STUDIES IN EMERGENT ORDER VOL 1 (2008): 51-72

The Double-edged Nature of the Hayekian Knowledge Problem: Systemic Tendencies in Markets and Science

David Emanuel Andersson

Introduction

Hayek's well-known argument for the spontaneous market order was based on its ability to coordinate dispersed knowledge through market prices, and the inability of a single individual or small group to process the local and subjective knowledge of millions of market participants into a comprehensive economic plan (Hayek 1945). From a knowledge[1] dissemination perspective, however, the necessarily local nature of much knowledge has distributional implications that did not command Hayek's attention, either in the original article (Ibid) or in his later work in political philosophy and cultural evolution (e.g. Hayek 1982, 1988).

Markets rely on exchanges of property rights, and the distribution of such rights influences the capacity of the market to disseminate local knowledge. The ability of a specific market to disseminate dispersed knowledge should be distinguished from its ability to coordinate such knowledge. Markets may be deficient in disseminating local knowledge if the distribution of property rights is highly skewed, even if institutions cause entrepreneurial expectations to converge[2]. Skewed asset and income distributions imply differential access to credit and other resources that are necessary for converting entrepreneurial ideas into action.

There are several reasons why the distribution of property rights – in the sense of control over resource attributes (cf. Barzel 1989) - may be skewed. The most noted sources of enduring economic inequalities are concentrated ownership of land and conventional scale economies that arise because of large fixed costs. But a skewed distribution of land ownership is not a generic market outcome, and large sunk costs do not protect established firms from innovators

of new substitutes. The aim of this paper is to elucidate a systemic tendency in some markets: so-called "winners-take-all" phenomena that are associated with a number of creative occupations. It is about entrepreneurship, but not all kinds of entrepreneurship. The focus is on a type of entrepreneurship where luck and imaginative conjectures play a greater role than objective discoveries of revenue-cost differences[3].

Some creators of theories, compositions, and designs become famous, while most remain unknown. This is an intrinsic principle that seems to apply to all of the three main types of spontaneous order (market, science, democracy)[4]. The distribution of order-specific "systemic resources" (cf. DiZerega 1997) tends to reflect the relative fame of a creative individual. The choice of order matters in spite of this similarity. A case in point is that the distribution of money income in the market order is likely to have a greater effect on future knowledge dissemination capabilities than the distribution of reputation (e.g. citation totals) in the scientific order. Moreover, a choice of science over markets tends to generate income and wealth distributions with lower skewness and variance: the *money* pay-offs no more than hint at the *reputation* pay-offs.

In the market order, different occupations are associated with different types of asset and income distributions. Traditional agricultural and manufacturing occupations as well as services that involve producer-consumer interaction exhibit distributions with relatively little variability. The creation of new ideas, compositions and designs – which is associated with low marginal costs - frequently result in asset and income distributions that are extremely skewed (Andersson 2006). This is not only because of low marginal costs, but also because of emergent reputation, conversation, and status attributes. The institutional details that structure market orders are not irrelevant, however: gate-keeping institutions such as intellectual property rights have systemic effects that allow us to identify meaningful differences between real and potential markets. The evolution of intellectual property rights over the past century has reinforced winners-take-all effects: a writer's copyright over an original text is now enforced for 70 years after her death. In addition, its scope has been expanded to encompass an increasing number of derivative and non-commercial uses (Lessig 2005).

Science is also a spontaneous order that results in the production of new knowledge. But the systemic resource is reputation rather than money, and the economic property rights structure reflects that fact. Thus, publications and citations tend to be more highly valued than pecuniary rewards (Andersson 2008a). A good reputation is more easily achieved if the barriers to the diffusion of ideas and compositions are as low as possible. At the same time, the market order intersects with science in the labor market, since academic

reputation influences both bids and offers in the market for academic positions. The difference from the pure market order is that the resulting distribution of income is much less extreme than in, for example, markets for "entertainment" knowledge (Andersson 2006).

The current delimitation between market and science institutions is not self-evident, and should be seen as the result of historical path-dependent processes. Indeed, the Hayekian knowledge problem provides a good starting point for a discussion about the (qualitative) desirability of various activity-domain combinations. Examples include the roles of markets, science and democracy in addressing issues such as the extent of intellectual property rights, asset and income distributions as well as alternative incentives for creating and disseminating knowledge. In some cases, the desirability of a specific order may not be absolute but reflect its compatibility with the slowly evolving informal institutions of a spatio-temporally specific group or society.

While this paper deals with a specific pathology that a subset of market processes generate, the implication is not that the pathologies of science or democracy are less important in any qualitative or quantitative sense. This is not a policy paper, but there are numerous examples of systemic problems that may be more serious in science than in markets such as gate-keeping (high entry barriers), crude quantitative measurements for establishing the relative reputations of scientists (a quantity bias with important incentive effects) and citation clubs (a type of information impactedness).

The Hayekian knowledge problem and the Austrian vision

In "The Use of Knowledge in Society," Hayek (1945) explains the relationship between market prices and the dissemination of local knowledge. The key to this was that Hayek recognized that economic models that use assumptions of perfect knowledge or perfect information make it impossible to deal with what he considered to be the central economic problem; the coordination of dispersed knowledge. Knowledge is dispersed because market participants have unique knowledge about opportunities and constraints that reflect their spatio-temporal location, their specific skills and their connections to other people. Because of the limitations of the human brain, it is impossible to communicate all this knowledge about particular circumstances to any group of production planners at the center.

Market exchange processes have the advantage of creating exchange ratios between money and resources with greater specificity. Such exchanges of resources disseminate signals about relative scarcities to other participants

within an integrated market network, which makes it possible for these other participants to take account of information of which they have no direct knowledge. Building on Hayek's contribution, Kirzner (1973) shows how profit-seeking arbitrageurs connect previously isolated markets by buying low and selling high, thereby disseminating price signals in a market of increasing size and interconnectedness.

In his later work on psychological theory, Hayek (1952) provides the cognitive basis for why it is impossible for a central planner to take the knowledge and preferences of all market participants into account in a comprehensive national production plan. His key insight is that "the capacity of any explaining agent must be limited to objects with a structure possessing a degree of complexity lower than its own" (Hayek 1952: 185). No matter how hard they try to allocate resources in a way that takes individual preferences into account, central planners can never know when resources should be shifted to new uses, because that would require that they have instant access to every new perception, idea, preference or skill within a heterogeneous and evolving population.

In Hayek's view, the market process is a communication system that transmits condensed information about the perceived marginal (opportunity) costs of scarce resources. This implies that any interference with this decentralized signaling system hampers the inter-local process of knowledge coordination. The prices that a central planner would impose are at best fortunate guesses that happen to be correct – but only temporarily, since they have no way of adjusting to new market conditions. In the normal case, they are either too high or too low, with gluts or shortages as the predictable outcomes. On the basis of this argument, we should expect pure market prices to achieve superior economic performance, in the sense that such prices reflect the combined knowledge (and expectations) of all market participants. And pure market prices are most reliable when they reflect exchanges of stable property rights over well-defined resources.

Hayek (1945) and Kirzner (1973) provide the building blocks for an "Austrian vision," where alert entrepreneurs discover inter-local price discrepancies that are gradually disseminated to all nooks and crannies of the economic system, thereby transmitting distilled knowledge and coordinating an expanding network of buyers and sellers. Kirzner (1982) further extends the equilibrating tendency of entrepreneurial arbitrage to encompass speculation and innovation, which he views as forms of "inter-temporal arbitrage." The implication is that the spontaneous order of the market is uniquely qualified to perform these beneficial functions. Kirzner writes that

> [i]t is markets, under institutional arrangements which include especially the possibility of buying at a low price and selling at a higher price, which are

> responsible for the initiation of those systematic processes of error-correction which we understand as making up the process of equilibration. While interaction between alert human beings can be expected to result in some relevant gradual mutual discovery under any institutional circumstances, the speed of such discovery processes within markets is clearly of an entirely different order of magnitude than is conceivable outside markets. (Kirzner 1999: 7, italics removed)

There is a catch however, since all entrepreneurs do not necessarily have the same ability to transmit their knowledge of local conditions, nor do they have the same ability to transform their imaginative conjectures into practical action. This problem is quite independent from Kirzner's (1973: 74, italics in original) problematic assumption that entrepreneurs – including innovators – are "*alert* to … opportunities that exist *already* and are waiting to be noticed."

The distributional implications of asset non-neutrality

In his critical assessment of Austrian economic theory, Loasby (1989: 161) notes that Kirzner does not "fully recognize that speculation and innovation, unlike arbitrage, need resources: judgments have to be backed with money … and entrepreneurship is not open to everyone on equal terms." Burczak (2002) offers a similar argument in his critique of the "finders-keepers" defense of entrepreneurial profits, as proposed by Kirzner (1989). The pervasive condition of credit rationing – which reflects the inescapably imperfect knowledge of all market participants and the resulting fear of moral hazard and adverse selection among lenders – implies that theories that are built on an implicit assumption of asset neutrality lose much of their applicability to real-world conditions. It is only under conditions of asset neutrality that asset-rich and asset-poor entrepreneurs have the same ability to act on the perception of a profit opportunity.

The dissemination of local knowledge depends on the practical ability of entrepreneurs to create or discover new valuable production and consumption attributes of various resources, which results in innovation, speculation or arbitrage. Such practical ability depends on access to resources. An individual's access to resources reflects some combination of her savings, her access to loans and her ability to persuade others to pool their resources with hers. Poor people typically have little access to resources. Since access to resources is equivalent to control over resources, this is equivalent to stating that poor people have few economic property rights. Consequently, many people with useful local knowledge are unable to disseminate that knowledge, since they do

not have sufficient property rights to influence prices in a way that is distinguishable from random fluctuations ("functionless" price changes, in the terminology of Lachmann [1957]). In this context, it is important to remember that prices are a function of property rights endowments; the rich have a greater ability to affect market prices than the poor (Samuels 1981).

But even if every market participant starts out with an equal share of natural resources and accumulated capital goods, the entrepreneurial market process results in profits for some and losses for others. In a pure market order, it is inevitable that the knowledge of the previously successful and their descendants will always count for more than the previously failed. If the institutional structure causes "winners-take-all" phenomena to be accompanied by a substantial accumulation of material wealth for the winners relative to the losers, there will then be an initial sorting of successful from failed entrepreneurs that over time may result in a society with highly skewed wealth and income distributions. A society with a highly skewed distribution of economic property rights will inevitably generate inferior knowledge dissemination capabilities, compared with a society with a more decentralized distribution.

There is an interesting parallel between skewed distributions of property rights and Hayek's critique of central planning. We might expect that a totalitarian dictator should attempt to maximize her economic property rights (i.e. her control) on the basis of her being the holder of all legal property rights in the jurisdiction over which she claims total power. The dictator's attempt to control all resources is identical to attempted inequality maximization. And maximized inequality corresponds to maximally centralized planning. Whether an individual or organization is nominally "public" or "private" is immaterial from considerations of effective control: large private firms in a market economy are small "islands" of central planning that have to rely on price data from external markets for the generation of the "prices" that they use for intra-firm transactions.

While a redistribution of land and accumulated capital might be able to equalize the resource access of a previously highly unequal society in property rights terms, the entrepreneurial process – which is the very process that disseminates knowledge through the profit-and-loss signal – will create new inequalities. This leads to the following two-fold pattern prediction[5] regarding the knowledge-generating tendencies of the market process:

1. At any point in time, we can expect *more* future local knowledge to be disseminated through market prices if we can make market participants start with relative resource access that is *closer* to equality, given a fixed set of resources.

2. *After* that point, we can expect more local knowledge to be disseminated if all market participants receive profit-and-loss signals through prices that are set in decentralized market exchanges.

These opposing tendencies imply that the knowledge generation and dissemination properties of a socio-economic system depends on how it resolves the trade-off between an egalitarian starting point and market processes with unequal outcomes. Since every second is a potential starting point but is also subsequent to all earlier potential starting points, it is impossible to know which mixture of egalitarian redistribution and undiluted market processes generates the most knowledge at an aggregate level. But it is extremely unlikely that the institutional structure that generates the most knowledge is either purely egalitarian or purely libertarian, even if it is impossible to identify a single best institutional structure. Nor is it possible to prescribe which mix of markets, democracy and science provides the best long-run opportunities for knowledge generation at the meta-institutional level. What we can say, however, is that different *types* of resource redistribution differ in the degree to which they subvert the knowledge-disseminating properties of *market* processes (e.g. the redistribution of land among individuals simply creates a new market with a different initial distribution of opportunity sets and different market prices, while a redistribution of resources that is used for the centralized allocation of students to specific schools amounts to sector-specific central planning). Moreover, it is my contention that the two-fold pattern prediction should be an integral part in analyses of alternative IPR institutions – in addition to widely recognized short-term incentive and dissemination effects.

The diffusion of knowledge

It was once common for economists to analyze labor as if it were a homogeneous resource. While this was always a simplification of reality, it is becoming an increasingly misleading one. Increasing specialization implies that labor is becoming increasingly heterogeneous. In spite of this heterogeneity, however, it is possible to distinguish between two types of labor on the basis of the character of consumption. One type of labor gives rise to consumer goods and services that have an inherently rival character, for example food, furniture, medical check-ups and – to a somewhat lesser extent – classroom teaching. The other type entails consumption that is mainly non-rival: an additional unit of

consumption is associated with negligible or non-existent marginal production costs. Examples of the latter type mainly include occupations that rely on the creation and dissemination of knowledge; examples include scientific research, design, composition of texts or music and the dissemination of the resulting products through existing media channels. Labor that produces non-rival consumption attributes is becoming increasingly important in post-industrial societies, with some estimates indicating a growth in the percentage of workers in knowledge-producing occupations from three to almost 30 percent over the past century (Andersson 1985).

The rationale for dividing labor into two types is that they give rise to two different types of income distribution within the market order. Taleb (2007) writes that they inhibit different worlds; "mediocristan" and "extremistan." Work that contributes to rival consumption attributes includes most traditional agricultural and manufacturing occupations, as well as personal services. The nature of consumption of rival goods and services ensures that the income distribution of the associated labor inputs is in "mediocristan": skilled and well-connected bakers may well earn more than their less successful colleagues, but the mean and median income of bakers will be quite similar, with the income range between the minimum and maximum incomes being more likely to involve a single-digit than a triple-digit multiple. By contrast, the potential upper income limit associated with knowledge creation is very high; the lack of rivalry in consumption ensures this. On the other hand, the nature of knowledge makes it difficult for consumers to evaluate the quality and usefulness of a specific knowledge product. This often leads to the neglect of some knowledge outputs that might otherwise have been popular.

All people have imperfect and more-or-less specialized knowledge; cognitive limitations and time constraints impose an upper limit on learning. Consumers must therefore in many cases rely on "knowledge brokers" when forming expectations about the quality of knowledge consumption. But the knowledge brokers have their own limitations. They take on the role of connecting knowledge producers and consumers, but in doing so, they cannot help but be biased, both in favor of the successful and at the expense of the neglected. While some knowledge producers may be neglected on account of what experts perceive to be the substandard quality of their output, this is by no means always the reason; even experts have time and knowledge constraints. The consequence is that some knowledge producers have no impact on potential consumers; they are and remain unknowns. The group of unknown producers may be quite large in winners-take-all markets that happen to be popular (e.g. fiction, rock music).

The income of successful knowledge producers, as well as consumption of their output, tends to follow the well-known s-shaped diffusion pattern [6]

(Rogers 1995). That diffusion pattern depicts how slow initial consumption growth may lead to a tipping point, which is also known as "self-organized criticality" (Batten 2000). While the basic pattern is illustrated by the phase transition that occurs when pairs of previously unconnected nodes are subject to pair-wise random connections (Kauffman 1993), the process in knowledge diffusion is somewhat more complex. The knowledge brokers[7] are not nodes that establish a single critical link that bridge previously segregated local networks, which would correspond to high-impact arbitrage in its Kirznerian sense. Rather, they are nodes that suddenly generate a profusion of links to nodes in all parts of the system. If we measure the importance of a node as its inherent link-generating capacity, it becomes obvious that the most important nodes are extremely likely to speed up the diffusion process and make it take off.

The problem for a knowledge producer such as a novelist or a scientist is that knowledge brokers have limited time and tend to be selective about their promotions. An illustrative example is Bonniers Publishing, which is an important knowledge broker in the market for Swedish language literature (Andersson 2006). The editors of Bonniers review approximately 2,000 novel manuscripts per year. On average, they publish two of the reviewed manuscripts. If we assume that there are ten mass market publishers in the Swedish market for novels and that they all offer the same low probability of success, the implication would be that an aspiring novelist can realistically expect a one percent probability of getting published (if we disregard quality considerations and potential future changes to the market).

The following example, which illustrates the importance of high-impact knowledge brokers, is perhaps an even more instructive illustration of the market that aspiring novelists face. It concerns Stephen King's discovery of the novel "The Memory of Running" by Ron McLarty (2005), who had previously earned his living as a television actor and reader of audio books:

> after more than 30 years of writing longhand five hours a day — after churning out 10 unpublished novels, 44 unpublished plays, hundreds of unpublished short stories, and "an encyclopedia's worth" of unpublished poems — McLarty is finally, finally a published novelist. And a millionaire first-time novelist at that. Viking paid "two-point-something" million dollars for *The Memory of Running*, his sentimental picaresque about a fat guy named Smithy who bikes across the country… [T]he author asked each publisher if all this interest was only because Stephen King liked the book. "And more than one said, 'No, it's just that we wouldn't have read fiction from someone at your age,'" recalls McLarty, who's 57… "It creeps me out

> a little bit," says King. "This is how close it came. The audiobook was rolling around behind the seat of my pickup truck, and if I hadn't picked it up, the book never gets published, probably. Who knows how many others are out there in the same boat?" (Kirschling 2005)

The situation is different for scientists. While rejection rates are hard to come by, the editor of a social science journal told this author that he was proud of his high rejection rate of 90 percent. If we assume that journals on average reject 90 percent of submissions, and that there are 10 refereed journals that are appropriate for a certain type of journal article (a very conservative estimate), there would still be a 65 % long-term probability of getting the article published for a persistent author (again disregarding the important matter of the perceived quality of the output, which obviously complicates matters). One reason reason for the difference is that novel and academic paper production are structured by two different types of order (market and science). The institutions of science offer a greater chance of survival for previously unsuccessful knowledge producers in discipline-based sub-orders, which in turn generates a greater number of potential knowledge brokers of each producer's future output. In addition, a greater eventual number of nodes encourages product differentiation, which in turn reduces the maximum number of potential consumers in the average (sub-)discipline[8].

So far, we have only looked at the role of knowledge brokers as connectors that make consumers aware of the available options. There is also the role of consumer imitation as impact inequality generators. It is to this question we turn next.

The Imitative Consumer

Consumers may become aware of a new product because information brokers provide the requisite information. If they deem the information broker reliable, they may then start consuming the product, which may generate an s-shaped aggregate diffusion pattern. But more explicit imitation propensities among consumers may also generate diffusion patterns in their own right. In a number of simulation studies, a group of evolutionary economists at the University of Pisa (Aversi 1999; Dosi 1999) have shown how simple imitation among pairs of individual consumers may generate s-shaped diffusion curves even without access to nodes with superior connectivity. In a world that does have specialized knowledge brokers, the implication is that autonomous consumer interaction has the potential to accelerate the diffusion process. Consumer imitation and knowledge brokers are therefore mutually reinforcing causes of winners-take-all phenomena.

In traditional theories of consumer demand, individuals have given preferences whose consumption may only change because higher incomes enable them to consume previously unaffordable offerings (their "latent demand"). In Aversi et al. (1999), consumers are in part modeled as having a combination of independent effective and latent demand, but they also have innovation and imitation propensities. The simulation results show that if there are some consumption innovators in the population and if there is also an average propensity to imitate other consumers that is positive, there will be s-shaped diffusion patterns that emerge for a subset of all available goods and services[9].

Why would consumers imitate one another? There seem to be three main motivations that on occasion imply that consumers value social attributes together with more tangible consumer good or service attributes: status, conversation, and reputation attributes.

The status attributes of consumer goods have been the main preoccupation of economists with an interest in intersubjective demand, for example Veblen (1899) and Duesenberry (1949). Duesenberry (Ibid) criticizes two key assumptions of traditional neoclassical demand theory: the assumption that individual consumption is independent of the consumption of other individuals and the assumption that consumption is reversible over time. The gist of the argument is that consumers are preoccupied with status and measure that status by comparing their consumption with that of other consumers. When some consumers change their consumption patterns, others emulate them. This may lead to changes in demand that are independent of changes in income and relative prices. New types of consumption that others imitate cause so called "demonstration effects" (Ibid: 27).

Cowan et al. (1997) propose that there are four generic forces that drive the consumption choices of individuals: sustenance; repetition or association; variety or distinction; and excellence or aspiration. Sustenance refers to the basic requirements for individual survival – such as food and shelter – and as such can be expected to be a type of consumption that is given priority and that is more or less independent from other people's preferences. Repetition is when a consumer buys products that she has consumed in the past, and association is when she buys products that her – subjectively perceived – peer group consume. The drive for variety and distinction, on the other hand, exhibits a negative correlation with personal habits and a reference group from which the individual wishes to distinguish herself, respectively. As such, it involves innovation, if only from a local point of view. Excellence refers to the way in which learning-by-experiencing in the process of repeated consumption

may reinforce the valuation of consumption by triggering an aspiration for higher quality (cf. Earl 1983; Potts 2000). Aspiration also reflects what the individual perceives as excellence; the individual aspires to the consumption habits of a reference group that she deems superior in some sense.

Many of the early theorists of the social determinants of consumption, such as Veblen and Duesenberry, viewed the hierarchy in very "materialistic" terms. Another tendency was to theorize about society as a homogeneous entity with imitation patterns of general applicability. Association would be acts such as driving the same Ford model as the neighbors; distinction the purchase of a more expensive model; and aspiration the purchase of an "upper-class" Mercedes Benz.

It is questionable whether individuals can be grouped together into broad social categories, especially in increasingly multicultural and specialized societies. Referring to imitation and aspiration effects in fashion, Swann (1999: 114) notes that "British academics do not exhibit … conspicuous consumption in dress." Indeed, one can think of many professional and other subcultures where consumers are indifferent to the consumption habits of the rich. There is also the question of domain specificity. But this does not invalidate the general influence of peer, distinction, and aspiration groups on individual consumer preferences, even if they by no means determine them. As an example, we may hypothesize that the peer group of a certain economics professor within the domain of on-the-job knowledge consumption (which may overlap with production inputs) consists of departmental colleagues, while the aspiration and distinction groups consist of an admired Nobel laureate and academic sociologists, respectively[10].

Certain products may give rise to conversation attributes, which refer to the ability of a consumer to derive utility from social interaction that depends on consuming complementary tangible product attributes (Hargreaves Heap 2002). Obvious examples are telephones and broadband connections. But it also applies to many goods and services for which a reliance on "conversation value" is not equally obvious. A consumer may have normal "intra-subjective" preferences regarding what type of novel, journal paper or television program she values. But these individual satisfactions make up only one part of what she derives her utility from. There may be an intersubjective attribute which results from the conversational value of the good as well as a more indirect attribute that reflects the social networking opportunities that familiarity with specific goods facilitate. A novel may become more valuable if it is also a conversation topic in a book club to which the consumer belongs, and a journal article may become more valuable if it is discussed in research seminars and on the web.

The salience of reputation attributes derives from consumers' time constraints and cognitive limitations. Consumption is not a static process. It is

a learning process that over time results in increasing "connoisseurship" (Earl 1983). As a consumer gains experience from repeated consumption of a type of good, there will in the normal case be a concurrent increase in the number of attributes and attribute gradations that she is able to perceive. This is particularly relevant to the consumption of articulated knowledge in the form of theories, compositions, and designs. Outside of one's own specialty, it therefore makes sense to rely on the evaluation of experts, since they tend to have a greater ability to perceive qualities of which the consumer is – so far – ignorant. This is also the second function of knowledge brokers; they not only make consumers aware of the existence of various consumption opportunities but also certify (in the case of endorsements) that the quality of the product justifies the consumer's sacrifice of time and also perhaps money. Committees that award prizes are perhaps the most striking instances of knowledge brokers that not only provide information but also endow knowledge outputs with reputation attributes. An example of the emergence of a reputation attribute is when Caves Books, a small English bookstore in Tainan, Taiwan, decided to stock four titles by Orhan Pamuk in late 2006 – like countless other bookstores around the world.

What is interesting is that all three intersubjective attributes reinforce winners-take-all patterns. Status attributes reinforce the popularity of the popular; conversation attributes increase the value of the topical; and reputation attributes make what is already known to exist more attractive.

Novels and journal papers

Knowledge brokers and intersubjective preferences generate s-shaped diffusion curves in all types of orders; markets, science, and democracy. There are some very obvious commonalities that unite the mutually reinforcing diffusion patterns of recognition, conversation benefits, reputation and status (whether out of peer group solidarity or superiority) that are associated with consuming the words of John Grisham, John Maynard Keynes, and Barack Obama. But the opportunities for aspiring novelists, economists, and politicians are much less similar. The choice of institutional structure results in identifiable patterns of incentives and survivorship as well as in the distribution of resources.

For someone embarking on a career as a fiction writer, the prospects are – to put it bluntly - grim. Few aspiring novelists eventually earn a living as full-time writers, and a minuscule share earn almost all of the money. The income distribution reflects the size of the readership and the "fame factor;" the mean

income is much greater than the median income[11], and the distribution is skewed to the right. But there is also what Taleb (2004) calls "survivorship bias." The observable income distribution at any one time in fact *underestimates* its long-run skewness, since a substantial proportion of all aspiring writers drop out from the population as a result of their inability to get published. If we were to define the population as all individuals who have at one time written a (published or unpublished) novel, rather than as all individuals who refer to themselves as current writers, a reasonable guess would be that the mean income (from writing novels) would be very low. It goes without saying that we should expect the median income to be zero.

Why then do some people still decide to submit manuscripts to commercial publishers? It seems likely that this market represents an extreme example of entrepreneurial overconfidence. In experiments with students, Camerer and Lavallo (1999) found that the subjects overestimated their own abilities as compared with objective measurements. On the basis of real-world observations, Hamilton (2000) concludes that three quarters of all entrepreneurs would earn more money in normal wage jobs. Koellinger, Minniti, and Schade (2005: 3-4) explain this as reflecting the tendency of individuals to "evaluate their prospects by taking a subjective view of the situation, overestimate their likelihood of success, and, as a result, rely significantly on their perceptions rather than on objective chances of success." Indeed, they found that aspiring entrepreneurs have an even greater confidence in their own abilities than established ones, even though the latter group must be considered more successful on average (Ibid).

Writers who are successful in the market tend to be very interested in copyright enforcement, which is the main reason that their incomes reflect their reputation. The publication of an additional paper copy is very low; the electronic reproduction of a text is approximately costless. While the economic rationale for intellectual property rights is the provision of incentives for creative production, it is not self-evident that this outweighs all other factors. First, while copyright law provides added pecuniary incentives before the first profitable publication, it simultaneously lowers incentives for continued creativity *after* the first market success. Second, while Dan Brown may have earned $78.5 million in one year from "The Da Vinci Code" (Echeverria: 2006), it is not altogether clear that this does (or indeed should) create an added incentive for writers contemplating whether to write a novel or do something else. Copyright-derived income opportunities do not necessarily provide the best *ex ante* incentive for embarking on a literary career. Turning to the conditions for creative workers in science helps to explicate why incentives may be less than ideal.

An individual who decides to pursue a career in science rather than popular fiction faces a much greater likelihood of survival, if we define survival as the ability to earn a living and devote most of one's time to the chosen path. The primary cause of this discrepancy is institutional; science operates with a different set of shared and durable rules, incentives, and values. The key is the tie between research and education. Knowledge workers in science are mostly at universities, but their salary distribution resembles school teachers more than it resembles writers, musicians and actors working within the institutional structure of the market order. But unlike specialized teachers, a knowledge worker in science can expect a money income that is a reflection of her scientific reputation – which is based on the systemic resource of publications and citations – rather than on her teaching ability.

The implication of a labor market that is structured by the priorities of science is an incentive structure that is radically different from that of the market order. A scientist's publications engender academic appointments rather than income from sales of article or book copies. While the academic journals in themselves are not by any means fully compatible with the institutions of science, the scientists themselves are much more so. Academic journals, in their most common manifestation, operate within the intersection of market, science, and democracy. Ostensibly part of the market order, their unpaid authors are scientists and their sources of revenue are for the most part tax-funded or heavily subsidized universities and libraries (which are thus components of the democratic order). But because the authors of journal papers work within the institutions of science, they approach publications in a way that would seem utterly alien to writers who create texts on market terms.

An attempt to maximize reputation and recognition without regard to sales revenues implies that scientists favor free diffusion of their non-rival output. It also favors formal and informal institutions that penalize plagiarism (i.e. unattributed citations) but encourage the free use of text excerpts, theories and results as long as there are explicit and exhaustive references to the relevant sources. Intellectual property rights institutions in science are not those of the market. The unsurprising result is that the market-conforming copyrights of academic journal publishers are much less effective than elsewhere: many scientists disseminate "discussion papers" from their personal websites that are all but indistinguishable from later published versions. The growing popularity of free on-line journals is also a reflection of the rules and incentives of science.

Finally, the values of knowledge workers in science have evolved to reflect the rules and incentives of their order. The motivations and objectives of scientists are not money-driven simply because money is not the systemic

resource (see DiZerega 1997). Scientific reputation is the primary objective, while market price signals are in the normal case either a secondary incentive or a side constraint (Andersson 2008a). This is especially true of those academic disciplines that yield low pay-offs in the market order, such as philosophy, mathematics or sociology. It is less true of disciplines where market institutions may yield extreme pay-offs from research spin-offs, such as in pharmacology and electronic engineering.

A position at a prestigious workplace with good opportunities for research is the primary objective for most research scientists, scholars, and Ph.D. students. Research grants, publication quantities and reputation are all positively associated at the level of science organizations such as universities and research institutes. Purely economic incentives such as high salaries have an impact, but it is a secondary impact that primarily becomes decisive as a selection criterion when the choice concerns two workplaces with similar reputation and location attributes.

Final remarks

Market, science and democracy are three catchwords that refer to goal-independent ways of organizing the use of scarce resources; all three are self-organizing spontaneous orders. All three orders also are ways of channeling the growth of knowledge by order-specific systemic resources. But there are important differences between science and the other two orders. Market and democratic processes constitute orders that are potentially all-encompassing. In modern liberal democracies, all human activities are at least potentially subject to both market and democratic principles. Both deal with ways of creating and disseminating knowledge about *priorities* in a global sense. The market process sorts endowment-weighted, fine-grained, individual priorities. Democracy sorts priorities that are egalitarian, coarse, and aggregated. Democracy asserts priority within political jurisdictions, while the market order sustains itself by its ability to escape political jurisdictions through trade, migration and the innovation of entirely new markets for goods and services.

Science is not global in this sense. While markets and politics affect scientific processes, the reverse is not always the case. Science is not about priorities in a global sense, but about priorities that apply to the growth of knowledge with rival production but non-rival consumption. What counts as science-relevant knowledge is however not pre-determined. Knowledge can not only be deductive or inductive, it can also be aesthetic or symbolic. In the past, the priorities of science have been heavily weighted in favor of the former, leaving the aesthetic and symbolic to the organizing principles of the market or to democracy. But this division of labor between orders is not self-evident.

Existing structures imply that neither market prices (as a reflection of existing IPR institutions) nor democratic voting is suitable for guiding the production of theoretical or empirical research, while at the same time being appropriate for guiding the type of knowledge production that is associated with textual and recorded art and entertainment.

Long ago, Frank Knight wrote that "[i]t would seem to be a matter of political intelligence and administrative capacity to replace artificial monopoly with some direct method of stimulating and rewarding research" (Knight 1921: III.XII.43). The historical evidence implies that Knight was mistaken: science has spontaneously evolved such a method without the need of any "political intelligence." What remains to be seen is whether its domain will expand or shrink in the future, and to what extent science will crowd out - or be crowded out by – the domains of the market and democratic orders. The knowledge-generating capacity of society as a whole depends on the division of domains among these – and perhaps other – spontaneous orders.

Acknowledgments: The author would like to thank Gus diZerega, Bill Butos, and other participants in the "Orders and Borders Conference" at the Sise Inn in Portsmouth, New Hamphire, November 1-4, 2008.

Notes

[1] This article uses the term "knowledge" in its most inclusive sense of referring to both articulated knowledge (information) and tacit knowledge (skills, capabilities).

[2] On the problem of expectations and coordination, see Lachmann (1976).

[3] Knight's (1921) conception of entrepreneurship is in this context more helpful than Kirzner (1973). Knight conceives of entrepreneurs as uncertainty-bearing residual claimants. For example, a decision to write a novel is associated with a structurally uncertain outcome; revenues and utility gains are uncertain, while opportunity costs are only partly known. The writer is the residual claimant of her labor output before contracting with a publisher, and remains a partial claimant after signing a contract to the extent that her income depends on future sales. See also Foss et al. (2007) and Andersson (2008).

[4] The Internet can be seen as an outcome of markets, politics and science. A cooperative process between the US government and a number of universities created the infrastructure, while search engines such as Google is a market outcome. A highly skewed distributions of a variable is often associated with the so-called "rank-size rule." It is possible to estimate rank-size distributions by estimating the equation $q = e^{(k - br)}$, where q is a relevant quantity variable, k is a constant, b is an estimated parameter, and r is the rank of the observed quantity. Using the number of Google hits in January, 2005 as the relevant quantity, occupations which followed a rank-size distribution included poets, Nobel Prize laureates, painters, classical composers, and jazz musicians. For example, the

distribution of Google hits (in millions) for the 40 highest-ranked classical composers is $q = e^{(7.5 - 0.07r)}$, with R^2=.98 (Andersson 2006).

[5] This conclusion is first presented in Andersson (2008), where it is applied to general economic development.

[6] The general form of s-shaped diffusion is $q(t+1) = a\, q(t)\, (Q - q(t))$, where q is the quantity of consumption at time t, a is a composite measure of product attractiveness (including price), and Q is an upper quantity limit that reflects the number of potential consumers and their per capita consumption.

[7] In this context, knowledge brokers can be either individuals or organizations. The decisive factor is their function of being link-generating nodes in an information network.

[8] This implies that an initial $q(t+1) = a\, q(t)\, (Q - q(t))$ is gradually divided into an increasing number of sub-disciplines (i): $q_i(t+1) = a_i\, q_i(t)\, (Q_i - q_i(t))$, usually with $Q_i < Q$. There may be discipline-specific information-processing capabilities that limit the number of potential consumers in each discipline or sub-discipline, as well as a fixed time constraint.

[9] In other words, Aversi (1999) provides a microeconomic basis for aggregate patterns. In terms of the diffusion function, it implies that the subjective utility of an individual i at time t (U_{it}), is a partial function of the observed number of consumers at t, so that $\delta U_{it} / \delta q_t > 0$; $q_t \in Q$.

[10] For consumer i at time t, this would amount to $q_{irt} = q_{ipt} + q_{iat} + q_{idt}$ where r = reference groups; p = peer group; a = aspiration group; d = distinction group; $q_{irt} \leq q_t$ (see footnote 3). In this case $\delta U_{it} / \delta q_{ipt} > 0$; $\delta U_{it} / \delta q_{iat} > 0$; $\delta U_{it} / \delta q_{idt} < 0$.

[11] One rather dated estimate is that the median annual income of all published US writers amounted to slightly less than $5,000 in 1979 (Cole 1983).

References

Andersson, A. E. and D. E. Andersson. 2006. *The Economics of Experiences, the Arts and Entertainment*. Cheltenham, UK and Northampton, MA: Edward Elgar.

Andersson, A. E. and M .J. Beckmann. 2008a. *The Economics of Knowledge*. Cheltenham, UK and Northampton, MA: Edward Elgar.

Andersson, A. E. And U. Stromquist. 1985. *The Future of the C-Society*. Stockholm: Prisma.

Andersson, D. E. 2008b. *Property Rights, Consumption and the Market Process*. Cheltenham, UK and Northampton, MA: Edward Elgar.

Aversi, R., G. Dosi, G. Fagiolo, M. Meacci and C. Olivetti. 1999. "Demand Dynamics with

Socially Evolving Preferences." *Industrial and Corporate Change*, 8 (2): 353-408.

Barzel, Y. 1989. *Economic Analysis of Property Rights*. New York: Cambridge University Press.

Batten, D. F. 2000. *Discovering Artificial Economics: How Agents Learn and Economies Evolve*. New York: Westview Press.

Burczak, T. A. 2002. "A Critique of Kirzner's Finders-Keepers Defense of Profits." *Review of Austrian Economics*, 15 (1): 75-90.

Camerer, C. F. and D. Lovallo. 1999., "Overconfidence and Excess Entry: An Experimental Approach," *American Economic Review*, 89: 306-18.

Cole, H. Y. 1983. "Public Lending Right: A Symposium at the Library of Congress." Appendix to *Library of Congress Information Bulletin*. 42 (427): 1196.

DiZerega, G. 1997. "Market Non-Neutrality: Systemic Bias in Spontaneous Orders." *Critical Review*, 11 (1): 121-44.

Dosi, G., G. Fagiolo, R. Aversi, M. Meacci and C. Olivetti. 1999. "Cognitive Processes, Social Adaptation and Innovation in Consumption Patterns: From Stylized Facts to Demand Theory." In S. C. Dow and P. E. Earl (eds.) *Economic Organization and Economic Knowledge*. Cheltenham, UK and Northampton, MA: Edward Elgar.

Duesenberry, J. S. 1949. *Income, Saving and the Theory of Consumer Behavior*. Cambridge: Harvard University Press.

Earl, P. E. 1983. *The Economic Imagination: Towards a Behavioural Theory of Choice*. Brighton: Wheatsheaf.

Echeverria, A. M. 2006. "The Da Vinci Code Author Faces English Courtroom Drama." *Agence-France Presse*, February 27.

Foss, K., N. J. Foss, P. G. Klein and S. K. Klein. 2007. "The Entrepreneurial Organization

of Heterogeneous Capital." *Journal of Management Studies*. 44 (7): 1165-1186.

Hamilton, B. H. 2000., "Does Entrepreneurship Pay? An Empirical Analysis of the Returns to Self-Employment," *Journal of Political Economy*, 108: 604-31.

Hargreaves Heap, S. P. 2002. "'Everybody Is Talking About It': Intersubjectivity and the Television Industry." In E. Fullbrook (ed.) *Intersubjectivity in Economics: Agents and Structures*. London: Routledge.

Hayek, F. A. 1945. "The Use of Knowledge in Society." *American Economic Review*, 35 (4): 519-530.

Hayek, F. A. 1952. *The Sensory Order*. Chicago: University of Chicago Press.

Hayek, F. A. 1982. *Law, Legislation and Liberty: A New Statement of the Liberal Principles of Justice and Political Economy, Vol. 1-3*. London: Routledge.

Hayek, F. A. 1988. *The Fatal Conceit: Errors of Socialism*. London: Routledge.

Kauffman, S. 1993. *The Origins of Order: Self-Organization and Selection in Evolution*. New York: Oxford University Press.

Kirschling, G. 2005., "The Running Man," *Entertainment Weekly*, 801 (Jan. 14).

Kirzner, I. M. 1973. *Competition and Entrepreneurship*. Chicago: University of Chicago Press.

Kirzner, I. M. 1982. "Uncertainty, Discovery, and Human Action: A Study of the Entrepreneurial Profile in the Misesian System." In I. M. Kirzner (ed.) *Method, Process, and Austrian Economics: Essays in Honor of Ludwig von Mises*. Lexington, MA: Lexington Books.

Kirzner, I. M. 1989. *Discovery, Capitalism and Distributive Justice*. Oxford: Basil Blackwell.

Kirzner, I. M. 1999. "Rationality, Entrepreneurship and 'Economic Imperialism'." In S. C. Dow and P. E. Earl (eds.) *Economic Organization and Economic Knowledge*. Cheltenham, UK and Northampton, MA: Edward Elgar.

Koellinger, P., M. Minniti and C. Schade 2005., "'I Think I Can, I Think I Can': Overconfidence and Entrepreneurial Behavior," DIW Berlin: Discussion Paper No. 501.

Knight, F. H. 1921. *Risk, Uncertainty, and Profit*. Boston: Houghton Mifflin.

Lachmann, Ludwig M. 1956., *Capital and Its Structure*, Kansas City, MO: Sheed Andrews and McMeel.

Lachmann, L. M. 1976. "From Mises to Shackle: An Essay on Austrian Economics and the Kaleidic Society." *Journal of Economic Literature*, 14 (1): 54-62.

Lessig, L. 2005., *Free Culture: How Big Media Uses Technology and the Law to Lock Down Culture and Control Creativity*, New York: Penguin.

Loasby, B. J. 1989. *The Mind and Method of the Economist*. Aldershot, UK: Edward Elgar.

Potts, J. D. 2000. *The New Evolutionary Microeconomics: Complexity, Competence and Adaptive Behaviour*. Cheltenham, UK and Northampton, MA: Edward Elgar.

Rogers, E. 1995. *Diffusion of Innovations*. New York: Free Press.

Samuels, W. J. 1981. "Maximization of Wealth as Justice: An Essay on Posnerian Law and Economics as Policy Analysis." *Texas Law Review*, 60: 147-172.

Swann, G. M. P. 1999. "Marshall's Consumer as an Innovator." In S. C. Dow and P. E. Earl (eds.), *Economic Organization and Economic Knowledge*. Cheltenham, UK and Northampton, MA: Edward Elgar.

Taleb, N. N. 2004. *Fooled by Randomness: The Hidden Role of Chance in Life and the Markets*. London: Penguin.

Taleb, N. N. 2007. *The Black Swan: The Impact of the Highly Improbable*. New York : Random House.

Veblen, T. 1899. *The Theory of the Leisure Class: An Economic Study of Institutions*. New York: Macmillan.