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Common Ground for Institutional Economics and Systems Dynamics Modeling

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In 1898 Thorstein Veblen asked, “Why is Economics not an Evolutionary Science?” (Veblen 1898). Veblen sketched out the changes in habits of thought from primitive animistic views of hunting and gathering and small agrarian societies to the prevailing view of his time of a natural order inspired by the work of Isaac Newton. His argument was that most sciences were moving beyond the view of a Newtonian natural order and adopting the more recent evolutionary view inspired by the findings of Darwin. In his opinion economists needed to adopt the latter view if they were to be considered modern in approach to scholarly inquiry. In this presentation, I will outline the major differences between these two views of economic society and suggest what the implications are for modeling economic behavior.

My purpose in this presentation is to suggest that practitioners of systems dynamics and institutional economists share some common ground regarding the structure of the economy and the processes of change emanating from that structural order. I believe that both groups endorse the Darwinian view[1] of cumulative change over the Newtonian view, though their methods of inquiry are substantially different. We should not let our methods separate us, but instead we should learn from each other. Thus, I hope this presentation will spark an interest in continuing a dialog between our two groups. It is obvious that this audience knows more about systems dynamics than I do, so I will concentrate on the view of economic evolution held by institutional economists.[2] Moreover, I will concentrate on the foundations of institutional economics rather than recent extensions and applications. A more bare-bones discussion will highlight the possibilities and difficulties in applying systems dynamics simulations to institutional questions.

I will begin by describing the characteristics of Newtonian order and what this implies for change. This is done to provide a contrast in the next section to an evolving system. In this contrast, I want to stress that the nature of the order assumed by the theorist will dictate the processes of change. Finally, I will raise some challenges, as I see them, in formally modeling economic systems driven by cumulative change.

Newtonian Order and Change

By the eighteenth century the powerful and important work of Isaac Newton in physics and mathematics had captured the imaginations of intellectuals in many fields ranging from theology, philosophy, and politics to create a worldview of physical order and change. This worldview was the foundation of the enlightenment where divine order and law was replaced by natural order and law (Becker 1932 and Randall 1940). The physical universe, and by extension, the social universe, was a clockwork where change within the mechanism was continuous but the structure remained unchanged and unchangeable. Of the social sciences, this view was most firmly embedded in economics and remains so today (Randall 1940, 271 and Veblen 1898, 374). In fact, Hans Lind has recently argued that any school of economics that does not employ this view has no discernable method (Lind 1993).[3]

It is critical that we understand the perceived framework of order as we engage in a discussion of the theory of change. Without an understandable order, change would be random and scientists would not be able to explain the changes we observe. Change must emanate from some order for a credible scientific discipline to be possible. Classical and institutional economists assume different causes of the order of economic systems, and this is a fundamental difference between the two schools. David Hamilton, writing fifty-five years after Veblen's provocative essay, argued that one of the major differences between the two schools was their conception of change (Hamilton 1970). Hamilton was correct to point out the importance of the differences in the theories of change, but he had to explain the differences in their theories of economic order to accomplish his argument.

Hamilton noted that many institutional economists thought that classical economists[4] had no theory of change, but he disputed that notion. His argument was that their theory of change was derived from their belief in natural law. He drew on the work of Carl Becker to show how the worldview of natural law had evolved from divine law. In medieval times the worldview was that God had created the natural and social order and that church scholars had to be consulted to understand the operation and purpose of the system. The spread of Newtonian ideas led scholars to replace God with nature and Divine law with natural law. But this was not as revolutionary as was first supposed because "…the disciples of the Newtonian philosophy had not ceased to worship. They had only given another form and a new name to the object of worship: having denatured God, they deified nature" (Becker 1932, 63, quoted in Hamilton 1970, 21).

What does this mean for explaining economic order and economic change? It means that a perfect system structure was in place and change could only occur within that structure because the structure was natural and not man-made and, therefore, beyond the power of man to change. According to Hamilton, "To men of the eighteenth century the social universe, like the heavens, was made up of individually suspended bodies, an orderly relationship among them assured by natural forces. For Newton's law of gravitation the eighteenth-century social philosopher used 'self-interest.' Each individual by exercising his 'natural right' to seek his own self-interest untrammeled by disturbing elements would simply be promoting the social good as well as his own welfare" (Hamilton 1970, 21-22). Therefore, this state of natural harmony can only be disturbed by exogenous forces but a harmonious equilibrium would be re-established rather quickly.

The individual in the classical system was a passive being, responding only to stimuli to avoid pain and pursue pleasure. As Veblen said, "Spiritually, the hedonistic man is not a prime mover. He is not the seat of a process of living, except that he is subject to a series of permutations enforced upon him by circumstances external and alien to him" (Veblen 1898, 390). Being passive, and not a prime mover, means that man is not the source of action that can lead to cumulative change of the system.

This stable structure allows one to describe the essential nature of the economy mathematically, and calculus was devised to map out such systems. These models assume a set of linear relationships based on immutable laws that depict only negative feedback loops. Nevertheless this approach has powerful appeal. According to Lind, "the role of analysis of a mathematically described model economy is to establish with *certainty* the existence of specific relationships" (Lind 1993, 9; emphasis in the original). It is possible to establish with certainty specific relationships in a closed, non-evolving system, especially if the individuals in the system are passive elements.

Lind's statement of the purpose of mathematical models is one reason for the disdain institutional economists hold for such models. However, it is not the attempt to model the economy mathematically that is the problem. The disagreement arises from depicting the economy as a clockwork where change is mechanistic and repetitive. Mathematical models are simply tools to help us search for and identify patterns, and pattern identification is essential for the success of any scientific discipline. However, math should not be used to simply confirm some assumed natural order. As Steve Keen said, "properly used mathematical reasoning debunks unsound economics" (Keen 2001, 268).

So if math is not the problem, then what is the problem? In my opinion the problem is that the dominant classical school of economics is built on unsound assumptions of a deified natural order, and deification discourages questioning the essential assumptions. There are competing views of economics to this school but the dominant view is in a position to disallow competing views (Yonay 1998, 75-76).

Institutional Order and Cumulative Change

A competing view is offered by institutional economics. Rather than the economy being a natural, unchangeable structure, the economic system is shaped by human institutions. Institutions are human created means to correlate behavior and interaction between individuals. They are artificial rather than natural. Institutional economists understand that order is necessary to carry on production but nature does not provide that structure. Some institutions are formal, such as law and government; others are informal, such as norms and customs. However, these are not totally separate as courts often adapt and adopt customs as legal rules. John R. Commons gave the following definition of an institution that relates individuals to institutions. He wrote, "…an institution is collective action in control, liberation, and expansion of individual action" (Commons 1970, 21).

Notice that the individual is liberated and his power is expanded by institutions that also control him. How can that be? Control of one person's action liberates another with respect to that action, or one person's liberty places a duty on others to respect that right. Rights create corresponding duties; otherwise the right would be hollow. Also, individuals are constrained by institutions, but the power to act is expanded relative to their power as an isolated individual. This is not the inert individual of the natural order because, in part, individuals derive power from institutions.

This definition of the institutional order has important implications for the role of the individual and the process of change in and of the system. Therefore, this conception of institutions and individuals has also enormous implications for modeling economic behavior. Individuals are affected by institutions but they are also *acting* within these rules of behavior established by institutions. In contrast, the individual in classical theory is simply choosing from *given* alternatives. He is a passive individual only responding to stimuli from the environment with no power to change that environment because it is a natural order and he is simply an atom in that order.

Both Commons and Veblen attributed the importance of the passive mind of the individual to the adoption of hedonistic psychology as a foundation of individual behavior in classical economics (Commons 1961, 140-157 and Veblen 1898, 389-390). Both men called for a more modern psychology to explain individual action within the institutional structure and to explain how this action could lead to cumulative change in the structure. Commons wrote that we need to understand the "…active concept of the mind constructing its own tools of law, cause and effect, necessity, and so on. If the mind is passive it perceives no relations between its 'perishing sensations.' But if the mind is active, then it actually creates its own relationship between parts and the whole of perishing sensations" (Commons 1961, 149). This is similar to Peter Senge's more recent observation of the power of mental models (Senge 1990, 174-204). Similarly Veblen observed that all classical economists adopted the position that "…the human material with which the inquiry is concerned is conceived in hedonistic terms; that is to say, in terns of a passive and substantially inert and immutably given human nature. The psychological and anthropological preconceptions of the economists have been those which were accepted by social sciences some generations ago" (Veblen 1898, 389). Veblen's point was that these preconceptions were out of date.

The question before us, is how to model behavior that is shaped by an active mind? In addition, we should be aware that all minds are not necessarily working in the same direction because different individuals will be driven to act by different perceptions and purposes. In short, this is not a system of natural harmony. Conflict is normal, and the trick is to learn how to create mutuality so that the going concern can be kept going. This is the task of organizations ranging from families to firms to governments. Dysfunctional families, bankrupt firms, and revolutionary governments have not mastered this proposition. It is one thing to preserve and model natural harmony; it is quite another to model artificial going concerns.

Before proceeding with the discussion of the active mind and purposeful action, we need to remember that for the institutional economist humans are shaped by their culture rather than being an isolated individual in a state of nature. According to Commons, "Collective action is the general and dominating fact of social life. Humans are born into a process of collective action and become individualized by collective action" (Commons 1970, 21). This individual's behavior is more difficult to model for several reasons. He is born into a going society with established norms, customs, or more generally, a distinctive culture. This individual is responding to his situation as a socio-cultural individual rather than a hedonistic atom in a stable molecule (Jensen 1987, 1069). Second, the individual may be acting with a purpose greater than immediate self-gratification. He may be acting to further family or civic goals. Or he may be acting simply from habit. We may assume that any of these actions will maximize the individual's utility, but that is circular reasoning. Third, an individual will often act with volition to change the rules of collective action. However, others may be acting to resist such change, or acting to change the institutional structure to suit their purpose. Finally, there are mutual interdependencies between institutions, which means that altering one institution can have negative consequences for other important and effective institutions

(Foster 1981, 933-34). In other words, there will losers as well as winners in the process of institutional adjustment rather than an outcome of natural harmony.

This concept of volition is fundamental to understanding the relation of collective action to economic evolution. Volition is not about the ability to choose among given alternatives. It is about acting on expectations to create new alternatives and this can have positive and negative consequences beyond the actor. Volition is about acting on expectations to expand or limit production and acting on expectations is uncertain. In a capitalist economy one must have legal control before production can occur and legal control provides some security of expectations. For example, it would be impossible to rely on a supply or demand curve in the absence of collectively sanctioned rights. Here we see people objecting to the constraints of rules but requiring new rules to reduce uncertainty for themselves.

Commons called this process of acting on expectations futurity, and it reverses cause and effect in regard to time. This relation of time and causation is so important for modeling that I will quote Commons at length.

"Production and consumption cannot be carried on without first obtaining legal control. Possibly this changes the idea of causation. It places causation in the future instead of the past, where it was placed by the labor theories of value of the classical and communistic economists; or instead of in the present sensations of pain and pleasure of production and consumption of hedonic economists since the time of Bentham. It becomes a *volitional* theory of future consequences of present negotiations and transfers of legal control, determining whether production shall go or slow, or stop, or determining the extent to which future consumption will be expanded or contracted or pauperized" (Commons 1961, 7).

This time sequence of cause and effect is the crucial step in understanding the process of cumulative change in an institutional order. The individual is acting, not simply choosing, in an uncertain environment to attempt to create a new future path among many possible paths. However, the individual is acting within his present culture and material circumstances. His action is necessarily another possible step in an ongoing process. As Newton and Darwin were men of their times, they also created new habits of thought or worldviews. Would system dynamic modeling be possible without the ideas of Darwin or the material invention of the computer? I don't think so.

Perhaps the coupling of Commons' concept of futurity, or the time sequence of cause and effect, with dynamic modeling could provide some concrete substance to Veblen's description of the necessary elements of an evolutionary economic theory. Veblen explained how economists would have to frame the individual and the community in order to develop an evolutionary theory of the economy. Veblen said that individuals "…are the products of his past experience, cumulatively wrought out under a given body of traditions, conventionalities, and material circumstances; and they afford the point of departure for the next step in the process" (Veblen 1898, 390-91). For the community he said, "All economic change is a change in the economic community, - a change in the community's methods of turning material things to account. The change is always in the last resort a change in habits of thought. This is true even of changes in the mechanical processes of industry" (Veblen 1898, 391).

Connecting Institutional Economics and Systems Dynamics Modeling

Both institutional economics and systems dynamics modeling are pattern modeling processes (Radzicki 2003, 151). Institutional economics tends to use a more qualitative methodology, using mostly descriptive statistics when quantification is necessary and possible. Both groups attempt to explain the structure of a system and how the system can evolve due to endogenous forces. They first construct the order, using mental models, of the system under investigation. This is what Commons meant when he said "…the active concept of the mind constructing its own tools of law, cause and effect, necessity, and so on" (Commons 1961, 149). Systems dynamics modelers take this a step further and describe dynamics of these relations with mathematically constructed models that can be visually simulated by computers. As I understand it, these are still group mental models that can mimic the behavior of real systems (Radzicki 2003, 151). An advantage of the models is the visual quality of the product. The audience can *see* when a feedback loop turns from positive to negative, or what difference a change in an assumption or a parameter makes in terms of the evolution of the system. The model will show the audience where the path they are on will likely lead them, and what they might do to alter the path toward a more desirable destination.

A fundamental similarity of the two groups of researchers is that actors are purposefully pursuing ends, but they are caught up in the structure of the system as well. The behavior of actors is not passive, but they are not free agents either. Arguably one of the most important contributions of institutional economics is the concept of futurity that expresses the time sequence of cause and effect as cause in the future and effect in the present. Acting on expectations is necessarily uncertain. This destroys Lind's notion that economic theory can establish specific relationships with certainty. Patterns of urban growth or the evolution of industries can be depicted, but there is novelty in each city or industry. Also, actions can be taken to alter evolution of these institutions because they are not part of the natural order.

The evolution of a system can be examined by proposing a formal change in a set of rules governing the system such as a policy, a law, a treaty, etc. It would be possible to predict a probable sequence of changes in relations of the elements of the system structure induced by the legislation. On the other hand, one could begin by historically modeling a series of small, unplanned steps that cumulatively lead to a transformation of the system. In this case, one wouldn't predict a path. Instead, the task would be to explain the actual path created by this historical chain of events. One might then be able use this as a generic model to help explain other similar processes.

In conclusion I suggest that institutional economists and systems dynamics modelers could collaborate on modeling the explanation of the evolution of the shoemaking industry from 1650 to 1895 as described by John R. Commons (Commons 1909). He explains how the interstate commerce clause of the U. S. Constitution had unintended effects, through the widening of the market, on the production of commodities such as shoes. Some of the consequences were a transformation of owner – worker relations, and customer – producer relations, the definition of property, our conception of money and it introduced the problem of managing stocks of inventories in manufacturing industries. This constitutional provision led to the gradual transformation of handicraft production techniques to the creation of the factory system.

There would be two purposes to such an exercise. First, it would help us understand to what extent our theories are similar even though our methods differ. Second, this would not be a project limited to a single period in history. For example, the same model might be used to explain the deflationary period of the last years of the nineteenth century when the expansion of the railroad system led to a substantial widening of the market. Of more importance, I would like to see if the model could be used to mimic the widening of the market in this era of globalization.

NOTES

[1] The term Darwinian view does not necessarily imply an exact application of biology to economics. Darwin's findings affected the infant discipline of anthropology that, in turn, affected the founders of institutional economics. See Radzicki 1994, 49 and Veblen 1898, 373, 390, and 394.

[2] As you read the institutional economics literature, you will find several points of emphasis are in dispute. However, you will find that all in the field holds the basic notion of cumulative change of economic institutions by endogenous forces. See Radzicki 1994 and 2003 for a more complete discussion of the similarities between systems dynamics and institutional economics.

[3] See Atkinson and Oleson 1996 for a rebuttal of this argument.

[4] Hamilton did not distinguish between classical and neoclassical economics in terms of concepts of change. Both groups held that only one institutional structure was consistent with the natural order. Hence, he used the term, classical, to capture this view.

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