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How Useful Is Universal Darwinism as a Framework to Study Competition and Industrial Evolution?

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**How Useful Is Universal Darwinism
as a Framework to Study
Competition and Industrial Evolution?**

by

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Abstract:

The adequate role of Darwinist concepts in evolutionary economics has long been a contentious issue. The controversy has recently been rekindled and modified by the position of “Universal Darwinism”, most prominently favored by Geoffrey Hodgson and Thorbjørn Knudsen. They argue that the ontology of all evolutionary systems accords to the basic Darwinist scheme of variation, selection and inheritance. This paper focuses on the emerging application of the Universal Darwinist framework to the analysis of market competition and industrial evolution and gauges its usefulness for organizing an evolutionary approach to industrial economics. Drawing on both a theoretical discussion and recent empirical findings, it argues that selection and inheritance concepts narrowly construed after the biological example are of limited help in studying markets and industries. As an alternative to the ‘top-down’ approach of Universal Darwinism, ‘bottom-up’ causal theories are suggested that explain how the interplay of descent, experience and learning shapes the competitive performance of firms in the evolution of industries.

Keywords: Universal Darwinism, routines, pre-entry experience, spinoffs, descent.

JEL classifications: B52, L10, L20

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How Useful Is How Useful Is Universal Darwinism as a Framework to Study Competition and Industrial Evolution?

1. Introduction

Evolutionary economics has no universally shared analytical framework except a fundamental commitment to focusing on the analysis of dynamic processes, change and innovation. As a heuristic to guide their interpretation and analysis of economic phenomena, evolutionary economists frequently adopt an explanatory scheme that is borrowed from Darwinist evolutionary biology. The intellectual origin of the Darwinist heuristic in modern evolutionary economics can be found in the seminal contribution by Richard Nelson and Sidney Winter (1982) who suggest that organizational routines, defined as regular and predictable behavioral patterns of firms, are the economic analogs of the genes of organisms. Just as the genome conditions the setup, development and behavior of organisms, routines are argued to condition the competitive performance of firms. They are “selected” through the differential growth (or decline) of differently successful firms reinvesting their profits, and the imitation of more successful firms by less successful competitors. Other evolutionary economists have emphasized the role of heterogeneity and population thinking, again making use of the heuristic potential in concepts and models taken from Darwinist evolutionary biology (e.g., Metcalfe, 1994, 2004). Yet in spite of its attractiveness as an interpretative frame, the role of Darwinism in evolutionary economics is a contentious issue. Criticisms of Darwinist analogies even predate the Nelson-Winter framework, as Joseph Schumpeter (1911, ch. 2) already rejected their use. Likewise, there has been an ongoing stream of criticism against Darwinist concepts in evolutionary economics over the past decade (e.g., Witt, 1996, 1999, 2003; Foster, 1997).

The controversy on the appropriate use of Darwinist concepts in evolutionary economics has been rekindled and modified by the idea of “Universal Darwinism”, which has recently gained much attention among theoretical biologists and biologically-inclined philosophers. It holds that all evolutionary processes share the abstract structure of the Darwinist scheme of variation, selection and retention. Put differently, evolution outside the realm of biology is not argued to be *similar* to evolution in nature, but the proposition is that, at a sufficiently abstract level of analysis, all evolutionary processes are *identical* in their basic structure. Among evolutionary economists, Geoffrey Hodgson and Thorbjørn Knudsen (Hodgson, 2002, 2003; Knudsen, 2002; Hodgson and Knudsen, 2004a, 2004b, 2004c) are the

most outspoken proponents of this position of a “Universal” or “Generalized” Darwinism, with their basic position shared by other authors such as Peter Murmann (2003), Sylvie Geisendorf (2004) and Viktor Vanberg (2004). Hodgson and Knudsen are very clear in pointing out that Universal Darwinism does not mean that all evolutionary processes follow the same detailed mechanisms that drive the biosphere’s evolution, which can be roughly summarized under the label of Synthetic or Neo-Darwinism. Rather, their theoretical position is that “there is a core set of general Darwinian principles that, *along with auxiliary explanations specific to each scientific domain*, may apply to a wide range of phenomena” (Hodgson, 2002, p. 270; emphasis in original).

In addition to their promotion of the Universal Darwinist framework, Hodgson and Knudsen have initiated pioneering efforts to practically apply this framework in evolutionary economics (Knudsen, 2002; Hodgson, 2003; Hodgson and Knudsen, 2004a, 2004c). These endeavors to make the basic Universal Darwinist framework operational by specifying units and processes of selection and inheritance in economic evolution provide the starting point of the present paper. Thus, the focus here is not so much an ontological as a pragmatic one, which at the same time sets it apart from the earlier critique by Christian Cordes (2004). The objective of the paper is to evaluate the usefulness of the Universal Darwinist concepts as tools for organizing an evolutionary approach to economics. The discussion is furthermore restricted to the level of market competition and industrial evolution, whereas other branches of economics and the more general issue of cultural evolution are neglected. It draws on theoretical arguments, which take into account earlier heterodox traditions in economics, as well as on recent empirical findings on industrial evolution.

The empirical evidence not only helps evaluate Universal Darwinism’s suitability for industrial economics. It also indicates possible starting points for identifying the processes underlying change and development in markets and industries. Capabilities of new entrants into an industry systematically differ according to the pre-entry experience of the firm and its founders. Differences in the “descent” of firms thus have an important role to play in causal explanations of firm performance. At the same time, the specific effects of pre-entry experience vary between industries, and the processes of knowledge transfer are quite different from inheritance in organisms. The performance of firms is moreover not determined by their background, but also depends on their ongoing learning and innovation activities. To reflect these complexities, theories accounting for the effects of pre-entry experience must identify the underlying processes of knowledge transfer in detail. As an alternative to the ‘top-down’ approach of Universal Darwinism, ‘bottom-up’ causal theories are thus proposed that

explain how the interplay of background, experience and learning shapes the competitive performance of firms in the evolution of industries. The overarching objective of such theories is to relate the present capabilities of firms to their descent and past development by identifying rather than postulating the relevant knowledge transfer and learning processes.¹

The remainder of the paper is organized as follows. Section 2 identifies the contentious issues in applying Universal or Generalized Darwinism to evolutionary economics. Section 3 explores the role of the selection concept developed as part of the Universal Darwinist framework. Limitations of viewing competition from a selection perspective are identified in section 4, before section 5 turns to the notion of inheritance. In section 6, some recent empirical findings on the effects of pre-entry experience for the competitive performance of firms are outlined, which indicate that processes of knowledge transfer in industrial evolution are more complex than the notion of inheritance suggests. The final section concludes.

2. General principles of Universal Darwinism in economics

In their call for a “Generalized Darwinism”, Hodgson and Knudsen adopt a broad definition of Darwinism as a “causal theory of evolution in complex or organic systems, involving the inheritance of genotypic instructions by individual units, a variation of genotypes, and a process of selection of the consequent phenotypes according to their fitness in the environment” (Hodgson and Knudsen, 2004b, p. 13). Selection does not necessarily refer to the natural selection mechanism found in biology, but is defined generally as any process in which the interaction of a set of entities with its environment modifies the frequency with which the different entities occur in the set (ibid., p. 5). An important implication of this broad definition is that the “Lamarckist” inheritance of acquired traits is not excluded from the definition of Darwinism – which is in accordance to the historical record, since Darwin himself did not reject the possibility that acquired traits can be inherited. The more restricted concept of evolution that does exclude the inheritance of acquired traits is referred to as Neo-Darwinism or “Weismannism” (ibid., p. 13).

Three aspects of this definition of Darwinism are noteworthy. First, the definition stresses the causal nature of Darwinist theorizing, echoing Hodgson’s (2002, p. 273) assertion that adopting a Darwinist stance implies a “blanket commitment to causal explanations”. Second, evolution for Hodgson and Knudsen implies a distinction between genotypes and

¹ Silke Stahl-Rolf (2000) has made a similar point with regard to institutional evolution.

phenotypes, and they maintain (2004a, p. 293) that this distinction, or the generalized one between replicators (entities that are replicated) and interactors (entities that interact with their environment), is essential. Finally, Universal Darwinism assumes that the lives of individual units of the evolving system are finite, and that these units have to be copied in some way in order for their characteristics to survive their death. Accordingly, Knudsen (2002, p. 418) characterizes evolution as “cumulative causation over generations.”

The emphasis on causal explanations (rather than, for example, functional ones) seems widely shared as a methodological principle in evolutionary economics. In contrast, neither the genotype-phenotype distinction nor the existence of a generational sequence are defining characteristics of evolutionary processes in alternative, broader definitions that evolutionary economists have proposed in the past. For example, Ulrich Witt (1993, p. 91) defines evolution as the “self-transformation over time of a system under investigation”, where self-transformation is understood as the “emergence and dissemination of novelty” (Witt, 2003, p. 13). These conceptual differences may not be inconsequential. If both criteria are not seen as defining characteristics of evolutionary processes, then a class of evolutionary processes is conceivable in which long-lived individual entities change and adapt to their environment, without necessarily having to exit and be replaced by new entities (i.e. without selection and inheritance). For example, individual learning – clearly a topic that evolutionary economists have studied in detail in the past (Brenner, 1996; Dosi et al., 1996) – fits this characterization. In contrast, if the two conditions hold, then “Universal Darwinism requires us to examine detailed mechanisms of variation, inheritance and selection” (Hodgson, 2002, p. 273) in the study of social and economic processes.

Adoption of the Universal Darwinist framework as proposed by Hodgson and Knudsen would potentially have far-reaching implications for the scope of evolutionary economics, as it may exclude subjects such as individual learning or the development of individual firms from the ‘proper’ agenda of evolutionary economics, or force researchers to frame these subjects in terms of a Darwinist scheme to make them acceptable in the field.² The use of the Darwinist ‘lens’ would thus no longer be a matter of its suitability for the issue at hand, but would be prescribed to the evolutionary economist.

In addition to this potential restriction in the scope of evolutionary economics, referring to the broad conceptual framework proposed by Hodgson and Knudsen as

² For example, learning could be argued to qualify as an evolutionary process because it involves selection at the level of mental models etc. However, this position appears questionable as learning at the physiological level is based on the establishment of new neural patterns, and it is far from clear that selection and inheritance can adequately describe this process. More generally, the issue is of course whether we want to accept the replicator-interactor distinction and the presence of inheritance as litmus tests for evolutionary theories.

“Darwinism” may not be uncontroversial. Even though biologists apparently do not fully agree on what constitutes the conceptual core of Darwinism, the most likely candidate seems the theory of natural selection, i.e. the combination of (i) non-purposeful variation at the individual level and (ii) systematic differences in the ability of organisms to survive and reproduce in a competitive environment with limited resources (Depew and Weber, 1995; Junker and Hossfeld, 2001).³ Broadening Darwinism such that it does not necessarily involve natural selection thus fundamentally redefines the meaning of Darwinism.⁴

From a social science perspective another aspect may be added. As is well known, Darwin’s thought was influenced by earlier ideas developed outside biology. Darwin acknowledged that when reading Malthus’ work on population dynamics, he immediately saw the implications that a ubiquitous struggle for existence would have for the evolution of the natural world (Junker and Hossfeld, 2001, p. 80). Moreover, writing shortly before Darwin and with considerable contemporary impact, Herbert Spencer had developed his evolutionary social philosophy, which he also applied to the biological realm, thus being the first to “link political economy and biology in support of evolution” (Depew and Weber, 1995, p. 156). Spencer argued that Malthusian population pressure ensured the improvement of society by triggering directed individual attempts at self-improvement. For Spencer, social change is driven by social competition. Accordingly the locus of control shifts beyond the individual level, which anticipates a crucial implication of Darwinist natural selection (Stahl-Rolf, 2000). These references to Darwin’s predecessors are not to diminish the importance of his contribution to evolutionary biology, as clearly he created a novel theory that was neither straightforward nor easily palatable for his contemporaries – witness the ensuing embittered debate. Nonetheless, social scientists might perhaps have as much reason to refer to Spencer

³ Others have suggested that not natural selection, but the theory of common descent constitutes the conceptual core of Darwinism (cf. Depew and Weber, 1995, p. 2, who attribute this view to David Hull). The theory of common descent clearly goes beyond earlier evolutionary theories in biology. Lamarck, for example, held that while all organisms evolve toward higher complexity, new lines of simple organisms emerge anew, which then follow the same evolutionary trajectory toward higher complexity. However, even though Darwin’s theory of common descent was a critical innovation in evolutionary biology, it is much less clear whether it is relevant to the social and economic sphere. More interesting in this context is that Darwin’s theory of evolution was the first one in biology that did not have ontogenetic development as its guiding metaphor (Junker and Hossfeld, 2001, p. 71-4). Prior to Darwin, theorists likened the change over time in species to the observed change during the lifetimes of individual organisms. This perspective limited the scope of evolutionary theories. For example, one reason why Lamarck did not arrive at a theory of common descent may have been that higher animals do not branch, and thus there was no ontogenetic analog available for the branching of species. In contrast, Darwin was able to overcome the limitations of earlier theories because he took his inspiration from classical political economy rather than ontogeny (ibid.).

⁴ Hodgson and Knudsen treat Darwin and Lamarck asymmetrically. While they define Darwinism as the broad theory developed by Darwin himself, not as the later modification and refinement of his theories (which they denote as Neo-Darwinism), their definition of Lamarckism is based on the reception of Lamarck’s theory, rather than on his own work. The inheritance of acquired traits is not central to Lamarck’s evolutionary theory, and it was not even his original contribution but was taken over from earlier theories (Junker and Hossfeld, 2001).

as the origin of evolutionary thinking in their field as to Darwin, particularly if their notions of evolution dispense with Darwinist natural selection.

Finally, even the emphasis on causal explanations is not a specific feature of Darwinism. Even within biology, Charles Darwin was not the first to develop a causal theory that explained the present state of organisms in terms of their past history of adaptation to their environment. Before Darwin, Jean-Baptiste de Lamarck and others questioned the view that species were constant in their divinely given anatomy and characteristics. Theories of “descendance” (Stahl-Rolf, 2000) were developed that explained the disappearance of species found in paleontological evidence by their subsequent evolutionary adaptation. The decisive conceptual step toward causal explanations of the natural world – through adaptation of organisms to their environment – had been made before Darwin, who was familiar with this prior work and built on it in developing his own theory.

Summing up the discussion of the present section, at the conceptual level the distinctive and potentially contentious features of the Universal Darwinist view of economic evolution are the insistence on distinguishing between genotype and phenotype and on the existence of inheritance mechanisms in all evolutionary processes. In contrast, applicability of the core Darwinian theory of natural selection is not postulated. The proponents of a Universal Darwinist understanding of economic evolution have gone beyond this conceptual level, however, and have started filling the abstract Universal Darwinist framework with concrete evolutionary economics content. Thus, the practical implications of adopting this position are beginning to become visible. The following section will start exploring some of these implications by discussing the usefulness of the proposed selection concept for the study of competition in markets and the evolution of industries.

3. Selection in biology and in economics

As part of their advocacy of Universal Darwinism, and building upon new developments in evolutionary biology, Hodgson and Knudsen have recently proposed stepping stones towards a generalized theory of selection in evolutionary economics (Knudsen, 2002; Hodgson and Knudsen, 2004a).

Knudsen (2002) aims at developing a minimal, general selection theory that provides necessary conditions for selection in theories of economic evolution. His concept of Darwinist selection (also referred to as “generative selection” in Hodgson and Knudsen, 2004c) is similar to natural selection in biology insofar as it consists of two sub-processes: the copying

of sets of encoded instructions (replicators), and the interaction of entities carrying these instructions (interactors) with their environment such that the frequency of the different replicators changes over time. In essence, selection is understood as the entirety of one-period changes in both replicators and interactors, whereas evolution is conceptualized as a sequence of selection processes (*ibid.*, p. 450). This notion of selection is more restrictive than the broadest definitions of selection available in biology, where with the notion of “subset selection” a selection concept has been proposed that does not depend on distinguishing genotypes from phenotypes, or more generally replicators from interactors. Subset selection is rejected as a selection concept for evolutionary economics because it “excludes the possibility that new variation may ever appear” (Knudsen, 2002, p. 445), and systems involving subset selection are seen as limited in their evolutionary potential.⁵ In contrast, in Darwinist or “generative” selection, new variation is generated as part of the selection process, because replication is assumed to be imperfect.

In spite of its abstract character, the adopted selection concept has significant implications for the interpretation of economic evolution. This is illustrated by Knudsen’s (2002, pp. 458ff.) criticism of Nelson and Winter’s (1982) evolutionary theory, who according to him fail to properly distinguish between replicators and interactors. To improve upon that situation, Knudsen proposes to consider routines exclusively as replicators (*cf.* also Hodgson, 2003). The question then is how the routines of successful firms are replicated. Knudsen develops a two-level explanation, in which the social and professional identities of firm members are the interactors corresponding to organizational routines. Firm members are organized into teams, which are isolated from other teams through team-specific tacit knowledge. The firm is interpreted as a collection of competing teams. It evolves through the differential replication of team routines, based on managerial selection between teams. Managers select teams that – in a Penrosian fashion – get to train new members of the organization and share their tacit knowledge with them, thereby replicating the team routines within the firm. At the aggregate level, the firm expands or contracts depending on its competitive performance in the market. At this level, the firm as a whole is an interactor, and the firm’s performance provides both selection criteria to the manager and a criterion with which the performance of managers can be judged.

Knudsen’s (2002) key addition to the evolutionary theory of Nelson and Winter is to specify the process by which routines are selected and replicated within the firm. He does not, however, specify the replicator that corresponds to the firm as an interactor at the level of

⁵ New variation may nonetheless be generated by processes independent of the selection process, *cf.* also Hodgson and Knudsen (2004c, p. 11).

competitive selection in the market. This missing element of the theory is provided in Hodgson and Knudsen (2004a) who propose firm-level routines as replicators in market competition. Their argument is based on an analogy to group selection in biology. The firm provides structure and cohesion to its teams, and the differential performance of the firm is not only due to characteristics of its individual members and its teams, but also to firm-level characteristics. At least in part, these firm-level characteristics are due to the firm's routines, which are defined as "organizational dispositions to energise conditional patterns of behaviour within an organized group of individuals" (Hodgson and Knudsen, 2004a, p. 290). Routines constitute "organizational meta-habits" (*ibid.*, p. 289) that cannot be reduced to the individual level. They are thus redefined, relative to Nelson and Winter (1982), to refer to behavioral propensities rather than actual behavioral patterns. Hodgson's (2003) justification for this new definition, which differs from most earlier empirical work on routines and their effects on organizations (Becker, 2004), is precisely that it makes the routine concept compatible with the Universal Darwinist scheme. Knudsen's (2002) additions to the Nelson-Winter theory are likewise motivated by the intention of making it consistent with the previously proposed general selection theory, particularly in order to relate replicators to interactors.

These modifications of established concepts of evolutionary economics based on the Universal Darwinist framework are not without problems. First, when redefined as behavioral tendencies, routines become non-observable and therefore non-falsifiable. This problem is aggravated by the lack of a substantive definition of routines in terms of their material content. What kinds of behavioral tendencies qualify as routines, and what kinds do not? Why do routines qualify as replicators, but rules and structures do not (Hodgson and Knudsen, 2004a)? Unless these open questions are answered, there appears to be a hazard, not unlike the case of the meme concept, that another "black box" is created which is of little help in explaining the empirical evidence. I will come back to this issue in section 5.

Second, the process of managerial routine selection within the firm suggested by Knudsen (2002) neglects that the firm is a locus for the division of labor. It does not seem realistic to assume that real-world firms consist of populations of functionally undifferentiated (e.g., accounting) teams that compete for managers' preferences, with the manager operating like a "breeder" (Knudsen, 2002, p. 466) who selects her favorite team from the population. Insofar as organizational teams differ in their tasks, it is not clear on what basis managers can select between them to steer the replication of routines. Put somewhat starkly, if managers favor the accounting team over the product development team, are the accountants to train newly hired development engineers?

Finally, the general selection theory leads Knudsen to come up with a fitness criterion that has little economic meaning. He suggests that “economic fitness is best viewed as the differential replication of firm-specific team-embodied routines [...], whereas differential profits only can be used with further qualification as a criterion for evolutionary success” (Knudsen, 2002, p. 467). The fitness criterion accordingly extends beyond the scope of the individual firm. Taken to the extreme, Knudsen’s criterion would imply that a firm’s fitness is increased when another firm perfectly imitates its routines, even if that causes the firm to lose all its competitive advantage, and if diversity in competition breaks down. One may speculate that this view of fitness is inspired by the inclusive fitness notion in biology. Yet what would be the analog to kinship on which inclusive fitness is based? And how helpful is inclusive fitness in the economic context, where intentional agents are narrowly interested in the performance of their own organization, and where the preservation of pluralistic competition may be an objective in its own right?

4. Selection, competition and the market process

The previous section identified problems in Universal Darwinism’s specific conception of selection. In addition, some of the more general limitations of approaching competition and the market process from a selection perspective also apply to Universal Darwinism. Framing competition as selection may entail a significant opportunity cost by detracting attention from other aspects of the competitive process, particularly if these aspects have no obvious place in the framework of evolutionary biology. Thus, even though allowing for domain-specific extensions – or even highlighting the need for these extensions, as Hodgson and Knudsen do – Universal Darwinism will probably not be neutral as a “focusing device” (Rosenberg, 1969). And since theories of competition have a long history in economics, the focus on selection may even result in a real regression below the state of the art.

It is of course not a new insight that the selection perspective on competition has limitations. However, given the ontological claim that underlies Universal Darwinism, they apply with even more force. As was argued in section 2 above, if the basic premises of the Universal Darwinism are accepted, then it is but a small step to the position that all evolutionary theorizing must proceed in terms of its variation-selection-inheritance scheme. Framing competition as selection would then no longer be a possible heuristic to be evaluated on the basis of its usefulness, but would become *the* perspective to be adopted on *a priori* grounds.

The market itself hardly plays any role in the selection concept, both in its heuristic uses and in the economic application of Universal Darwinism that is proposed by Hodgson and Knudsen. As opposed to organisms, firms do not directly compete for resources but for customer demand. In the terminology used by Hoppmann (1988, p. 266), competition in markets consists of an “exchange process” between producer and customer, and a “parallel process” in which producers (and likewise customers) compete amongst each other. The exchange process is downplayed by the selection concept. While this might seem like a trivial point, it is worthwhile recalling that market competition is based on voluntary exchange.⁶ In order to survive, firms must turn out some product that finds customers. “Selection” in markets, then, largely consists in the choices made by humans who prefer one kind of product to another one. Likewise, consumers may play an important role in industrial evolution (Windrum, 2004). Firms can and do influence consumer choices in many ways, by product innovation, advertising and the like, and differential capabilities in doing so are a key component of the “parallel process” of market competition.

Moreover, as opposed to biology, differential market performance has the potential to directly feed back into the extent and kind of innovative activities pursued by market participants. Declining performance in the market can trigger increased innovation activities. On the other hand, firms can use profits from successful competition in the market to enhance their innovative activities, in which case past success breeds future success. The crucial point is not what specific form this feedback takes. Rather, the point is that not only performance in the market is affected by innovation, but innovation may also be affected by performance. Performance, in turn, depends on the activities of competitors, so that one firm’s innovation may be the unintended consequence of another firm’s earlier innovation. The outcome is a dynamic process in which the actions of the various firms are interdependent. As is noted by Nelson and Winter (1982, p. 11), this feedback from competition to innovation is similar to Lamarckism in biology, which is encompassed by the general framework of Universal Darwinism (see section 2 above). However, it is quite different from the proposed dynamics of “Darwinist” or “generative” selection in the Universal Darwinist framework, where the emergence of variation is attributed to imperfect replication, not to the effects of interaction.

More generally, a dynamic view of market competition is not easily squared with the tendency inherent in the selection perspective to see firms as passive objects. For example, Hodgson and Knudsen (2004a, p. 302) note that “firms are selected through competition in a market environment.” In spite of the notion of interactors, there is little in terms of actual

⁶ Voluntary exchange of resources – symbiosis – does exist in nature, but is not a central element in Darwinism.

interaction between competing and cooperating firms in their characterization of market processes. But this interaction is of course at the core of industrial economics, and in addition to innovation there are a number of ways in which firms can affect the competitive process and/or try to preempt its effects. Moreover, since humans have the capacity of forming expectations on how others will behave, the threat of potential entry by new competitors can have a systematic effect on the competitive process before it even materializes. Rather than passively awaiting new competitors, firms may actively try to preempt entry.

In trying to deal with these issues, present-day evolutionary economists can draw on a wealth of earlier contributions. A number of theoretical approaches to understand the dynamics of the market process have been developed in the past, which essentially build on Schumpeter's (1942, ch. 7) view of competition as a "process of creative destruction". For example, Clark (1961, ch. 19) characterizes competition as a dynamic process based on "a series of initiatory moves and defensive responses" (*ibid.*, p. 471). He also discusses factors conditioning the rate of innovative activities and the extent to which firms react to the innovations that are introduced by their competitors. Witt (1985) emphasizes the "self-organizing" features of coordination in markets, arguing that changes in firm behavior can be triggered by the erosion of their competitive position following innovations introduced by others. Buchanan and Vanberg (1991) build on Austrian market process theory to account for the creative character of the market process stemming from the creative act of market participants.

A similarly fundamental issue relates to the absence of money and prices in the biological realm. When customers choose to buy a product in the market, they pay a price for it. The revenue thus generated allows the firm to purchase the inputs it needs to continue producing. Money from sales is not "earmarked" to any particular kind of input, but can be spent on whatever input is being most valuable or urgent to the firm, with the relative prices of different inputs also being determined in markets. Compare this to organisms in nature. Organisms also require a set of resources to survive. However, in the absence of market exchange and a universal medium of exchange, there is little room for them to trade between inputs. A plant in the rain that does not get enough sunlight cannot trade surplus water for more light. Moreover, as has long ago been argued by Friedrich Hayek (1945), prices have yet another, informative function in the market. For prices to fulfill this function, competition is crucial to uncover the true costs of producers and valuations of customers, and how they change over time. The prices that are formed in the competitive process convey this information to other agents in a decentralized way, thus enabling these agents to adapt their

behavior accordingly. This aspect of competition, a crucial prerequisite of well-functioning markets, is entirely different from the selection concept.

Finally, market competition is in no way “natural”. Markets are created and organized by humans. The specific institutions governing markets affect how the competitive process operates and what results it generates. The selection concept does not provide any criteria to evaluate various forms of interaction between market participants. If anything, it may even have an implicit tendency to condone the outcome of competitive processes (“survival of the fittest”), irrespective of how they have come about. Thus, it does not help in evaluating and actively shaping competitive processes, which after all is a task for economists as social scientists. Typically, the objective that economists pursue in this normative endeavor is not so much to bring about fairness among competitors, but rather to try and ensure the best possible results for customers (i.e., those entities that are non-existent in nature).

These dimensions of market competition have all been previously identified by economists, and frequently by economists working outside the mainstream. Evolutionary economics may have as much to learn about competition from these earlier economic works as from a generalized selection concept derived from biology. To be sure, the Universal Darwinism framework does not rule out the incorporation of these aspects, and it even calls for bringing specifically economic aspects under the umbrella of an overarching evolutionary framework. However, in the economic application of the framework by Hodgson and Knudsen, the specifics of market competition have hardly been addressed so far. This might be a consequence of the fact that the agenda of Universal Darwinism is still unfinished. Alternatively, it may indicate that the exclusive focus on biology compromises the capacity of evolutionary economists to analyze some relevant dimensions of the competitive process, and to give relevant advice to policy makers and the public.

In spite of this criticism, there is one important way in which the selection concept may indeed be of fundamental importance in the social realm. The emphasis on selection is helpful in highlighting that the outcome of evolutionary processes in complex social systems, including market competition, is at least in part beyond the control of the individual competing agents. In line with earlier arguments by Popper (1945) and Hayek (1973), this aspect seems to be Viktor Vanberg’s (2004) main concern, which leads him to endorse the selection concept. The non-controllability of the competitive process does not provide a compelling argument for Universal Darwinism, however. As argued above, it is not an original contribution made by Darwin, but can be found earlier in Spencer’s evolutionary philosophy. Moreover, by allowing for intentionality in variation and for the inheritance of

acquired traits, Universal Darwinism discounts this aspect of (natural) selection. Finally, the insight that in complex systems actions may have results that are quite different from the agent's intentions can also be derived from self-organization theories. Indeed, it is taken by Hayek (1967) to constitute the crucial characteristic of spontaneous orders as “results of human action but not of human design.”

5. Inheritance and the replication of routines

In addition to selection, inheritance is the second key component of the Universal Darwinist framework. In the application of the framework to economic evolution, inheritance operates through the replication of organizational routines, which are seen as the analog of the organizational genotype (Hodgson, 2003; Hodgson and Knudsen 2004a). However, there are a number of characteristics of routines that complicate the transfer of the inheritance concept to the economic context.

First, as is detailed by Hodgson and Knudsen (2004a), the replication of routines (understood as behavioral tendencies) fundamentally differs from the replication of DNA in nature. As a consequence of these differences, it seems dubious that routines satisfy the criteria for “good” replicators: longevity, fecundity and fidelity (Knudsen, 2002, p. 449). No direct copies are made of routines, but routines are argued to replicate indirectly whenever the behavior they cause is copied. Because of this indirect replication of routines, the correspondence between original and copy will often be loose. Moreover, the knowledge requirements for copying a routine suggest that in many cases it is not the routine itself is copied, i.e. the disposition for conditional behavior, but only the behavior it gives rise to. At least it will be hard for an external observer to tell the difference, because from the similarity in the expressed behavior, the similarity of the corresponding routines cannot readily be deduced.

Replication of routines is no trivial task. Again, this is readily acknowledged by Hodgson and Knudsen, and it is already – for their own notion of routines – extensively discussed in Nelson and Winter (1982, ch. 5). As routines are located above the individual level, they are dependent on a context of interaction with other organization members. Consequently, routines may be difficult to reproduce in a different context even within the same organization. Routines moreover involve tacit knowledge that is acquired by performing the routine itself and is not fully accessible consciously to the involved agents themselves. Given the inter-individual character of routines, the knowledge underlying them will be

distributed among the involved organization members, which limits their individual ability to successfully copy the routine.

Organizational routines may be replicated in a variety of processes. Specific replication mechanisms are mentioned by Hodgson and Knudsen (2004a, p. 291). They suggest that some routines are replicated through employees migrating from one firm to another. Employees leaving a firm probably will have acquired knowledge of how the firm operates in particular situations. They may take that knowledge with them and try to reproduce it in the new organization. Another mechanism of replication is based on the activities of external experts (consultants) that help in the transfer of routines from one organization to another. Finally, firms may try to imitate the routines of other firms. Since they cannot normally observe their competitors' behavior directly, learning about their routines and faithfully replicating them would seem particularly difficult in the case of imitation by competitors. Routines can also be replicated within an organization. Nelson and Winter (1982, pp. 117-21) discuss growth-induced replication in the context of establishing a new plant that is meant to be a perfect replica of an existing one. Similarly, Winter and Szulanski (2001) study the replication of routines in firms that sequentially establish large numbers of similar outlets (dubbed the 'McDonalds approach'). However, not all firm growth involves duplication processes that are so nicely divisible. Growth will often require the upscaling of existing routines, or their replacement by routines that are suitable for larger organizations, rather than the replication of the old routines.

Given the Universal Darwinists' emphasis on sequences of generations, and on variation through imperfect replication, being able to clearly demarcate generations of routines would seem desirable. However, generations of routines are frequently hard to identify. In the limit, single organizational routines may be stable for decades and longer, for example because they are directly derived from a corporate culture or formal corporate regulations that are strictly adhered to. Clearly, even such long-lived routines have to be renewed by being passed on to new firm members, and it may be argued that they change in the process. However, typically not all involved members are new to the organization, but new firm members are socialized and integrated into the existing routine. In this ongoing process of routine renewal, no clear-cut generations can be discerned. There is no natural end of one routine or an obvious beginning of another. In still other instances, routines may be too flexible to be meaningfully characterized as a replicator (the longevity requirement is violated).

The above discussion indicates that there are quite different processes and channels to transfer organizational routines to new contexts. The replication concept tends to gloss over the substantial differences between processes that range from internal renewal of an existing routine to attempts at emulating the complex marketing or product development strategy of an international competitor. Further complications arise from the heterogeneity of routines. Nelson and Winter (1982) do not develop a functional taxonomy of routines. They do distinguish, however, between three classes of routines: operating characteristics governing the firm's short-term behavior, investment rules, and higher-order procedures to modify lower-order ones. The replication of these different routine classes can also be expected to differ. Investment rules and higher-order procedures are more likely to be made explicit since they are the subject of internal deliberation processes within the firm's management, and probably are also be affected by external developments in management thought. Differences in how routines are acquired, and in the degree to which they are made explicit, also exist within the class of higher-order procedures (Zollo and Winter, 2002). Likewise, routines will differ between the different functional activities of the firm. For example, accounting routines would be expected to be much more explicit and codified than, say, routines for managing shop-floor production processes or product development. In turn, differences in the degree of codification and explicit deliberation will condition the fidelity with which the routines can be replicated. Further differentiation between kinds of routines therefore appears a crucial prerequisite for a better understanding of how they are developed and transferred within the firm and across its boundaries.

A related issue is whether or not routines are the only kind of knowledge that is transferred between firms. For example, in their discussion of imitation of routines (1982, p. 123-4), Nelson and Winter study conditions for the imitation of products and production technology. They note that the ease of imitating a competitor hinges on a number of conditions. In some cases, imitation may be feasible through reverse engineering of a competitor's product, while in other cases imitation is a much more involved activity. In spite of these differences, imitation is generally framed as a form of routine replication. Likewise, Hodgson and Knudsen (2004a) take routines as the single kind of replicator at the firm level. Reverse engineering provides a good illustration, however, why it may make sense to allow for a variety of replicators or objects of knowledge transfer. Products are difficult to subsume under the general rubric of routines, and yet product designs, as well as patent and license information, play substantial roles in the transfer of technological knowledge between firms. The mechanisms and channels of knowledge transfer via product designs clearly differ from

those of knowledge transfer via tacit organizational routines. Accordingly, an operational Universal Darwinist framework for economic evolution would have to allow for multiple replicators at the firm level. However, while Hodgson and Knudsen (2004c, p. 15) emphasize that replication operates at multiple levels, they do not entertain the possibility that multiple replicators may correspond to the *same* interactor (the firm), presumably because this has no counterpart in Darwinist evolutionary biology. This exclusive emphasis on routines as firm-level replicators may be indicative of hidden assumptions underlying their framework.

Finally, as regards the imitation of routines by competitors, another aspect of routines is noteworthy. For imitation to be relevant in competition, the routine must be related to performance. However, as has been discussed in management science, capabilities of a firm – including routines – can give rise to a competitive advantage only if they are hard to trade, imitate and substitute. Accordingly, the same characteristics that make a routine valuable to a firm also inhibit their imitation through competitors.

In summary, then, the case for Universal Darwinism in market competition and industrial evolution relies on non-observable behavioral tendencies of unspecified content that cannot necessarily be distinguished from the actual behavior they give rise to, and which are transferred through a variety of rather difficult efforts – necessarily so, because if they could easily be transferred they would be of little competitive relevance. In addition, the homology between biological inheritance and the replication of routines seems to be weak at best in many instances. Generations of routines are hard to identify, and replication can proceed across competitors rather than only within one lineage.

These criticisms are not to deny the usefulness of the routine concept as such. One major role of the routine concept, and the related notion of capabilities, is to provide a framework for discussing performance differences between firms that are based on differences in the firms' knowledge base. This leads the way to a discussion of how knowledge is transferred within and among firms. And this discussion seems a particularly promising project for evolutionary economics, particularly since orthodox economics, because of its view of knowledge as a public good, has little to say on these issues. However, instead of leaving the black box of routines closed, and at the same time placing it prominently at the center of an inheritance mechanism, it would appear more fruitful to study in detail what kinds of knowledge transfers are relevant for firm performance and via what channels they can take place. This kind of research can be pursued in a number of ways. The next section will discuss one particular line of current research that helps identify mechanisms and conditions of knowledge transfer.

6. From inheritance to descent: towards a better understanding of knowledge transfer in industrial evolution

In recent years, economists and organization theorists have accumulated a body of empirical findings on how knowledge based on pre-entry experience affects the firm's competitive performance (cf. Helfat and Lieberman, 2002, for a survey of the literature). This evidence suggests that knowledge is transferred between firms and industries. It helps answer some of the questions raised in the previous sections.

The best analog to "inheritance" of organizational characteristics is knowledge transfer through the spinoff process. Spinoffs are entrants founded by earlier employees of firms within the same industry, with or without the support of the employer (Klepper and Sleeper, 2005). It is customary to use biological metaphors in discussing spinoffs and to talk about "parent" firms and their "children". This is another indication of the attractiveness that heuristics derived from biology have for evolutionary economists, even though the processes under investigation may differ substantially from the alleged biological counterpart. Spinoffs are also suggested as an example of inheritance within the Universal Darwinist framework (Hodgson and Knudsen, 2004c, p. 2 fn. 2).

A number of studies have found that the performance of spinoffs systematically differs from that of other *de novo* entrants into the same industry, and that the performance of spinoffs is positively correlated with the quality of their parent firm (see Helfat and Lieberman, 2002, for a literature review). At the same time, the importance of spinoffs varies widely across industries. These inter-industry differences have a twofold implication. They indicate that knowledge transfer through the spinoff process is non-trivial, and they open opportunities for comparative research to identify relevant conditions and processes of this knowledge transfer.

Based on the discussion in the previous section, it is plausible to expect that spinoff founders bring with them some of the knowledge embodied in the parent firm's routines. As routines are context-dependent, spinoff founders are moreover in a better position to transfer routines than other employees migrating between firms, both because the new firm has not yet developed its own set of routines and because founders have more influence on the context than other employees. These differences should be further pronounced when several co-founders of a spinoff come from the same previous employer and share knowledge of the parent firm's routines.

At the same time, spinoffs are not just about taking routine-embodied knowledge from the old employer somewhere else to faithfully reproduce the parent firm. Fundamental

disagreements over strategy are an oft-discussed impetus for the organization of spinoffs. Indeed, there is widespread evidence of spinoffs started because employees conceived of new products or processes that their employer chose not to pursue, and the innovators left the incumbent firm to pursue their ideas on their own (SAP is a prime example).⁷ The reverse case also exists, in which the employer embarks on a new strategy, and employees leave and start spinoffs because they dislike the new strategy.⁸ Likewise, changes in top management have been shown to increase the likelihood of spinoffs, which indicates that changes in the fundamental strategy of firms may trigger the formation of spinoffs. In either case, the spinoff is based on a modification of what its parent firm does, indicating that spinoffs are no exact copies of their parent firms. While they may transfer knowledge from the parent firm, they also differ from the parent. In terms of the Universal Darwinist framework, this implies that variation and inheritance cannot be separated in the spinoff process. While variation is the exception in nature, it is apparently a key element of the spinoff process. The spinoff process accordingly lacks the fidelity of copying required by the Universal Darwinist framework.

What does the empirical work tell us about knowledge transfer in the spinoff process? First, there is systematic evidence that spinoffs have capabilities which distinguish them from other startups, and that these capabilities are indeed based on the prior experience of their founders. For example, research on the U.S. laser industry shows that spinoffs from industry incumbents on average performed better (had lower exit rates) than other kinds of entrants, including both other *de novo* entrants and diversifiers from other firms (with the exception of diversifiers with backgrounds very closely related to lasers; cf. Sleeper, 1998; Klepper and Sleeper, 2005). Two further findings support the interpretation that the superior performance of spinoffs is due to knowledge acquired in the parent firm. First, spinoffs tended to produce types of lasers similar to those made by their parents, and second, spinoff rates were positively correlated with firm performance, suggesting that employees of more successful firms could acquire more useful knowledge.

Similar patterns in other industries indicate that spinoffs benefit from their founders' experiences at previous employers. For example, as is discussed elsewhere in more detail (Buenstorf and Klepper, 2004a), spinoffs performed distinctively well in the U.S. tire industry. Based on rich empirical material compiled for the tire industry in Ohio, which was

⁷ The parent firm's failure to pursue these opportunities itself need not be pathological. As shown by Steven Klepper and Sally Sleeper (2005), it may make sense for incumbent firms not to preempt all possible opportunities for spinoff entry if by doing so they would risk cannibalizing existing product varieties.

⁸ As a historical example, consider the Swinehart Tire Company, founded by James A. Swinehart who had designed Firestone's early solid tires. When Firestone decided to change to pneumatic tires, Swinehart left and started his own firm to make the solid tires discontinued by Firestone.

the historical center of the U.S. tire industry, we were able to investigate the performance of various types of firms. Statistical survival analyses indicate that, controlling for differences in the time of entry to eliminate first-mover advantages, spinoffs had a significantly lower exit hazard than other startups. The performance of spinoffs reflected the quality of their parent firms. When distinguishing direct and indirect spinoffs⁹ of the four leading Ohio tire firms (B.F. Goodrich, Goodyear, Firestone and Diamond) from spinoffs of other tire firms, only the former performed significantly better than average, with a pronounced difference also between the leading firms' direct and indirect spinoffs. In addition, we analyzed the probability of tire firms to generate spinoffs and found that the leading firms generated more spinoffs than their lesser competitors (Buenstorf and Klepper, 2004b). These results again suggest that there was more to be learned in successful firms. Spinoffs are apparently not just organized out of frustration with the incumbent firm, but the experience accumulated while working for incumbent firms provides spinoff founders with useful knowledge.

Beyond the laser and tire industries, spinoffs were also among the most successful entrants in a diverse set of industries including autos (Klepper, 2002), semiconductors (Moore and Davis, 2004) and disk drives (Agarwal et al., 2004), suggesting that in all these industries spinoff founders had access to kinds of knowledge that were unavailable to other founders. For the U.S. disk drive industry Agarwal et al. (2004) show that, in general, more competent firms give rise to more and better spinoffs, which is line with the results on lasers and tires. The authors moreover distinguish between two types of knowledge, namely "technological" (measured by improvements in storage density) and "market pioneering" know-how (measured by whether a firm pioneered the introduction of new disk drive sizes). They find that both kinds of knowledge individually increase the likelihood of spinoffs, suggesting that (i) firms that are at the forefront of technological development offer more opportunities for spinoffs, and that (ii) the willingness of firms to introduce new products provides employees with the cognitive prerequisites for their own entrepreneurial activities. By contrast, the interaction of the two kinds of knowledge reduces the spinoff likelihood. The authors interpret this as indicating that firms strong in both dimensions may successfully prevent unintended spinoff activities, as they are both attractive employers and dangerous competition for potential founders.

How well does the replication of routines as suggested by the Universal Darwinist framework capture the learning that underlies the spinoff process? As was noted above, spinoff founders are likely to transfer some routines from their employer to their new firm,

⁹ "Indirect" spinoffs of leading firms are defined as firms founded by ex-employees of the four leading firms, but only after these employees had been with other (non-leading) tire producers for some time.

possibly without even being aware of it. At the same time, the empirical evidence suggests that technological capabilities play an important role in the spinoff process. Yet another aspect of the knowledge transfer via the spinoff process emerges from recent evidence on laser firms in the German-speaking countries (Buenstorf, 2005). Similar to the U.S. laser industry, spinoffs from incumbent laser firms outperformed other types of entrants, including academic spinoffs from university labs and public research organizations, as well as diversifying firms from other industries. However, there is one small group of non-spinoff entrants that on average performed equally well: firms that started as distributors of imported lasers and subsequently integrated into the manufacturing stage.

This finding reflects the peculiar history of the German laser industry, which had a slow start and was dominated by imports before substantial German producers emerged and were able to get a foothold in specific market segments (notably industrial lasers). Consistent with the findings of Agarwal et al. (2004), it suggests that not (only) organizational routines or technological know-how are transferred from parent to spinoff. Being more remote from the R&D and the production process of the firm whose products they sell, integrating distributors should be less able than spinoffs to absorb technological knowledge. Similarly, since the integrating distributors are not part of the organization of the manufacturing firms they represent, they are unlikely to have in-depth knowledge of the tacit operating routines from these firms. The most straightforward explanation why their performance was comparable to that of the spinoffs seems that both types of entrants are well positioned to learn about market opportunities prior to actually entering the market. Almost by definition, distributor firms are in close contact to customers and likely to learn about their needs and the corresponding opportunities. Although it is acquired within an incumbent firm, this knowledge of market opportunities is not necessarily shared by the incumbent firm itself, but may be idiosyncratic knowledge of the spinoff founder. In this case, it is not part of the incumbent's organizational routines. Consequently, learning of market opportunities is hard to reconcile with the notion of inheritance of routines.

In addition to the spinoff process, a second kind of knowledge transfer has a systematic effect on the competitive performance of firms and the evolution of industries: related diversification of pre-existing firms. In a study of U.S. producers of television sets, Klepper and Simons (2000) find that this industry was dominated by firms with pre-entry experience in radio production, particularly by the largest radio producers. Although radio producers represented a minority of all entrants, no firm without a background in radios ever captured a large market share in TVs. Radio producers entered earlier than the typical entrant,

and their rate of exit hazard was lower. Interestingly, the effect of pre-entry experience on the risk of exit persisted all through the evolution of the TV industry. This suggests that pre-entry experience could not be substituted by post-entry learning. Peter Thompson's (2005) results further corroborate the finding that pre-entry experience may have permanent rather than transitory effects on firm performance. He analyzes a 90-year panel of all U.S. steel and iron shipbuilders after 1825, combining data on the pre-entry background of the various producers with complete data on their subsequent output in ships. Thompson finds that even when controlling for capacity and current output, permanent effects of pre-entry experience in making wooden ships or engines remain significant, so that the effect of pre-entry experience cannot be explained by its effect on capacity and output alone. Successful diversification is also found in other industries, with the diversifiers typically coming from closely related industries. This suggests that similar to the spinoff process, specific technological capabilities and knowledge of market opportunities underlie the diversifiers' superior performance.

Taken together, the empirical findings on spinoffs and diversifying firms provide ample evidence that differences in pre-entry experience are systematically correlated with performance differences in industrial evolution. Entrants to an industry vary in their capabilities because there are sources of knowledge that differ in how accessible and effective they are for different kinds of entrants. In other words, the firm's descent matters – and orthodox economic theories of organizations have little to offer to account for its role. The empirical research helps identify sources of knowledge and channels of knowledge transfer in industrial evolution. It also indicates that their importance is conditioned by the specific circumstances in the respective industries, as there are pronounced inter-industry differences both in the shares of the various types of entrants and in their post-entry performance.

Unlike in biology, there is no singular, neatly defined mechanism of inheritance in industrial evolution. Knowledge flows between firms and industries via a variety of channels. In some channels, such as the spinoff process, the transfer of knowledge between firms is closely linked to its modification. In addition, pre-entry experience based on the spinoff process and on related diversification certainly is only part of the picture. Other, complementary, sources of capabilities affect the performance of firms. Most of them will be even less congenial to a characterization in terms of inheritance because they become relevant only after the firm has been organized. For example, R&D activities and learning within established firms have not even been touched upon in the present discussion. Perhaps most importantly, however, based on the empirical record it is far from obvious that all relevant knowledge can meaningfully be subsumed under the notion of organizational routines. As is

indicated by the findings on disk drive producers and German laser producers, an important element of the capabilities of spinoffs seems to relate to knowledge about customer needs and market opportunities. That diversifiers entered earlier into the TV industry than others points to a similar role of this kind of knowledge in their performance. Other relevant knowledge is related to technological capabilities, which may or may not be suitably interpreted in terms of routines.

For all these reasons, the notion of inheritance of routines, as part of a Universal Darwinist framework, appears too narrow to be fruitful as a framework for studying knowledge transfer in industrial evolution. However, as long as we understand evolutionary economics as a body of causal theories on how products, firms and industries change over time and how the present evolved from the past, there is no reason why these differences between evolution in nature and evolution in industries should worry us. They rather seem to indicate that – not unlike biologists did in the past – evolutionary economists have to develop their own “paleontological” record to trace the origins of firms and industries, and to identify how exactly descent, in combination with other factors, affects the performance of firms and thus the evolution of industries. This will require detailed theories on how particular kinds of knowledge are acquired and transferred to new contexts, and under what conditions they are relevant for firm performance.

7. Conclusions

This paper started by trying to pin down the distinctive features of the Universal Darwinist framework proposed by Geoffrey Hodgson and Thorbjørn Knudsen: selection based on a replicator—interactor distinction, and the notion of inheritance as replication. I have then outlined some skepticism about the usefulness of this framework in guiding research into market competition and industrial evolution. Finally, some recent empirical findings on how pre-entry experience affects the competitive performance of firms have been sketched. While there is strong evidence that the background of firms and their founders conditions their competitive performance, the observable effects and the underlying mechanisms of learning and knowledge transfer are too diverse for general concepts such as replication or inheritance to be useful. Instead, these findings can be interpreted more broadly as indicating that descent does affect performance, and can provide a starting point for understanding *how* it does.

Darwinist heuristics have provided inspiring insights to evolutionary economists, thus enabling them to approach economic phenomena in innovative ways. Darwin’s own

inspiration by political economy illustrates the power of this kind of interdisciplinary interaction. Darwinist metaphors can moreover be powerful rhetorical devices. And also the discussion of Universal Darwinism can be a stimulating intellectual exercise of exploring abstract parallels between evolutionary processes in various realms, which may help evolutionary economics in its quest for a unified analytical framework. The concern with Universal Darwinism expressed in this paper is that the attempt of fitting evolutionary theorizing in economics into a framework too close to evolutionary biology risks losing sight of important aspects of economic processes. Moreover, it may induce us to accept overly stylized and potentially non-falsifiable concepts that give new labels to economic phenomena or redefine existing concepts, but do not further our understanding of them. This hazard may be present in the routine and inheritance concepts proposed as parts of the Universal Darwinism framework. The need for redefining existing concepts like routines moreover indicates a fundamental problem with Universal Darwinism. If it really provides an overarching, domain-unspecific framework, then it should be able to accommodate the existing theories and concepts of evolutionary economics without modifying them.

As an alternative to the ‘top-down’ approach of imposing an abstract framework on evolutionary economics, a ‘bottom-up’ approach has been proposed that starts from empirical efforts to identify the detailed processes underlying the acquisition and transfer of knowledge within and across real-world organizations. This kind of research is already under way, even though it is only pursued in part by researchers within the evolutionary economics community. Pursuing this alternative approach would also be in line with another Darwinist legacy that is under-emphasized in evolutionary economics. One striking difference between Charles Darwin and earlier evolutionary theorists was the way he developed his theories. Darwin was an empiricist who did not start from abstract philosophical principles but from the evidence he confronted. Biology has since been an empirical science, and this is one of the cornerstones of its tremendous success in the 20th century. Perhaps evolutionary economics would be well served by being more “Darwinist” in this specific sense.

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