

## Macquarie University ResearchOnline

---

**This is article from the following conference:**

Mathews, John A. (2006) A Strategic and evolutionary perspective on entrepreneurial dynamics : reconciling Schumpeter with Kirzner *DRUID Summer Conference* (18 - 20 June 2006 : Copenhagen)

**Access to the published version:**

<http://www2.druid.dk/conferences/viewpaper.php?id=406&cf=8>

Paper to be presented at the DRUID Summer Conference 2006 on

**KNOWLEDGE, INNOVATION AND COMPETITIVENESS:  
DYNAMICS OF  
FIRMS, NETWORKS, REGIONS AND INSTITUTIONS**

Copenhagen, Denmark, June 18-20, 2006

**A STRATEGIC AND EVOLUTIONARY PERSPECTIVE ON ENTREPRENEURIAL  
DYNAMICS: RECONCILING SCHUMPETER WITH KIRZNER**

**John Mathews**

Professor of Strategic Management  
Macquarie Graduate School of Management  
Macquarie University  
Sydney NSW 2109, Australia  
Phone: +61 2 9850 6082  
Fax: +61 2 9850 9942  
Email: [John.Mathews@mq.edu.au](mailto:John.Mathews@mq.edu.au)

February 2006

**Abstract**

Nothing would seem to be more opposed than the Schumpeterian and Kirznerian conceptions of entrepreneurship – the one driving the economic system away from equilibrium, the other driving the system towards equilibrium. In this paper an original solution to this conundrum is offered, by focusing on different evolutionary processes operating simultaneously within the business system, giving rise to both equilibrating and disequilibrating outcomes. Along the way, the paper sheds light on the nature of entrepreneurial dynamics, viewed from an evolutionary perspective, and their capacity to generate the variety that is the dominant characteristic of the resilient and innovative capitalist system.

## **A strategic and evolutionary perspective on entrepreneurial dynamics: Reconciling Schumpeter with Kirzner**

“This process of Creative Destruction is the essential fact about capitalism. It is what capitalism consists in and what every capitalist concern has got to live in. ... Economists are at long last emerging from the stage in which price competition was all they saw. As soon as quality competition and sales effort are admitted into the sacred precincts of theory, the price variable is ousted from its dominant position... But in capitalist reality as distinguished from its textbook picture, it is not that kind of competition which counts but the competition from the new commodity, the new technology, the new source of supply, the new type of organization (the largest-scale unit of control for instance) – competition which commands a decisive cost or quality advantage and which strikes not at the margins of the profits and the outputs of the existing firms but at their foundations and their very lives.”

Joseph Schumpeter, *Capitalism, Socialism and Democracy*  
(1942/1975: 82; 83; 84)

“... markets tend continually (in the face of equally continual exogenous changes in the relevant independent variables) towards equilibrium, as the consequence of continually-stimulated entrepreneurial discoveries.... The entrepreneurial role is that of alertly noticing (“discovering”) where these errors [of entrepreneurial over-optimism or over-pessimism] have occurred, and of moving to take advantage of such discoveries, and thus of nudging the market systematically in the direction of greater mutual awareness among market participants. (Since equilibrium is the state in which all market participants are, in effect, fully and correctly aware of what all others are doing, the entrepreneurial discovery process is one whose tendency is systematically equilibrative.)”

Israel Kirzner, Creativity and/or alertness: A reconsideration of the Schumpeterian entrepreneur, *Review of Austrian Economics*, 11: 5-17  
(1999)

It would seem on the face of it that nothing could be more opposed than the Schumpeterian and Kirznerian conceptions of entrepreneurship – the one driving the economic system away from equilibrium, the other driving the system towards equilibrium. How are these two views to be reconciled?

In this paper I offer an original solution to this conundrum, by focusing on different evolutionary processes operating simultaneously within the business system, giving rise to both equilibrating and disequilibrating outcomes. Along the way, I hope to shed light on disequilibrium itself, and on the nature of entrepreneurial dynamics, viewed from an evolutionary perspective. One outcome of such a more general perspective, which may be

dubbed a ‘strategizing in disequilibrium’ perspective, is a resolution of the long-standing Schumpeterian vs. Kirznerian conceptions of entrepreneurship.

In the recent period there has been a revival of interest in these matters, and some important contributions – and some setbacks.<sup>1</sup> Consider the case of Shane and Venkataraman (2000; 2001), for example, who begin their recent survey of entrepreneurship as a field of study with the provocative statement that: “For a field of social science to have usefulness, it must have a conceptual framework that explains and predicts a set of empirical phenomena not explained or predicted by conceptual frameworks already in existence in other fields. To date, the phenomenon of entrepreneurship has lacked such a conceptual framework” (2001: 217). Shane and Venkataraman then outline their version of a framework that should guide research on entrepreneurship, using as definition of this field that it is “the scholarly examination of how, by whom, and with what effects opportunities to create future goods and services are discovered, evaluated, and exploited” (2000: 218). Consequently, they argue that the field involves study of opportunities and their sources; processes of discovery and evaluation; and the set of individuals who discover, evaluate and exploit such opportunities. If these scholars are to be believed, entrepreneurship does not involve study of how businesses are actually founded and how they grow; nor with how they are diversified; nor with how the entrepreneurial process fits into the wider processes of the economy including the industrial dynamics involved, nor with how it meshes with any notion of strategizing. All of these elements, I suggest, must be part of any comprehensive framework that captures the role of entrepreneurial behavior in generating strategic variety and in driving the economy along new pathways.

In this paper, I first develop a framework within which entrepreneurial processes may be given a clear functional meaning from a strategizing perspective, and the features of entrepreneurial dynamics from such a perspective may be displayed. The emphasis is on linking entrepreneurial dynamics and their success to the conditions of the economy, and in particular disequilibrium conditions and cyclical features such as upturns and downturns, rather than the psychological characteristics that are still held to be important – even by Kirzner when he describes the Schumpeterian entrepreneur as having “aggressive, bold, creative leadership qualities” (1999: 13). Then I put entrepreneurial dynamics into an evolutionary setting, and in particular pose the possibility of varying Darwinian processes based on variation, selection and retention operating over different time spans. It is in such a setting that I propose that the Kirznerian and Schumpeterian entrepreneurs may best be reconciled.

### **Firm-level dynamics**

From the perspective of the firm, a strategic choice is an entrepreneurial initiative that has economic repercussions as the new firm, or line of business created, starts activities of its own. Entrepreneurship is the core of strategizing, given that all firms’ dynamic strategic positioning calls initially for the development and exercise of entrepreneurial strategies. There can be no sustained competitive advantage without the prior creation of an advantage in the first place, which can only be accomplished through some entrepreneurial initiative. Entrepreneurial strategic management should rightfully be seen as the source for all the diversification, new

product development and spinoff of new ventures that goes on in established firms, as well as the classical concern with the creation of new business ventures. In all cases, new resource combinations are being created, and new ways of organizing activities are being discovered, or imitated: uncertainty is being tackled by a direct market experiment. This is the essence of entrepreneurial behavior.<sup>2</sup>

The recombination of resources, activities and linking routines within the firm is the implementation of the strategic choice, and it leads to a new set of activities, new sources of revenue, and a new business model for the firm. Just as the Greek philosopher Heraclitus stated that “you can never step into the same river twice” – meaning that the river flows along, and is always changing its identity – so the firm is constantly changing its mix of activities, resources and routines. “You never deal with the same firm twice” might be a modern equivalent to Heraclitus’ comment.<sup>3</sup> Firms change through the strategic choices that they make. Those that do not change will eventually die.

The “new” firm, with its recombined activities, resources and routines, now provides itself with a platform for the generation of new strategic options. The new set of resources might create a platform that could be exploited, either through a new diversification, or for simple growth of output in the same market. It was this feature of the firm’s strategic behavior that was captured by Edith Penrose, in her notion that the rate of growth of the firm is limited by the degree of management “attention” that can be paid to any set of activities based on a set of resources. Thus the strategically active firm will be exploring new strategic options based on its new resource and activity platforms – explorations that in themselves are costly, consume resources, and are not to be undertaken lightly. New strategic goals might be set as a result of such explorations.

Following Schumpeter, who first discussed this question, we deem *entrepreneurial behavior* as that which takes firms in a new direction, or involves the establishment of new firms, without regard to the resources involved. It might be undertaken by an individual, or by a group of managers planning a spinout, or by a group of managers charged with developing a new line of business within an existing firm. Consistent with a conception of strategizing by firms in disequilibrium, entrepreneurial initiative may be viewed as involving one or more of three things:

- a) resource acquisition or resource recombination;
- b) activity reconfiguration, either with existing resources or through addition of new resources; and
- c) building of new routines needed to operate the new activities and connect them with the new resource combinations.

The essence of entrepreneurship as a strategic form of behavior thus lies in reconfiguring activities, and the routines needed for them, without regard to the resource constraints encountered, and the taking of action to secure access to the resources required.<sup>4</sup>

### ***Entrepreneurship and competitive forces***

Fleshing out the sources of new resource and new activity combinations involves the consideration of the *competitive forces* that always impinge on any strategic choice. For new resource combinations, the firm reaches into its own operations to develop the additional

resources, or it searches for sources outside. Either way, the resources are subject to the competition of alternatives – whether sourced internally or externally. The difference lies in the charging decisions taken within Net Present Value (NPV) calculations by the firm, for the use of the services provided by resources, which are fundamentally a matter of strategic choice. In our disequilibrium framework, we have no need to impose any arbitrary *ex ante* or *ex post* limits to the competition involving resources, as done in the Ricardian rents or Resource-based View (RBV) perspective. We assume simply that there are tolerably good markets for resources, and that these provide a source that can be utilized (as in a firm acquiring a technology under license) or a source that sets competitive limits on what can be developed internally (as when a firm in a network seeks a technology from a partner firm, knowing full well what the prevailing price might be in the open market). The criteria utilized might be quite different – as discussed in the case of the challenger firm.<sup>5</sup>

In dual fashion, we consider the question how the development of new activities (supplying new goods to new markets) is impacted by competitive forces. At any moment in time, the comparative static framework serves the purpose well. The new activities have to meet the competitive threat of existing activities (firm rivalry) and the appropriation of profits from the new activities has to confront the appropriation efforts of other firms involved in the value chain (customer firms and suppliers). The development of new activities has to take into account the likelihood of new entrants, imitating the initiative or developing an alternative to it, as part of the process of competitive imitation. If we insist on viewing such issues in an equilibrium setting (comparing a partial equilibrium in one industry with a partial equilibrium in another, as done in the field of Industrial Organization) then there may be justification for describing the strategizing by the firm as the pursuit of monopoly rents. But why limit the situation in this way? Considering the firm in disequilibrium, we are interested at any point in time with its ability to deal with the range of competitive forces arraigned against it in the product market selected for its new activities. These competitive forces consist in the direct zero-sum head to head competition with rivals; in the less direct, positive sum part-competition, part-collaboration with other firms in the same value chain (where the firms are competing over the appropriation of the profit generated within the chain as a whole, and where they are collaborating to make this profit as large as possible). This is an analysis that obviously traces its roots to Porter's "competitive forces" framework, but goes beyond it both in the static setting, and in linking it to a dynamic framework.

Entrepreneurship must be seen as central to strategic decision-making. Let us then proceed to characterize the features that distinguish entrepreneurial behavior from a strategizing perspective, and why it can be seen to make sense only in a setting of disequilibrium.

### ***1. Drawing resources from their existing uses and recombining them***

Schumpeter's great contribution was to endogenize change in a static system, thereby creating the first full-fledged dynamic model of a real economy. He did so by insisting that the entrepreneur draw resources from their existing uses, and recombine them – the mechanism supporting such activity being the credit system. In terms of the theory of the firm adopted in this text, the entrepreneur creates new resource combinations, which then allow for the generation of new activities, requiring the construction of new routines by managers

hired for the purpose.<sup>6</sup> Thus the resources, activities and routines are tied together in a strategizing and entrepreneurial perspective. Schumpeter poses his entrepreneur as acting on the economic system in equilibrium (as part of the circular flow) to drive it towards disequilibrium. This captures one aspect of the process; Kirzner captured the inverse process.

## ***2. Utilizing resources not necessarily under present control***

For Kirzner, the role of the entrepreneur is to locate opportunities in disequilibrium, and through his or her actions, drive the system towards equilibrium. This is what is described by Austrian economics as the “market process” and the work of Kirzner can hardly be improved on in this regard. It is just that it only captures a part of the picture; the other part is the Schumpeterian process through which entrepreneurial initiative drives the economy away from equilibrium.

According to Kirzner (1973; 1995), the entrepreneur is the economic agent who lacks resources (but knows where to find them), who becomes aware of profit opportunities, and acts to realize these opportunities through resource mobilization and activation.<sup>7</sup> The goal is entrepreneurial profit, which we see as the prime motivator of strategizing behavior, and indeed the driving force behind economic dynamics. An approach to entrepreneurship couched in terms of securing access to resources not already possessed, is framed to complement the notion of entrepreneurial profits as residual income, after all contractual incomes accruing to factors (resources) have been settled. Thus it is the prime function of the entrepreneur to assemble the resources needed to carry out a business plan of some kind, offering each of them some contractual form of payment in reward for services to be rendered. This is a behavioral approach to defining entrepreneurship, where the focus is not on the personal traits of the entrepreneur, but on the object of the behavior, namely the creation of a new enterprise.<sup>8</sup>

Thus the “Austrian” emphasis on entrepreneurial dynamics driving the economy towards equilibrium needs to be balanced by the Schumpeterian emphasis on these entrepreneurial dynamics as creating disequilibrium. We shall come back to this issue below, in the context of evolutionary dynamics of the economy as a whole.

## ***3. Creating and sustaining a disequilibrium position***

While Schumpeter emphasizes the link between entrepreneurial behavior and innovation, and thus with the creation of disequilibria; and while Kirzner emphasizes the equilibrating character of entrepreneurial initiatives, in the approach I develop here the main effect of entrepreneurial initiatives, whether involving innovation or not, is to create and sustain disequilibria in the economic system. From a strategizing perspective, firms are not interested in whether they are taking the economy towards or away from equilibrium (not that Kirzner claims they are so interested); they are simply interested in creating and sustaining for as long as possible entrepreneurial profits. My point is that these are created and sustained to the extent that the entrepreneurial firm maintains its position away from equilibrium. From such a perspective, it spells death for a firm to actually arrive at a perfectly competitive equilibrium.<sup>9</sup>

## ***4. Entrepreneurship as the test of a market conjecture***

Entrepreneurship has an immediate interpretation as the *test of a market conjecture*. Several such conjectures are formed in the “mind” of the firm, or more immediately, in the mind of the entrepreneur. The conjecture can cover a huge array of possibilities. It might be a conjecture about the possibility of blending a technology of interactivity with a technology of digital TV reception, to generate a particular way of delivering an interactive digital TV service. It might be a proposition that lowering the price of a service by a mobile phone company will increase its marketshare. Whatever the conjecture, it is made in conditions that Knight described as uncertainty, that is, in conditions that cannot be made the subject of an insurance policy. In a free enterprise system, there is a way to resolve such uncertainty, and that is to put the conjecture to the test.<sup>10</sup>

Now the test of a conjecture in this sense, like the testing of a scientific conjecture, with which it is perfectly analogous, carries some important implications. The first is that the entity conducting the test has the resources needed to do so. As a professor, I might entertain the conjecture that a word-processing program that writes books automatically, without the need for thought, might have a large potential market. But unless I am prepared to go into the market and secure the resources needed to test such a conjecture, it remains a speculation. Likewise a scientific conjecture can only be tested in a laboratory, with all the required lab equipment, trained lab technicians, and intellectual capital needed to make the test of a conjecture credible.

The second implication is that there is a reasonable means available of deciding whether the test is successful or not. In the scientific field, this involves canons of good practice, plausibility and concordance with the observed facts (in the Popperian sense, of refuting a conjecture). In the business field the criteria are no less ruthless, but less transparent: the firm conducting the test of the conjecture must eventually make a profit, or the conjecture is deemed “false.”<sup>11</sup> The testing of a market conjecture always leads to some recombination of resources, activities or linking routines within the firm making the test (or probably involving all three). It involves a commitment by the firm to the combination chosen, taken with regard to internal circumstances and to making material changes to the operating environment of the firm.<sup>12</sup>

### ***5. The process through which new businesses are created***

In any dynamic system, there has to be a mechanism through which variety is generated. In the economy, such variety is generated through the creation of new businesses, which occupy new strategic positions, or through the extension of an existing business, which again takes it to a new strategic position. In each case, the process is conducted under competitive conditions, so that there is competitive pressure on the entrepreneur to innovate (occupying a position not tested before) or to imitate the innovations of others. This is essentially the engine of innovation, and of the rapid diffusion of innovations, that is so characteristic of the free-market system. This must be the primary focus of any theory of competitive behavior and entrepreneurial dynamics. New businesses are of course generated by existing businesses as well as by creative individuals – as in the process of corporate spin-offs, spinouts, intrapreneurship and, simply, corporate entrepreneurship.<sup>13</sup>

This focus on the creation of new businesses, which is an essential feature of entrepreneurship and can be ignored only by changing the meaning of the term, also gives rise to an operational definition, first utilized and studied by Audretsch (1995). This is that



the extent to which an industry is made up of new and young firms is a measure of its degree of entrepreneurial activity.<sup>14</sup> Immediately there is a practical implication to this approach, that finds empirical support: many firms will elect to enter a new market in a small way, rather than with massive investments, in order to test the viability of their business plan. Only if some support for the venture is demonstrated, will more substantial investments be made. This fact has been well recognized in the IO literature, but was generally misinterpreted to mean that if firms enter an industry in a small way, then they have a high probability of failure.<sup>15</sup> The character of attempted hypothesis refutation was missed altogether.

There is a second immediate practical implication. Experiments either succeed or fail; hypotheses are indeed frequently refuted. In the same way, entrepreneurial experiments against the market frequently fail. The result is not entrepreneurial profits, but entrepreneurial losses. If the entrepreneur has been careful to finance the venture through borrowed capital, then it is the investors who suffer the losses – and the entrepreneur lives to fight another day. But capital losses as well as capital gains are irreducibly associated with entrepreneurial ventures. This is another reason why entrepreneurship does not fit easily into mainstream economic discourse, which is almost totally concerned with income effects – not the wealth effects associated with capital gains and losses. But such considerations certainly fit a disequilibrium framework.

### ***6. Is entrepreneurship a resource?***

Oddly enough, in the current strategic management literature “entrepreneurship” is discussed not from a Schumpeterian perspective but as a “resource” that earns the firm Ricardian rents. The most prominent case of this reasoning is that associated with “entrepreneurial rents” – as discussed for example by Alvarez and Barney (2000) and Alvarez and Busenitz (2001). Here the argument goes that entrepreneurial initiative is associated with some identifiable “resources” such as entrepreneurial recognition (the recognition of opportunities) and entrepreneurial resource-combining (the exercise of combinative capabilities), brought to the firm by the entrepreneur, and which then earn *entrepreneurial rents*. Apart from the fact that such rents would only be earned in imperfect equilibrium, whereas it is much more straightforward to see entrepreneurial earnings as generated in disequilibrium, the real difficulty here is to view the entrepreneur’s attributes as resources in themselves. If this is the case, then one must ask: who utilizes these “entrepreneurial resources” – if not the entrepreneur himself or herself? If the entrepreneur is going to pay a contractual amount for the use of the “entrepreneurial opportunity resource” then who is to seize the opportunity to utilize such a resource? There is an infinite regress involved here. The Knightian and disequilibrium setting makes it abundantly clear that the entrepreneur mobilizes resources – *but entrepreneurship itself is not a resource*.<sup>16</sup>

### **Strategizing and evolutionary dynamics of the economy as a whole**

From the strategic perspective, we are interested in firms not just at the level of the individual entity, but in terms of their interactions, and how the strategic variety they generate gives rise to competitive dynamics seen as an evolutionary process. What is at issue is the capacity of the firms being studied to respond and adapt to change, both individually and in collaboration

with other firms in networks and emergent suprafirm structures. In this sense the firms are intelligent agents capable of generating “emergent behavior” that is not predictable in advance. Thus the focus now shifts away from firms as such, to the interactions between them, and to the structures they create through this mutual interaction -- to investigate the “worlds that firms mutually create” – to adapt a striking phrase of Kauffman’s.<sup>17</sup> At the level of the economy as a whole, the patterns that result from these interactions are emergent; they are beyond the control of any individual firm, or even of any group of firms.<sup>18</sup> It is the dynamics of the firms’ ability to vary their activities in terms of their underlying resources, and to build routines and engage in resource-sharing and resource-extending behavior through network dynamics, which gives them enhanced competitive capacities and that generates evolutionary dynamics for the economic system as a whole.

Capitalism, or the free-market system, is best conceived then as a vast exploratory system, where different bets are laid by firms in terms of their different expectations, and the market acts as efficient selector of the bets that are best “adapted” to the current business environment. Strategies, or the range of strategies employed by firms at any one time, represent the variety of the system as a whole, and its degree of adaptiveness, or adaptability, is a function of this measure of variety. If monopoly or oligopoly rules, the immediate price paid is loss of variety, and consequent lack of adaptivity to changing circumstances – just as a series of farms all devoted to a single monoculture become exceedingly vulnerable to damage from a well targeted pest or other infestation. The evolutionary virtue of the free-market system and the variety of strategies it encourages, is precisely this long-term adaptivity of the system as a whole. This is to view the economic system as an expression of Darwinian processes working themselves through at multiple levels, and at multiple time scales.

The essence of the evolutionary perspective is not captured simply by a sense of change. Things change in the economic sphere, as in many other areas of human activity. But the changes might be entirely in terms of stimulus and response. They might entail learning. Or they might be simply random. What distinguishes evolutionary processes from all these is its character of blind variation (i.e. variation with unforeseen consequences) followed by selection combined with retention (or inheritance).<sup>19</sup> This is an entirely general and abstract formulation of an evolutionary process, which can be applied in the social, cultural and economic spheres as much as in the biological sphere. It just happens that the process was first identified in all its power by Darwin in the sphere of biological adaptation and new species formation.

The modern view then is to see evolutionary processes in general terms with applications in the world of biology, of behavior, of individual development and development of such systems as the immune or nervous systems, and in the world of ideas, laws, institutions and business processes. Thus it is no longer a case of describing a biological process and then using biological “analogies” in the business world. It is the evolutionary process itself which can be seen as primary, as an abstraction, and then applied in different settings, be they biological, developmental, human social or economic. This is as profound a shift in intellectual outlook as any that has occurred in the history of the sciences: it is the “Copernican revolution” of the social sciences. We are still seeking to come to terms with its extraordinary ramifications.

### ***1. Darwinian processes everywhere***

Darwinian processes of variation followed by selection and retention are now understood to be powerful engines of development, operating across an astonishing variety of domains. Darwinian processes are recognized everywhere, from individual development, to the acquisition of behavioral routines, and from the evolution of languages, through evolution of conceptual thinking, to evolution of technologies, organizations, institutions and laws.<sup>20</sup>

The striking shift in viewpoint is that evolutionary dynamics are now seen to apply at multiple levels, including at the level of the individual's development and even at the level of choice of behavioral routine by an individual at any moment of time. For example in the development of the individual person, it is now suggested that the nervous system and brain develops along Darwinian lines (or through the operation of what Calvin calls a neural "Darwin machine").<sup>21</sup> Experiments in cat brain and ocular development have found for example that there is no set template of neural connections between the eye and the visual cortex, but instead there is a proliferation of potential connections followed by their selection by the weight or preponderance of visual stimuli actually experienced by the growing cat. Thus it is the visual environment that "selects" the pattern of visual neural-cortical connections that is best "adapted" to it.

Likewise the mammalian immune system is now thought to develop along Darwinian lines. Instead of being born with a set of templates describing "self" and "non-self" it is now seriously entertained that the immune system of each individual develops a great variety of antibodies and that only a few are "selected" by antigens (foreign bodies or "danger" stimuli). Iterative variation and selection result in antibodies that are "tuned" to the antigens the immune system is likely to meet, and clones of such cells maintain a "memory" of such encounters, and thereby give the body the chance to respond swiftly to further invasions. In this way, the immune system of each individual is tuned differently, depending on the individual's early experiences.

These phenomena all refer to the operation of Darwinian processes within the lifetime of an individual. The application of Darwinian processes thus clearly extends well beyond its traditional domain in geological time. The other striking thing is that several such processes could be operating simultaneously, e.g. in the development of the brain and of the immune system, separately and independently. Thus we should be looking at evolutionary dynamics within the economy not necessarily as a single set of phenomena, but as several processes operating simultaneously and at different levels of recursion.

Closer to the case of business and the economic system, there is by now substantial scholarship that views the changes in technological systems as evolutionary and adaptive. The changes in populations of organizations can likewise be given an evolutionary interpretation. A persuasive argument can be mounted that science and technological knowledge similarly "evolves" through processes of variation and selection of hypotheses, with selection being mediated through a highly developed system of controlled experimentation and social peer review. This is the field known as "evolutionary epistemology."<sup>22</sup> Popper's account of science, with conjectures being posed in an effort to refute them, is one of the sources of such Darwinian accounts, with its emphasis on the institutional features governing the "selection" of hypotheses. We noted above how the entrepreneurial process can be captured in such terms. Now we are considering the same

process from an evolutionary perspective. In all cases, we see the power of a process that generates variety in order to have adaptive “options” available as environmental circumstances change, so that some forms are selected and others disappear.

Perhaps most interestingly of all, Darwinian processes have been harnessed technologically as a means of producing well-adapted products when “fitness” conditions have been sufficiently well specified. The best known example would be the production of software in the form of “genetic algorithms” – which would be better labeled as “Darwinian programming” since it uses iterated production of software strings with randomly introduced variation and cross-recombination, to produce, over thousands of iterations, extremely well constructed programs. The full power of the process is revealed in such an example. A software program is a human artifact whose writing usually requires great skill and experience – and yet a machine can be programmed to simulate a Darwinian process over thousands of iterations to come up with a program as good as or better than one produced by a human programmer, provided the purpose of the program is sufficiently clearly specified to act as a means of selection in each iteration. Experience with genetic programming has also thrown up fascinating discoveries, such as the appearance of “parasite” programs which compete with legitimate programs for space in the computer memory, and force the artificially selected programs to improve themselves in defence against parasitic attack. Darwinian processes are harnessed in the pharmaceutical industry for the production of new drugs; the complexity of molecular design has thrown up a radical alternative in the form of programmed iterations where starting with a basic design and a clear specification of molecular action, a drug design can be produced through a sequence of variation and selection. Likewise Darwinian approaches are now utilized in the design of electronic circuits, in a process referred to as production of “evolvable hardware” – now widely discussed in the scientific literature.<sup>23</sup> Again it is the clear “fitness criterion” in this case that provides the starting point for the application of Darwinian mechanisms.

Of course not all processes of biological and behavioral development are thought to be Darwinian. Most actually develop according to some kind of template or formula, such as our biochemical pathways. It would indeed be costly in terms of human life if every fetus had to experiment with a wide variety of metabolic pathways in order to find the most appropriate, within its own lifetime. Many behavioral patterns are likewise acquired through learning, which is not the same as evolutionary development. Thus enthusiasm for “Darwin machines” needs to be tempered by a sense of their appropriateness.

## ***2. Generation of strategic variety***

The key to the evolutionary success of the capitalist system is the variety of strategies it generates. These are then selected through market processes, in accordance with shifts in firms’ operating environments. This is an essentially evolutionary view of strategizing, where firms are the instruments through which strategy variation is produced, through which successful strategies are selected, and which retain and reproduce the selected strategies from one period to another. It is an application to the world of disequilibrium strategizing of the notion of Darwinian process, or rather of Darwinian processes, that are now applied across the spectrum of the social sciences.

Simple as it is to state, this is actually a profoundly subversive view of economic dynamics. It emphasizes not the variety of products, nor even the variety of resources, routines and activities – even though these are all important, and are seen to contribute in some sense to economic prosperity. What it emphasizes is variety of *strategies*. A satisfactory theory of competitive behavior needs to be able to account for this, and build on its implications.

From a strictly evolutionary perspective, variety is the driver of evolutionary dynamics, whether we are talking about technologies, firms or resources. This is the core of the Fisher principle, the "fundamental theorem" of systems in evolutionary motion. It states, when applied to competitive economic systems, in the words used by Metcalfe (1994: 328) that "the rate of change of average behavior within a population of competing entities [firms] is governed by the degree of variety in behavior within that population."<sup>24</sup> The key issue then is how variety and diversity drives economic learning and adaptation, i.e. evolutionary success, in the economy as a whole. Resource variety is generated by new combinations and, sometimes, by genuinely new resources, as in the case of a new technological standard emerging and driving the spawning of a new industry. Activities variety is generated, for example, by the creation of new strategic networks, and by new strategies of out-sourcing. Strategy variety, by contrast, is the product of pure entrepreneurial imagination. It is the driver of evolutionary dynamics.<sup>25</sup>

### ***3. Evolutionary dynamics***

In the economy, as in any evolutionary system, there needs to be a source of variation, a source of selection (possibly utilizing different vehicles) and a source or mechanism of retention.<sup>26</sup> The point is that the processes of variation, selection and retention – which constitute evolutionary dynamics -- *operate over multiple time periods, independently and in parallel* – just as multiple Darwinian processes are now seen to operate in biological organisms, and indeed in our own bodies, as in the case of immune system tuning to its environment, and selective processes through which neural pathways are laid down. We should be characterizing the dynamic processes in the economy in the same kind of way – always with the emphasis on the generation of strategic variety. Thus there are Darwinian processes at work in the way that a single entrepreneur selects a strategic combination of resources, and puts this choice into effect. There are Darwinian processes at work in the way that firms embodying different strategies compete with each other, and are “selected” by market processes that weed out the less well adapted. There are Darwinian processes at work in the way that groups or clusters of firms compete with each other, enabling some clusters to flourish and others to wither and die. Darwinian processes are inherently “wasteful” – since out of diversity comes adaptive survival of the system as a whole. Thus the evolutionary perspective is profoundly subversive of conventional notions of economic “efficiency” – for what might appear to be efficient in terms of an individual firm, might be profoundly inefficient in evolutionary terms at the level of the system as a whole. There is an irreducible tension involved here.

### ***4. Upturns and downturns***

In cyclical industries – like flat panel displays and semiconductors – and in business cycles generally, there are upturns and downturns. When linked to resource dynamics in the wider economy, these phenomena take on clear functions. The upturns (prosperity) are a time for harvesting profits. In upturns, investment is increasing, and so production can increase, leading to employment increases – all driven by rising prices and rising profits (provided efficiency issues are taken care of). But the upturns tip into downturns – when prices fall, triggering downturns in investment, and leading to falling production, and falling employment, and falling profits. The downturns (recession) are a time for restructuring and the carrying through of entrepreneurial initiatives. In the flat panel display industry, for example, incumbent firms have utilized downturns to improve their efficiency, and to restructure their supply chain, bringing in new suppliers and testing them to see if they can improve on the performance of incumbent suppliers. These restructurings depend on the availability of resources – such as technologies being available for licensing by firms that are cashflow-poor, or skilled engineers becoming available as they are laid off by firms having to cut back on production.<sup>27</sup>

Resource dynamics in the economy thus capture the idea that resources are not just available – as in the case of a firm offering a license to its technology to many potential licensees. Resources also circulate and recirculate, through recombination. They are released when firms go bankrupt, for example, and then become available to entrepreneurial firms for repackaging in new combinations. Thus the failure of a large firm, which would appear to its employees as a disaster, might in reality be an important source of resource renewal and recirculation, as called for by a dynamic, developmental economy. Many of the former “rustbelt” industrial towns, centered for example around steelworks, have experienced a renaissance as entrepreneurial energies and resources held captive in the old vertically integrated firms, have been released.

These phenomena are linked to that of new firm formation and the *churning* of industry, which refers to the turnover of firms within an industry. As firms turnover, so they circulate and recycle resources. Recent empirical work conducted since the late 1980s reveals hitherto unsuspected levels of churning, thus reinforcing the view of capitalism as a dynamic system driven by entrepreneurial behavior – rather than a static system disturbed by external influences and returning rapidly to its equilibrium price position after each such disturbance.<sup>28</sup>

### **Kirzner vs. Schumpeter**

The multiple time-frames approach provides a means of resolving the long-standing tension between the Kirznerian/Austrian conception that entrepreneurial dynamics drive the economy through a market process towards equilibrium, and the Schumpeterian conception that entrepreneurial dynamics create disequilibria. I suggest that the Kirznerian approach operates in a shorter time-frame from that of the Schumpeterian, but that *both are operating simultaneously*. Loasby puts the matter succinctly, in the context of a discussion of disequilibrium states in the economy, when he states: “Whereas Kirzner’s entrepreneurs respond to changing data, Schumpeter’s cause the data to change” (1989: 178). Nooteboom (1999) provides an interesting discussion of the same issue, but with a different solution in

the form of a “logic of development”, where equilibration is characterized as first-order learning or exploitation, and dis-equilibration as second-order learning or exploration.<sup>29</sup>

In contrast with many of the current approaches to entrepreneurship, emphasizing features such as “entrepreneurial alertness” and the still-prevalent approach of characterizing entrepreneurs in terms of their personal characteristics, an evolutionary perspective on the topic needs to be consistent with a trial-and-error approach to business formation in the face of vast uncertainty. In this sense, as we discuss above, the theory of entrepreneurship can be placed in a Popperian framework, one that emphasizes the entrepreneurial venture as equivalent to a conjecture, and the market processes of selection as equivalent to the testing of a business conjecture and its attempted refutation. From an evolutionary perspective, entrepreneurial failure is just as important as entrepreneurial success. In a setting of industrial dynamics, entrepreneurial initiative is more likely to succeed during downturns rather than upturns – a feature of entrepreneurial dynamics comprehensively ignored in the literature ever since Schumpeter.

From an evolutionary perspective, we may view the entrepreneurial function as essentially a process of *settling on a choice* of combination of resources, in the same way that Calvin (1996) regards thoughts in the brain as the products of a rapid Darwinian process that considers many alternatives only to discard most of them. We see the actual choice made by an entrepreneur; but we rarely see the process of selection in which numerous options are entertained and then discarded. It is the entrepreneur who himself or herself acts as the agent of selection, in making the final choice of *this* combination rather than *that*. And then we witness a further Darwinian process as entrepreneurs place their bets on their resource combinations and strategies for employing them, and perform to the best of their abilities – with the market at this stage acting as the selection device.<sup>30</sup> Or rather we see the market emerging as the vehicle for the Darwinian process, and entrepreneurs’ resource-combination bets being tested for their fitness to the current operating conditions, and weeded out accordingly.

Over a longer time-frame, the entrepreneurial process works its way through the market, and one entrepreneur places one bet in terms of a particular strategy, while another places a different bet in terms of a different strategy. There are also the incumbents, who have made their bets, and are defending their position as best they can, against the entrepreneurial challenges. These entrepreneurial processes then work themselves out in the form of industry dynamics, with firms electing to enter an industry, or trying to do so, and electing to exit if things are too tough, or finding themselves destroyed in the process. This is the domain of Schumpeterian “creative destruction” – an ugly enough process if one is caught in it (e.g. as investor, or worker in a destroyed firm) but absolutely essential if the system as a whole is to maintain its adaptability and viability.

## **Concluding remarks**

Drawing these threads together, we may define strategic entrepreneurship as the activity that drives the economy in new directions, through recombination of resources, activities and routines, and the entrepreneur as the economic agent who lacks resources (but knows where to find them), who becomes aware of profit opportunities, and acts to realize these opportunities through resource mobilization and activation. The goal is entrepreneurial profit,

which we see as the prime motivator of strategizing behavior, and indeed the driving force behind economic dynamics. The entrepreneur, so conceived, is an endogenous source of change, or development, in the economic system – in keeping with the Schumpeterian schema.

The entrepreneur, so conceived, is an endogenous source of change, or development, in the economic system. This creates the possibility of endogenously induced growth and development, as opposed to the static conception that sees all change as static adjustment to an external shock – which is the mainstream economizing perspective. Thus the definition encompasses a Schumpeterian notion of innovation as recombination; entrepreneurial dynamics; entrepreneurship as the starting of new lines of business, and hence as central to strategizing; increasing returns, externalities, path dependence; technological systems and the shaping of production by demand; evolutionary dynamics and the generation of variety. It thus brings our theory of strategizing into conformity with our picture of how the economy grows and develops, through its internally generated industrial and evolutionary dynamics. In particular, with entrepreneurship defined in this manner, I am able to close the framework offered: *entrepreneurial behavior creates the disequilibria within which the strategizing firm operates.*

## References

- Ahuja, G. and Lampert, C.M. 2001. Entrepreneurship in the large corporation: A longitudinal study of how established firms create breakthrough inventions, *Strategic Management Journal*, 22 (6/7): 521-543.
- Aldrich, H.E. and Martinez, M.A. 2001. Many are called, but few are chosen: An evolutionary perspective for the study of entrepreneurship, *Entrepreneurship: Theory and Practice*, 25 (4): 41-57.
- Alvarez, S.A. and Barney, J.B. 2000. Entrepreneurial capabilities: A resource-based view. In G.D. Meyer and K.A. Heppard (Eds.), *Entrepreneurship as Strategy*. Thousand Oaks, CA: Sage.
- Alvarez, S.A., and Busenitz, L.W. 2001. The entrepreneurship of resource-based theory. *Journal of Management*, 27 (6): 755-775.
- Alvarez, S.A. and Barney, J.B. 2004. Organizing rent generation and appropriation: Toward a theory of the entrepreneurial firm, *Journal of Business Venturing*, 19: 621-635.
- Audretsch, D.B. 1995. *Innovation and Industry Evolution*. Cambridge, MA: MIT Press.
- Audretsch, D.B. and Thurik, A.R. (Eds.) 1999. *Innovation, Industry Evolution, and Employment*. Cambridge, UK: Cambridge University Press.
- Bhidé, A.V. 2000. *The Origin and Evolution of New Businesses*. New York: Oxford University Press.
- Caves, R.E. 1998. Industrial organization and new findings on the turnover and mobility of firms, *Journal of Economic Literature*, 36 (4): 1947-1982.
- Calvin, W.H. 1996. *The Cerebral Code: Thinking a Thought in the Mosaics of the Mind*. Cambridge, MA: MIT Press.



- Campbell, D.T. 1974. Evolutionary epistemology. In P.A. Schlipp (Ed.), *The Philosophy of Karl Popper* (Vol. 1, pp. 413-463). La Salle, IL: Open Court.
- Cohen, W.M. and Malerba, F. 2001. Is the tendency to variation a chief cause of progress? *Industrial and Corporate Change*, 10 (3): 587-608.
- Covin, J.G. and Slevin, D.P. 1991. A conceptual model of entrepreneurship as firm behavior, *Entrepreneurship Theory and Practice*, 16 (1): 7-25.
- Cziko, G. 1995. *Without Miracles: Universal Selection Theory and the Second Darwinian Revolution*. Cambridge, MA: MIT Press.
- Davidsson, P., Low, M.B. and Wright, M. 2001. Low and MacMillan ten years on: Achievements and future directions for entrepreneurship research, *Entrepreneurship: Theory and Practice*, 25 (4) (Summer): 5-15.
- Fransman, M. 1995. *Japan's Computer and Communications Industry: The Evolution of Industrial Giants and Global Competitiveness*. Oxford: Oxford University Press.
- Gartner, W.B. 1988. 'Who is an entrepreneur?' is the wrong question, *American Journal of Small Business*, 12 (1): 11-32.
- Gartner, W.B., Shaver, K.G., Carter, N.M. and Reynolds, P.D. (Eds.) 2004. *Handbook of Entrepreneurial Dynamics: The Process of Business Creation*. Thousand Oaks, CA: Sage.
- Gordon, T.G.W. and Bentley, P.J. 2002. On evolvable hardware. In S. Ovaska and L. Sztandera (Eds.), *Soft Computing in Industrial Electronics*. Heidelberg, GE: Physica-Verlag.
- Harper, D.A. 1996. *Entrepreneurship and the Market Process: An enquiry into the growth of knowledge*. London and New York: Routledge.
- Hodgson, G.M. 1997. The evolutionary and non-Darwinian economics of Joseph Schumpeter, *Journal of Evolutionary Economics*, 7: 131-145.
- Hodgson, G.M. 2002. Darwinism in economics: From analogy to ontology, *Journal of Evolutionary Economics*, 12: 259-281.
- Jarillo, J.C. 1989. Entrepreneurship and growth: The strategic use of external resources, *Journal of Business Venturing*, 4: 133-147.
- Kauffman, S. 1996. Investigations: The nature of autonomous agents and the worlds they mutually create, Working paper 96-08-072. Santa Fe Institute, NM.
- Kauffman, S. 2000. *Investigations*. New York: Oxford University Press.
- Kelm, M. 1997. Schumpeter's theory of economic evolution: A Darwinian interpretation, *Journal of Evolutionary Economics*, 7: 97-130.
- Kirchhoff, B.A. 1994. *Entrepreneurship and Dynamic Capitalism: The Economics of Business Firm Formation and Growth*. Westport, CT: Praeger Publishers.
- Kirzner, I.M. 1973. *Competition and Entrepreneurship*. Chicago, IL: University of Chicago Press.

- Kirzner, I.M. 1997. Entrepreneurial discovery and the competitive market process: An Austrian approach, *Journal of Economic Literature*, 35 (1): 60-85.
- Kirzner, I.M. 1999. Creativity and/or alertness: A reconsideration of the Schumpeterian entrepreneur, *Review of Austrian Economics*, 11: 5-17.
- Knight, F.H. 1921/1971. *Risk, Uncertainty and Profit*. New York and Boston: Houghton Mifflin Co. (Republished, with Foreword by George J. Stigler, University of Chicago Press, 1971)
- Knight, F.H. 1942. Profit and entrepreneurial functions, *Journal of Economic History*, 2 (Supplement: The tasks of economic history; Symposium on profits and the entrepreneur) (Dec): 126-132.
- Langlois, R. and Robertson, P.L. 1995. *Firms, Markets and Economic Change: A Dynamic Theory of Business Institutions*. London and New York: Routledge.
- Loasby, B.J. 1999. *Knowledge, Institutions and Evolution in Economics* (The Graz Schumpeter Lectures, No. 2). London and New York: Routledge.
- Loasby, B.J. 2001. Time, knowledge and evolutionary dynamics: Why connections matter, *Journal of Evolutionary Economics*, 11: 393-412.
- Low, M.B. and MacMillan, I. 1988. Entrepreneurship: Past research and future challenges, *Journal of Management*, 35, 139-161.
- Marchal, J. 1951. The construction of a new theory of profit, *American Economic Review*, 41 (4): 549-565.
- Mathews, J.A. 2002. A resource-based view of Schumpeterian economic dynamics, *Journal of Evolutionary Economics*, 12: 29-54.
- Mathews, J.A. 2005. Strategy and the crystal cycle, *California Management Review*, 47 (2): 6-32.
- Mathews, J.A. 2006. *Strategizing, Disequilibrium and Profit*. Stanford, CA: Stanford University Press.
- Metcalfe, J.S. 1994. Competition, Fisher's principle and increasing returns in the selection process, *Journal of Evolutionary Economics*, 4: 327-346.
- Metcalfe, J.S. 1998. *Evolutionary Economics and Creative Destruction: Graz Schumpeter Lectures, I*. London: Routledge.
- Plotkin, H.C. 1993. *Darwin Machines and the Nature of Knowledge*. Cambridge, MA: Harvard University Press.
- Schumpeter, J.A. 1912/1934/1983. *The Theory of Economic Development: An Inquiry into Profits, Capital, Credit, Interest, and the Business Cycle*. (Translated from the German *Theorie der Wirtschaftlichen Entwicklung*, 1926 edition, by R. Opie 1934; with a new introduction by J.E. Elliott 1983). New Brunswick, NJ: Transaction Publishers.
- Schumpeter, J.A. 1912/2002. The economy as a whole: The "lost" seventh chapter to Schumpeter's *The Theory of Economic Development, Industry and Innovation*, 9 (1/2): 91-145.
- Schumpeter, J.A. 1939. *Business Cycles: A Theoretical, Historical, and Statistical Analysis of the Capitalist Process*. (Vols I and II). New York: McGraw-Hill.

- Schumpeter, J.A. 1942/1976. *Capitalism, Socialism and Democracy* (with Introduction by Tom Bottomore 1976). New York: Harper Collins.
- Shackle, G.L.S. 1973. *An Economic Querist*. Cambridge: Cambridge University Press.
- Shane, S. 2000. Prior knowledge and the discovery of entrepreneurial opportunities, *Organization Science*, 11 (4): 448-469.
- Shane, S. and Venkataraman, S. 2000. The promise of entrepreneurship as a field of research, *Academy of Management Review*, 25 (1): 217-226. (Dialog, *Academy of Management Review*, 26 (1): 8-20).
- Stauss, J.H. 1944. The entrepreneur: The firm, *Journal of Political Economy*, 52 (2) (June): 112-127.
- Stevenson, H.H. and Jarillo, J.C. 1990. A paradigm of entrepreneurship: Entrepreneurial management, *Strategic Management Journal*, 11 (Summer special issue: Corporate entrepreneurship): 17-27.
- Tesfatsion, L. 1997. How economists can get Alife. In W.B. Arthur, S. Durlauf and D.A. Lane (Eds.) *The Economy as an Evolving Complex System II*. Redwood City, CA: Addison-Wesley Publishing.
- Witt, U. 2002. How evolutionary is Schumpeter's theory of economic development? *Industry and Innovation*, 9 (1/2): 7-22.

## Notes

---

<sup>1</sup> Low and Macmillan (1988) put the position well, when reviewing earlier definitions of entrepreneurship: “The problem with these definitions is that though each captures an aspect of entrepreneurship, none captures the whole picture. The phenomenon .. is intertwined with a complex set of contiguous and overlapping constructs ... (and) can be productively investigated from disciplines as varied as economics, sociology, finance, history, psychology, and anthropology ... Indeed, it seems likely that the desire of common definitions and a clearly defined area of inquiry will remain unfulfilled in the foreseeable future” (1988: 141). For a commentary a decade later, where the prospects for clarity are not seen as much brighter, see Davidsson, Low and Wright (2001).

<sup>2</sup> On entrepreneurial dynamics there is now a vast literature; see for example Bhidé (2000) or *The Handbook of Entrepreneurial Dynamics: The Process of Business Creation* (Gartner et al 2004).

<sup>3</sup> Heraclitus (c.544 to 483BCE) was a famous opponent of Pythagoras. An aristocrat from Ephesus, in Asia Minor, he believed all things are in flux, with no beginning and no end. Permanent identities are a mask to conceal the changes that go on beneath the surface. The modern firm fits Heraclitus’ views exactly, since as a legal fiction it continues indefinitely, and yet we all know that it is constantly changing its products, its staff, its customers, its operations, and ultimately, its strategies. And yet it is always considered to be the same firm.

<sup>4</sup> This approach is consistent with that elaborated by Jarillo (1989) and Stevenson and Jarillo (1990), who likewise place the emphasis on entrepreneurial behavior being oriented towards the capture of resources not currently under the firm’s (or entrepreneur’s) control. This was of course also the emphasis of Schumpeter (1912), where he characterized the credit system of the free-market economy as underpinning the recombination of resources to be found under other firm’s control. Aldrich and Martinez (2001) provide an evolutionary perspective on the processes of entrepreneurship.

<sup>5</sup> On alternative criteria for resource selection utilized by challenger firms, as distinctive from incumbents, see for example Mathews (2002).

<sup>6</sup> Of course an entrepreneurial venture may be created inside a firm, even by the former entrepreneur, recycling resources into the new venture. The emphasis on resources “not necessarily under present control” is to differentiate entrepreneurial initiative from investment as an activity, where the resources involved are definitely under the investor’s control. For an interesting longitudinal study, see Ahuja and Lampert (2001).

<sup>7</sup> The point of *entrepreneurial action*, as emphasized by Stevenson and Jarillo (1990), is that the entrepreneurial act is directed towards accomplishing a *resource recombination* goal, without regard to the existing resource limitations. As they put it: “entrepreneurship is the process by which individuals [or firms] pursue opportunities without regard to resources they currently control.” Their formulation echoes that of Kirzner (1973; 1979), who defined the entrepreneur as an economic agent who could get things done without necessarily possessing the needed resources. “Pure” entrepreneurship in Kirzner’s scheme, is exercised “only in the absence of an initially owned asset” (1973: 16).

<sup>8</sup> See Gartner (1988) for an important contribution on this score.

<sup>9</sup> It hardly needs to be pointed out that at a perfectly competitive equilibrium, firm profits sum to zero; see Knight (1942) for a definitive discussion, where entrepreneurship is “saved” within a rigorous neoclassical economic system.

<sup>10</sup> Ever since Knight (1921; 1942) formulated the difference between risk, to which probabilistic estimates can be attached, and uncertainty, which cannot be so quantified, this has remained central to all thoughtful economic discussion. Loasby (1999; 2001) provides a recent appreciative exploration.

<sup>11</sup> Harper (1996) engages in an insightful discussion of these points. The problem is that it might not be easy to see just what is the conjecture that is being tested – at least in a multi-product firm. In the case of new product development, the issues are even harder to distinguish. Fransman (1995) provides an illuminating discussion, in the context of NTT’s strategizing over whether to insource or outsource the technological components of a new switching system; he suggests that the complexities

---

can be cut through by a pattern of behavior that might be called “belief” – for example, that NTT “believes” that it is a market leader, and behaves accordingly.

<sup>12</sup> Recently Alvarez and Barney (2004) claim to have created an entrepreneurial theory of the firm out of the static versions of TCE and RBV, by posing an entrepreneurial opportunity and asking three simple questions about it: a) whether the economic actor who wishes to take advantage of the opportunity controls the required resources or not; b) whether the knowledge involved is tacit or explicit; and c) whether there are effective isolating mechanisms in place. Thus for the case of an opportunity to develop a new business based on a new technology protected by a patent, reading off the Alvarez and Barney schema one finds that the “correct” economic form of organization is “non-hierarchical” i.e. contractual – to wit, the opportunity should be exploited via licensing. In practice, where effective markets for technology exist, such an outcome may be desirable. But what about the host of situations where the entrepreneur actually wishes to start his or her own business based on the patent-protected technology? Such an obvious (and common) procedure would be condemned by the *a priori* reasoning of Alvarez and Barney.

<sup>13</sup> Covin and Slevin (1991) provide an overview of the phenomenon, while Stauss (1944) advanced the idea of the firm as an entrepreneur in the economic literature.

<sup>14</sup> Such a measure is used in Audretsch (1995) to test hypotheses regarding the factors that affect the degree of entrepreneurial activity – factors such as “the extent of scale economies and the technological environment, as well as the competitive environment or the ability of incumbent firms, to retaliate against new entrants” (1995: 105).

<sup>15</sup> See Caves (1998) for a discussion that adopts this perspective.

<sup>16</sup> Perhaps the strongest statement of this view in the economics literature of the 20<sup>th</sup> century is provided by the French economist, Jean Marchal (1951):

“... the entrepreneur, although undeniably providing a factor of production, perhaps the most important one in a capitalist system, is not himself to be defined in those terms” (1951: 551).

Marchal elaborates a theory of profit (published in the *American Economic Review*) that sees it as the fundamental engine of capitalism, and derived from entrepreneurial action on the market structure – not taking it as given, but changing it to profitable ends.

<sup>17</sup> The phrase comes from Kauffman (1996) as representative of the Santa Fe approach. In his intriguing book *Investigations* (2000), Kauffman notes: “.. the co-constructing behaviors of autonomous agents spill over to the economy, with surprising implications for the foundations of economics, for economic growth, and for the development of adaptive firms that coevolve in corporate ecosystems whose dynamics almost certainly express the same laws as do biological ecosystems, with small and large gales of Schumpeterian creative destruction, weeding out old species and technologies, ushering in the ever new species and technologies whose nonprestatable features are expressions of the very creativity of the universe” (2000: xi).

<sup>18</sup> In the words of Tesfatsion describing a simulation approach to this totality:

“[T]he actions of each unit depend upon the states and actions of a limited number of other units, and the overall direction of the system is determined by competition and coordination among the units subject to structural constraints. The complexity of the system thus tends to arise more from the interactions among the units than from any complexity inherent in the individual units per se” (1997: 534)

<sup>19</sup> See Metcalfe (1998) for a comprehensive discussion of the issues. By “blind” variation is meant a process where actors are not in a position to anticipate or predict the consequences of their actions, since these depend on the actions of so many others in the complex system. Blind variation certainly does not imply purposeless behavior.

<sup>20</sup> On Darwinian processes in general, see recent reviews such as those by Cziko (1995) or Plotkin (1993). For an application of the perspective to the economy, see Hodgson (2002).

<sup>21</sup> See Calvin (1996) for an overview of this perspective.

<sup>22</sup> See Campbell (1974) for an original exposition of this “evolutionary epistemology” viewpoint, and Hull (1988) for a systematic discussion of science as an evolving system.

<sup>23</sup> See Gordon and Bentley (2002) for a recent overview.

---

<sup>24</sup> Metcalfe (1994: 328-9) notes that: "Implicit in this view are the four central themes of the evolutionary perspective: that it is differences in behaviour between firms which drive the evolutionary process; that these differences are evaluated economically within a population of competing behaviours; that this evaluation generates selective pressure to change the relative performance of each distinct form of behaviour in the population; and, that these behaviours are subject to inertia, changing slowly relative to the changes imposed by selection."

<sup>25</sup> On variety as the driver of capitalist dynamics, see Cohen and Malerba (2001).

<sup>26</sup> Schumpeter provided all of these in his 1912 book. Thus it is entirely appropriate to regard Schumpeter as the fount of evolutionary economics – even though Schumpeter himself disavowed any identification with the Darwinism of his day, which he regarded as obscurantist, particularly in its application to social processes. For recent discussions on the question of the “evolutionary” character of Schumpeter’s schema, see Witt (2002), Hodgson (1997; 2002) and Kelm (1997).

<sup>27</sup> Thus industry upturns and downturns may provide a qualification to the observation by Langlois and Robertson (1995: 41) that “We might ... expect some follower firms to be less vertically integrated than first movers in an industry.” They argue this on the grounds that as the industry develops and specialization occurs, follower firms may have access to more specialized resources – and thus rely less on vertical integration. But this might be expected in downturns rather than upturns. In fact the evidence from the Flat Panel Display industry in Taiwan is mixed: some firms specializing in TFT-LCD entered the industry, while others entered through their vertical integration with downstream PC producers (Mathews 2005).

<sup>28</sup> On new firm formation and industry churning, see for example Kirchoff (1994) or Audretsch and Thurik (2000).

<sup>29</sup> Kirzner (1999) provides his own reflections on the Schumpeterian entrepreneur. But this is a disappointing discussion, in that Kirzner seems to be working with a rigid conception that the Schumpeterian entrepreneur is “heroic and bold” while no such psychological criteria apply to the Kirznerian counterpart. This somewhat misses the point, and a different approach is adopted in this paper.

<sup>30</sup> As Aldrich and Martinez (2001) put it, in their discussion of the evolutionary dimensions of entrepreneurship: “Interaction between entrepreneurs’ chosen strategies and the particular environmental forces they face determines entrepreneurial success or failure” (2001: 50).