1 Economics from an Evolutionary Perspective

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1.1 WHAT IS THIS BOOK ABOUT?

This book is about modern evolutionary economics. It is designed for economists and other social scientists who want to become more familiar with this body of research and writing, and provides an overview of the field, its theoretical orientation, and the empirical findings it has achieved.[1] It brings together several different strands of work in evolutionary economics that have been developing relatively independently and displays the broad perspective on how modern economies work and evolve that together they bring into view.[2] And as evolutionary economics is a work in progress, it considers where the field seems to be going.

The term "evolutionary economics" has been used to denote a wide range of economic research and writing.[3] This book focuses on work aimed to illuminate empirical economic phenomena oriented theoretically by the proposition that the phenomena being studied have evolved, in a sense that will be laid out in what follows. While

[1] A strong background in economics is not required. However, a basic familiarity with the field would be very helpful to the reader, if not indispensable. A large share of the topics treated and concepts employed by evolutionary economists are traditional in economics, and readers will be assumed to have at least a rough understanding of these. And the significant differences between evolutionary and neoclassical economics will stand out more clearly for readers with a familiarity with the latter.

[2] We note that much of the work in evolutionary economics has been done by economists who have their home outside of standard economics departments, particularly in business schools and in programs focused on science and technology policy. Much of it has been published in journals outside of the economics mainline, we note in particular the *Journal of Evolutionary Economics*, *Industrial and Corporate Change*, and *Research Policy*.

[3] Here are a limited set of references to a vast literature: Veblen, 1898; Nelson and Winter, 1982; Hodgson, 1993; Metcalfe, 1998; Dopfer, 2005; Dosi, 2014; Winter, 2014; Malerba et al., 2016.

formal evolutionary modeling has played a significant role in developing and sharpening that perspective, the focus here is not on formal models but rather on the broad perspective on economic activity that they have helped to shape.[4] And, to keep reasonable constraint on the subject matter we will explore, while evolutionary economists clearly have a kinship with the broader body of evolutionary social science research and writing, we do not consider that extensive literature in any detail.[5]

This book is tightly focused this way because we, the authors, believe that the value of a broad theoretical perspective, such as that of evolutionary economics, should be judged in terms of the strength and quality of the understanding of empirical phenomena and the illumination of policy questions provided by research oriented by that perspective. We believe that the research done over the last thirty years oriented by evolutionary economic theory has amply demonstrated the value of that theory, and we want to increase the number of scholars who appreciate that.

This introductory chapter lays out the broad orientation taken by evolutionary economists and the questions they regard as central. The following chapters will describe in more depth the evolutionary perspective on fields of empirical study where evolutionary economists have been particularly active, and show the kind of picture of how economies work and change that they provide when they are put together. The concluding chapter considers the evolution of evolutionary economics.

1.2 CAPITALISM AS A DYNAMIC EVOLVING SYSTEM

At the root of the difference between evolutionary economics and economics of the sort presented in today's standard textbooks is the conviction of evolutionary economists that continuing change,

[4] The formal modeling of evolutionary economists is scattered and varied in style; for a sampling see Nelson and Winter, 1982; Metcalfe, 1998; Dosi, 2014; Malerba et al., 2016. For a survey of evolutionary game theory, see Weibull (1995).

[5] For a broad recent review, see Alex Mesoudi's *Cultural Evolution* (2011).

largely driven by innovation, is a central characteristic of modern capitalist economies, and that this fact ought to be built into the core of basic economic theory. Economies are always changing, new elements are always being introduced and old ones disappearing. Of course economic activities and economic sectors differ in the pace and character of change. In many parts of the economy innovation is rapid and continuing, and the context for economic action taking is almost always shifting and providing new opportunities and challenges. And while in some activities and sectors the rate of innovation is more limited, attempts at doing something new are going on almost everywhere in the economy, and so too change that can make obsolete old ways of doing things. Neoclassical theory, which is a significant influence on how most professionally trained economists think,[6] represses this.

With our central interest in innovation and the economic conditions continuing innovation generates, evolutionary economists are Schumpeterian, and as Schumpeter does we highlight the amazing, if uneven, economic progress that capitalism has engendered. Economies at the economic frontier today support a standard of living that would have been almost unthinkable two centuries ago, when capitalist economies were just emerging. For evolutionary economists perhaps the most challenging and important economic questions that need to be addressed are: How did the economic progress we have achieved come about? What can be done to enable those societies that to date have not shared in economic progress to do better? And what kind of progress can we expect in the future, and how can we influence the paths taken?[7]

[6] We recognize that many empirically oriented economists do their research and write it up under very little explicit influence of neoclassical theory. But we would argue that even in these cases the implicit influence can be significant. More on this shortly.

[7] Evolutionary economists also are much concerned with the "creative destruction" associated with innovation-driven economic development, and the fact that often the benefits or economic growth are not widely shared.

In having these questions at the center of their attention, modern evolutionary economists are returning to the perspective on the workings of market economies laid out long ago by Adam Smith,[8] and later Karl Marx, and more recently of course by Joseph Schumpeter. Long run economic development certainly is treated in today's standard economic textbooks, and technological innovation is recognized as the key driving source. However, this subject matter is presented as a special topic, rather than at the heart of economic description and analysis.

Evolutionary economists would argue that analysis of what goes on in the economy at any time cannot be separated from, but must involve in an integral way, explicit recognition of the dynamic processes involved in ongoing innovation-driven economic change. The core assumptions of neoclassical theory make it very difficult to do this.[9]

There is, first of all, the need to recognize the importance and nature of innovation. Innovation is an activity involving a vision of something that has not existed before and beliefs about its potential value. Inventors and innovators may draw as best they can from what is known empirically about what is and is not likely to succeed. But the imagination and sophistication guiding the effort, and luck, are at least as important in determining what paths are explored and the innovations that actually emerge. These aspects of what innovators see and believe, and don't see, do not fit in very well with a theoretical presumption that economic actors somehow know the best course of action for them.

And in a world of innovation-driven change, not just the innovators, but also many economic actors who would prefer to keep

[8] Recall that Smith begins his great book by describing innovation and productivity growth in pin making. His central interest clearly is in economic development.

[9] As we noted, many empirically oriented economists get around this problem basically by ignoring the canons of neoclassical theory in their empirical work and writing. Thus discussion of what is involved in industrial competition may well stress Schumpeter. But when the analysis is linked to formal theorizing, the emphasis is on how competition affects industry output and prices in equilibrium.

on doing what they have been doing often can't because the context they are in has changed, and therefore must take the actions they employ on the basis of limited relevant experience. Again, a theory that presumes that actors have a strong understanding of the context they are in and of appropriate actions to take would seem not to recognize important aspects of what is going on in many contexts.

Similarly, evolutionary economists see an inclination to presume that economic activity tends to be in or close to an equilibrium configuration as a hindrance for analyzing contexts in which innovation is going on, with a variety of new ways of doing things actively competing with each other and with prevailing practice. Some will be winners, and some losers, but the race must be understood as ongoing rather than already finished.

On the other hand, the nature of the economic dynamics we have been describing is readily interpretable as an evolutionary process. This certainly is not a new idea. Over a century ago Thorstein Veblen (1898) asked "Why Is Economics Not an Evolutionary Science?" While Alfred Marshall[10] generally is associated with the rise of neoclassical economics, in a famous statement he proposed that "The Mecca of the economist lies in economic biology …" And Schumpeter (1950) argued that "in dealing with capitalism we are dealing with an evolutionary process." Thus many economists long have believed that the process through which economic change occurs has important aspects similar to those involved in biological evolution; this is why we and our forebears have used the term "evolutionary" to denote our theoretical orientation.

Later in this chapter we will discuss the aspects of economic evolution, and the similarities and differences from evolution in biology, in more detail. However, here we want to highlight the following essential features.

First, when we call the process of economic change evolutionary we do not mean to deny, or play down, the purpose, thought,

[10] The quote is from the eighth edition of Marshall's *Principles*, published in 1920.

and often the considerable sophistication that lies behind much of economic action taking. Rather, we use the term to highlight the incomplete character of human understanding even in contexts that are illuminated by a strong science, and the consequent uncertainties that surround important parts of economic activity, and which are always present when new things are being created and tried out. The outcomes of trying new things almost always differ, in some cases radically, from what the inventor or innovator had in mind. How things actually work only can be learned in actual practice, and even then reliable learning about the efficacy of new ways of doing things can be slow.

This characterization clearly fits efforts at significant innovation. But it also fits efforts by economic actors to respond to changes in the economic environment in which they operate, even if the appropriate new behaviors do not require any sophisticated action once they are found. Thus the responses of retail stores to changes in population density or location almost always involve considerable trial and error learning, and failures.

As a consequence, in any field of economic activity where innovation is under way, and we argued earlier that in modern economies no field is completely static, there is bound to be a variety of different ways of doing things employed by different actors. At the same time some of these practices, generally but not always ones that are relatively superior in some sense, are expanding in their relative importance, and others, generally relatively ineffective ones, are declining. And as this goes on new modes of operation may enter the picture. This is very much the way traits evolve in biology.

In many cases an important aspect of the selection processes going on in economic evolution is expansion of actors doing relatively well and the decline and possible disappearance of those doing poorly.[11] However, while there are exceptions, most empirical

[11] This statement is relevant to practices employed by firms in competition with each other. It has much less relevance to household practices.

studies of change in an arena of economic activity find that the principal mechanism through which a new and better practice takes over a large share of the action is adoption by increasing numbers of economic actors. As highlighted above, a principal difference between economic evolution and biological evolution is that economic actors generally are able to choose what they are doing and how they are doing it, and have the capability to learn not only from their own experience but from available information about alternatives. But this is a long way from proposing that economic actors "optimize."

This perspective on the process of economic change molds not only how evolutionary economists see economic dynamics, but also how they understand what is going on in the economy at any time: the prevailing allocation of resources across activities firms and industries, the technologies and business practices in use, the present quantities of production and consumption of different goods and services, their prices and the prices of the different factors of production, the current structure of industry, etc. We evolutionary economists see these features of economic activity not as an equilibrium configuration with all participants doing the best they can, but as more or less transient phenomena being generated by a path dependent evolutionary process.

Thus the considerable variation at any time in the productivity and profitability of firms within the same industry that is widely observed in market economies is something that evolutionary economists expect, while neoclassical economists have a difficult time explaining it. More generally, evolutionary economists would predict that at any time a number of firms (and households) are making decisions, doing things, that are poorly conceived and for that or other reasons will not turn out well for them. At the same time learning from experience and, for firms, competitive selection will have led to much of prevailing economic behavior being reasonably competent, given the range of practices that are available at that time, and in some cases remarkably effective.

Evolutionary economists of course are interested in what is relatively constant in an economy, as well as the processes of change. However, given their presumption of continuing change, we look for constancies in variables and relationships that tend to hold up in a dynamic economy, and which reflect the nature of the processes driving change. Thus evolutionary economists see the forces of dynamic competition in an economy as generally preventing average rates of profit in an industry from having a strong persistent drift in one direction or another. And while they would expect the prices of different goods and services to be continuingly changing, in many contexts they would expect the ratios of prices to costs to remain relatively constant over relatively long periods of time. On the other hand, evolutionary economists also see drastic breaks from paths that had been relatively stable as an important feature of the creative destruction involved in economic progress.

In short, evolutionary economics puts forth a very different view of what is going on in an economy than that laid out in today's more standard economics. That view highlights continuing change, much of that connected with processes that in the long run generate economic progress, and at the same time requires many economic actors to cope with new conditions. It sees the configuration of economic activity at any time as the current result of an evolutionary process whose workings over time have generated a variety of different behaviors which vary in effectiveness, which have been winnowed but not completely (among other reasons because of the continuing innovation going on). Evolutionary economists believe that this orientation provides a much better basis for understanding how modern capitalist economies work.

1.3 NARROWING THE DISTANCE BETWEEN ECONOMIC THEORIZING AND WHAT ECONOMISTS ACTUALLY BELIEVE

There is good reason to believe that a significant number of empirically oriented economists, who may present a neoclassical theory of

economic activity when they are teaching theory or writing a theoretical article, in fact harbor an implicit evolutionary perspective regarding much of what is going on in the economic world. This is reflected in their writings and other presentations for general audiences regarding such matters as the nature and economic significance of competition in high tech industries, their identification of creative innovation as the key driving source of economic growth, arguments about the need for capital markets to finance the birth and growth of new entrepreneurial firms, and about the importance of flexible labor markets for coping with an economic context where the location and nature of jobs and the needed skills are constantly changing. And the top economic journals often are open to empirical research reports framed implicitly by a dynamic evolutionary point of view.

Evolutionary economists obviously see these developments in a very positive light. However, rather than regarding them as indicating that there is little need to push further, we believe they increase the importance of getting an explicit evolutionary perspective on economic activity better known and entertained more widely.

It is important to recognize that theorizing in economics is of several different kinds and involves different levels of abstraction and generality. Some of it is very general and abstract, providing a broad conception of what shapes what goes on in market economies and how they work. When economists employ the term "neoclassical theory" they tend to mean such a broad perspective on economics, and when we use the term "evolutionary economics" here we are denoting a similarly general and abstract theory of economic activity. At the present time neoclassical theory holds a near monopoly on conceptualizations at a general level of what economic activity and structure are about that professional economists know and teach. Evolutionary economists aim to break that monopoly.

Of course much of economic theorizing is focused not on an abstract view of economic activity in general but on particular sets of phenomena or economic questions. It is concerned with such

matters as how labor markets work, how particular prices are determined, the determinants of the overall rate of inflation, the patterns of international trade, etc. A good portion of theorizing at this level is quite formal, often laid out mathematically. Economists often refer to formal theories at this more limited level of generalization as "models." While formal models have their own particular orientations, those that today are widely known by economists tend to have a general perspective that, not surprisingly, is broadly consistent with the broader conceptions of neoclassical theory. On the other hand, while their work may not be familiar to most economists, evolutionary economists also have been active in formal modeling.

However, what we want to highlight here is that much of the effort by economists to understand what is going on in the economy is abstract to a much more limited degree than the general theoretical orientations and the formal models we have referred to above. Rather, it is quite close to the empirical subject matter it is concerned with, and is the result of economists knowledgeable about that subject matter trying to identify the gist of the forces at work. It is to a considerable extent inductive in nature, and is less logically fleshed out than general theories and formal models. Nelson and Winter (1982) have called this kind of theorizing "appreciative" as contrasted with "formal" theorizing.

Virtually all appreciative theory is expressed verbally, and takes advantage of the richness of natural language, and its ability to describe qualitative as well as quantitative detail. But the cost of this is that it is much more difficult to check on the logical coherency of a complex verbally expressed theory than one that is sharper and articulated more formally, and the ability to explore and deduce implications is much more limited. On the other hand, the ability of formal theory to incorporate details that the analyst believes are important, particularly if these cannot be characterized quantitatively, is much more constrained.

Nelson and Winter (1982) argue that, if they are oriented the same way, appreciative and formal theorizing should be understood