect the subjective preferences of the rich.

Another equally serious lacuna in Hayek's thinking is his minimal recognition of the damage done to the wisdom of prices by market failures. These failures include the problem of *externalities*—the fact, for example, that the full *social* costs of pollution, congestion or resource depletion are rarely reflected in the prices that individual firms or consumers face in the market. They also include the problem of *information asymmetries* where one party to an exchange has an information advantage over the other. In such circumstances, as is well articulated in modern information economics, there may be opportunistic behaviour by the advantaged party. The fear of this alone is enough, in the absence of trust, to cause “thin” markets and the mispricing of deals (Akerlof 1970); and there is little doubt this problem played a part in the recent distortion of price signals in financial markets (Cassidy 2009, 164f). Crucially, though, the very tacit and contextual knowledge that Hayek believed to be an important reason for favouring the decentralised cognition of market pricing implies information asymmetries; and these asymmetries in turn imply that tacit knowledge is likely to be associated with thin markets characterised by distrust, mispricing and low liquidity. Hayek never, I believe, recognised this problem with his theory. In practice, any sector where tacit knowledge is key to the valuation of products (for example, the specialised mechanical engineering sector in Germany) needs non-market coordination mechanisms that allow relevant parties to share tacit knowledge and build trust (Bronk 2009, 162f).

A related problem with Hayek's theory concerns the pricing of non-standard products. Non-standard products are for Hayek a prime example of where tacit and contextual knowledge is key. But modern theory suggests that in these cases we do not have the level of liquidity and repeat transactions that allow prices to gain acceptance as fair public indicators of information. MacKenzie (2012, 336f, 345), for example, notes that in financial markets prices typically provide good information that most market participants are willing to trust only where there are standardised products, highly liquid markets, and continuous trading. Mackenzie argues that, additionally, there must be few concerns (arising from opportunism) about the “quality” of prices—

their “fairness”. This implies an important general qualification to Hayek’s theory: in the case of non-standard product areas and especially one-off transactions (where tacit and contextual knowledge and information asymmetries are often crucial) there is unlikely to be widespread faith in the fairness of posted prices. In these cases, prices are likely to be agreed upon only by parties who share crucial information through non-market mechanisms, and then the price mechanism itself is not a primary source of the knowledge required to transact. Furthermore, when prices for non-standard transactions are agreed in this way, they may never be made publicly available in a form that third parties can learn from.

## CONCLUSION

As a critique of attempts to aggregate information centrally with statistics, Hayek’s analysis of the problems of knowledge remains peerless. His championing of the feats of coordination enabled by the market price mechanism also remains convincing in explaining why in most markets we rarely experience widespread gluts or shortages of products, and why we largely succeed in catering for an astonishing variety of subjective preferences. Such coordination makes use of knowledge that is never available centrally and it does so through the signals given by prices.

It is important, however, to recognise that, particularly in the conditions of uncertainty caused by widespread innovation (where no strong anchor for expectations exists), prices may be seriously misleading. In these conditions, market participants tend to gravitate to group narratives to help make sense of their predicament, with the result that prices tend to reflect a narrow range of partial perspectives rather than the fully decentralised and diversified cognition that Hayek correctly saw as key to the wisdom of prices. There are several mechanisms endogenous to financial markets that particularly favour the epistemologically dangerous emergence of *homogenous* frames of reference, widespread *conventional* opinions and analytical *monocultures*—notably feedback loops between economic (or modelling) narratives and prices. Paradoxically, another threat to the wisdom of prices is that widespread belief in the wisdom of prices can become self-defeating if it causes market participants (contrary to Hayek’s advice) to economise on their own decentralised cognition and free-ride on the wisdom of others, thereby depriving the price system of some

of its informational input. And, finally, Hayek's followers need to acknowledge the serious damage done to the knowledge-generating properties of market prices whenever markets are characterised by large inequalities of wealth, externalities or information asymmetries.

Like most great theories in the history of ideas, Hayek's theory of the wisdom of prices may be as interesting for the reasons we now want to qualify its applicability as for its continued insights in other areas. For, when we understand better the sources of weakness in the epistemic role of the price system, we may have a better chance of avoiding the conditions that generate widespread distortion of market prices. In particular, the argument advanced in this paper suggests the importance of safeguarding the cognitive diversity of market participants by minimising as far as possible endogenous market pressures for analytical monocultures and homogeneity of belief. It also suggests that great care is needed in weighing up the advantages of regulatory harmonisation against the disadvantages for the operation of the price mechanism of this exogenous source of cognitive homogeneity. But consideration of this regulatory trade-off is another story for another paper.

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