

New institutionalism, old institutionalism, and distribution theory.

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To theorize about observed reality, one must abstract. This process of abstraction requires making leaps of faith about the nature of the observed interrelationships in that reality. These leaps of faith become embodied in implicit and explicit assumptions that become part of one's world view. It was differing views on the appropriate leap of faith that led to the parting of company of institutionalist and neoclassical economists in the early 1900s.

Is the Economy Complex or Simple?

Institutionalists saw the economy as complex, evolving, and full of novelty; it was the equivalent of a living being. Neoclassicals saw the economy as a mechanistic economy that followed simple laws. Consistent with their world view, neoclassical economists made a leap of faith that the underlying interrelationships in the economy could be expressed in simple functional forms, and that the underlying economic system was interconnected in a way that could be represented by an analytically solvable system of equations. Institutional economists made a different leap of faith; they assumed the underlying interrelationships were too complex to be represented by simple solvable equations.

To distinguish the two world views, it is helpful to consider two modeling problems. One is to design a model of dripping water. The other is to design a model of the path of a comet. Even though modeling the path of a comet is a much grander problem (in the cosmic sense), modeling it is, by far, the easier of the two. The reason is that, relative to the degree of accuracy generally desired, the appropriate functional relationship involved in mathematically capturing the comet's movement is expressible in relatively simple functional forms that are solvable using simple calculus. Modeling the comet's path does not involve higher order differential or functional interrelationships, which would make it a much more complicated problem.

The mathematics relevant to modeling dripping water are much more complicated. True, water dripping is subject to the same physical laws as the comet's path, but, to discuss the drip at the level of accuracy that is generally desired (e.g., it will drip in .00001 seconds), frictions must be considered formally. Incorporating these frictions into the model requires a much more complicated mathematics involving higher order differential interrelationships and a resulting complex nonlinear dynamics.

Institutionalists saw the problem of modeling the economy as the equivalent of modeling dripping water; neoclassicals saw the problem of modeling the economy as the equivalent of modeling the path of a comet. Their respective research programs reflected that view. Neoclassical economists searched for a general theory and set out on a research program of developing a formal theory of the economy embodied in a set of equations and laws about those equations. Institutionalists pursued a more varied and less formal research agenda. Thorstein Veblen and his followers poked fun at neoclassical theory and

worked on structuring a non-formal general theory that could take some of the complexities into account. John Commons and his followers worked on studying existing institutions and on developing real-world policies; they concentrated on empirical specification of observable phenomena and on concrete policy problems. W. C. Mitchell and his followers worked on establishing an empirical description of the complex economy. No institutionalist school worked on setting up a formal grand theory.

Wesley Claire Mitchell, in a letter to J. M. Clark, nicely explains institutionalists' reasons for not working on a formal grand theory. In explaining why he could not take neoclassical theory seriously, he compares the grand theorist to a great-aunt with whom he argued when he was young. In arguing with that great-aunt, who "was the best of the Baptists, and knew exactly how the Lord had planned the world," he found when he presented her with logical difficulties that her simple scheme could not handle, she always "slipped back into the logical scheme, and blinked the facts," just as the grand theorists do. For Mitchell, developing grand theories was child's play. He states: "Give me premises and I would spin speculations by the yard." Not only was it child's play, it was also futile; the underlying relationships that his intuition told him existed were far too complicated to be captured in the theories of his contemporaries. In short, grand theorizing was not going to get you to an understanding of the economy; the economy was too complicated for even the grandest of the grand theories.

The Institutional Cause of Institutionalists' Demise

These contrasting research strategies of neoclassicals and institutionalists had significant implications for the development of the economics profession. Institutional economist were seen as anti-theoretical and anti-mathematics. Neoclassical economists were seen as theoretical; mathematical neoclassical economists portrayed economics as a predictive science that involved specifying a theory and empirically testing that theory. Institutionalism presented economics as a policy-driven combination of the study of institutions and empirical facts about the economy, with no formal theory and no definitive empirical tests. Given those choices, it is quite clear which view would win - and it was not the institutionalist view.

Whether one believes the grand theory is true in some grand sense is irrelevant. Even if you don't believe a theory, it can still be useful in the metaphysical sense of organizing one's thinking. Students, and indeed, almost everyone, require such an organizational scheme; neoclassical economics offered one, but only Veblen's brand of institutional economics offered one, and that was highly nonformal and indefinite. The reason such formal theories are needed is that while Mitchell might have been able to twist his great-aunt's arguments every which way, most students cannot; they need an organizing structure for their study. Most people need a simple structure to organize principles in their minds. Neoclassical economics offered such a simple organizing principle; institutional economics did not. The lure of neoclassical economics is the same lure that religion offers - a relatively simple way of organizing one's understanding of an otherwise almost hopeless chaos.

This need for a formal organizing theory was strengthened by the structure of U.S. higher educational institutions. Modern U.S. educational institutions emphasized a broad-based educational system where many individuals would be introduced to economics. That meant multiple choice tests. The institutionalist approach to economics, with no accompanying formal theory, did not fit well in that system. There are only so many times that "it depends" can be given as an answer.

In the eyes of institutionalists, the neoclassical simple models did not even closely correspond to reality. Institutionalists recoiled at the disparity between the simple model and the observed reality. But most students who shared an institutionalist sensibility either dropped the study of economics or they were weeded out since they were unable to bring themselves to provide the simplistic answers to the complex questions the educational system required of them. Those who were satisfied with simplicity did well on exams and went on to do more complicated versions of those simplistic models; they became modern

neoclassical economists.

What I am arguing is that having a branch of economics working on a formal grand theory is a requirement of survival in the U.S. educational environment. Without a grand theory reducible to textbook models that helped students organize their thoughts and vision of a complex economy, institutionalists' complex economic world view was incompatible with the pedagogical institutions through which economic ideas were propagated. Institutionalists' decision to simply not discuss formal theorizing led to no competition in the metaphysical grand theory realm, and the neoclassical world view organized students' thinking about the economy. Once that simplistic world view was built in, it was not questioned, and it structured the way economists approached problems. No one gave explicit consideration to the implications of the institutionalists' complexity leap of faith, and more and more elaborate theorizing was developed on the simplicity leap of faith.

The Role of Mathematics in Economics

As is the case in many aspects of life, the evolution of economic thought involves a wonderful irony. Neoclassical economic models became more and more elaborate; they became complex simple models. This increasing complexity of the models generated significant debate about the role of mathematics in economics. The irony is the following: In this debate, institutionalists were seen as opposing complex mathematics; neoclassical economists were in favor of more complex mathematics. In my opinion, each of the two sides was seen as holding views 180 [degrees] opposite from the other's world view. Institutionalists should have been arguing that even the most complex of the neoclassical models were way too simple - formally discussing grand theories required a much more complicated mathematics than currently existed. The institutionalists should have been arguing for a more complex mathematics; the neoclassicals for a less complex mathematics.

Modern Developments in Complex Mathematics

That debate did not originally take this form since, until recently, the mathematics complex enough to even contemplate the development of a formal mathematical foundation of an institutionalist economics did not exist. In the last 10 years, that has changed. With the development of chaos theory, catastrophe theory, nonlinear dynamics, game theory, and computer simulation methods, it is becoming possible to think about developing a formal mathematical institutional theory. It is marked by such terms as path dependency, sensitive dependence on initial conditions, butterfly effects, strange attractors, focal point equilibria, pattern coordination, NP hard, and soliton.

It is a mathematical system in which extra-market coordinating mechanisms are necessary to create systemic stability. In the absence of such extra-market coordinating mechanisms, there will only be chaos. These extra-market coordinating mechanisms are, of course, institutions, and thus modern analytic economics is returning the debate to where it was earlier - a debate in which the fundamental importance of institutions is recognized. That formal complex theory will, I suspect, be far too simple for many institutionalists, but I hope they, nonetheless, encourage it because it will provide a foundation for the institutionalist complex world view. It is a vision of an economic system in which institutions are absolutely necessary to create stability; it is a vision in which equilibria are arrived at sequentially in a series of nested systems; it is a system in which global rationality of the type proposed by neoclassicals is impossible for people to achieve. If it is not NP hard, it is at least graduate student hard.

Developing the mathematical skills needed to seriously work in models incorporating complex dynamics will require much more training in mathematics than is currently given to economists. A doctorate in mathematics is a minimum to even start dealing with formal theory.(1) Most economists would not be trained to do such grand formal theory; instead, they would be presented the vision behind the grand formal theory and introduced to a course that would

give them an appreciation of the complexities of developing such a theory. So while theorists would get much more mathematics training, the typical economics student would get far less training in formal mathematics and far more training in the intuitive rationale for the formal mathematics than they currently receive.

As is obvious from the above discussion, I foresee a future with some new bedfellows, ultra mathematicians aligned with institutionalists in pursuing a complexity vision of the economy against quasi mathematical neoclassicals pursuing a simplicity vision of the underlying economy. The ultra mathematicians will work on formalizing the grand theories of Veblen and other conceptual institutional theorists, and those grand theories will be simplified into models teachable at the introductory level. The result will be a formal theory, grounded in complexity, that will directly challenge the neoclassical grand theories.

Distribution Theory and the New Mathematical Institutionalism

If the new work is to succeed in introducing an institutionalist vision of complexity into the profession, it must be translatable into something that can be presented at the textbook level. I now turn to one area of translation - distribution theory. Textbook neoclassical theory presents the analysis of the distribution of income as a relatively simple issue. In marginal productivity theory, factors are paid their marginal product. From a pedagogical standpoint, marginal productivity theory has much going for it: it is just hard enough to challenge, but not challenge too much, undergraduate students who do not have a math background. There are, however, two problems with marginal productivity theory. First, intuitively, it does not fit reality - inquisitive students can think of many cases in which individuals do not seem to be paid their marginal products: cases where seniority rules govern distribution, cases where social pressures influence wages, and cases where marginal products cannot be determined. Luckily for neoclassical economics, most students are not inquisitive.

The second, more substantial problem is known in the history of thought literature as "the adding up problem." The adding up problem is the following: for marginal productivity theory to serve as a theory of distribution, the summation of the marginal products times the factors has to equal the total product produced. In general, that does not happen, so neoclassical economics must posit that our economy has a linear homogeneous production function. Limiting the production function to a particular subset of allowable simple functions is a stronger assumption that many are willing to make. But in the absence of this additional assumption, marginal productivity theory is incomplete. A variety of justifications have been put forward as to why the production function will be linear homogeneous.(2) Perhaps the strongest of these justifications is empirical evidence - the relative constancy of shares going to capital and labor. These shares could only be constant, so the argument goes, if the production function were linear homogeneous. So empirical evidence justifies the assumption.

Given simple causal functions, that conclusion is correct, but one of the results of the mathematical analysis of complex systems is that, under the right conditions, extremely complicated causal interrelationships can result in simple, stable results. Simplicity of result does not imply simplicity of cause. My institutionalist distribution theory posits that the observed constancy is highly complicated causal functions. The complex mathematics supporting this view is the mathematics of solitons.

A soliton is a wave that does not break up - a wave that continues over long distances. In a vacuum or near vacuum, such a wave would not be unusual; it is what is to be expected by Maxwell's simple equations of wave motion. However, outside a vacuum, where frictions of various sorts impinge upon the integrity of the wave structure, the existence of a soliton wave is very unusual. By all logic, with the size of the frictions relative to the stability of the generating function, the wave should dissipate, and indeed, in the real world, most waves do. A soliton wave is a real-world wave that does not; somehow

the dynamics of the frictions offset each other, providing wave stability where there should be none. Recent work in complex mathematics has shown that such stability can be described by a nonlinear mathematical system of equations in which the frictions play a central role in maintaining stability.

What have solitons got to do with distribution theory? I claim that they provide the mathematical foundation for an institutionalist theory of distribution that can provide a vision around which a textbook discussion of an institutionalist theory of distribution can be discussed and compared with the neoclassical theory. Complex mathematics offer a much more intuitively plausible, but analytically more difficult, theory. Somehow, in this theory the complex causes of chaos must be kept in check, and out of that chaos must come a reasonably stable outcome that can include a stability of shares. That is what the ultra mathematicians will be looking for. I suspect that the key element to this new theory will be a general equilibrium system of sequential decisions in which higher level decisions place constraints on lower level decisions. Intuitively, such a system could impose the needed stability through a system of natural selection. In a complex system, only certain combinations of dynamic forces provide stability. Our economic system, when it finds such a combination, must build that combination into an institution; these institutions operate as an operating system in a computer - they provide the stability needed for individuals to operate. But, in doing so, they impose constraints on individual actions which limit individual actions to actions consistent with systemic stability.

There are two interesting aspects of this view for economics. The first is that a complex system can only arrive at a stable result if it is solved sequentially and involves institutions. Since these institutions impose constraints on individuals, an analysis of individual actions must include those constraints. The neoclassical simplistic view does not do this, and consequently it cannot be appropriate if the complex world view is correct.(3) Within a complex system, any micro foundation must be contextual.

The second aspect concerns the rationality appropriate for that contextual micro foundation. Complex systems are beyond global rationality-dealing with all issues simultaneously exceeds the computing capability of individuals. So individuals operate with a type of institutional rationality, rather than with global rationality. This leaves profit exploitation opportunities - which the system can take advantage of to maintain systemic stability. In effect, the economic system is stable only because people are not globally rational, and follow institutional norms even though doing so is not always in their global rational interest. This means that the system is always on the edge of chaos and that there are profit opportunities for people breaking with established norms. A system like that imposes a systemic cost that is borne by everyone, requiring a new set of stability creating norms to be established. This public good aspect of stability means that every so often people will take advantage of the system to increase their profit - by violating the existing institutional norms. The result is a continual evolution of institutions. Institutions give the system stability and are part of the core of the economy. Any explanation that does not include institutions is unable to explain the stability of a complex system.

Implications for Distribution Theory

What does this mean for distribution theory? If the world is complex, any distribution theory must take account of these institutional constraints and bounded rationality. Specifically, in a system in which individuals' actions are constrained by institutions, marginal productivity cannot be attributed to individuals, but instead, can only be attributed to individuals in their role in institutions. A person's marginal product is determined by a combination of individual and institutional traits, and the rationing mechanism that society uses to distribute positions within institutions will be an inherent part of the general distribution theory. It is not separable.

Within institutions, since markets do not exist, individuals fight for institutional rents. In an analysis of this fight, there can be no a priori presumption that the pay a factor receives corresponds to his or her marginal contribution. In short, in an institutional world, the human capital model must be replaced by an

institutional capital model, and marginal productivity will be only a part of the distribution story.

Marginal products play a role in an institutional distribution theory, but so too do a myriad of institutional constraints - these institutional constraints act as offsetting dynamic constraints that maintain consistency of distribution even as forces would move the economy significantly away from the existing distribution. The institutionalist complex system answer to the question "Why does the distribution between labor and capital remain relatively constant?" is that institutions create constraints on individuals that create that stability.

In game-theoretic terms, the argument is that to get an acceptance of institutions, side deals must be made among participants that place constraints on individuals and change the nature of equilibrium. Let me give an example of how this approach can be integrated into what we teach about distribution. Say you have two types of individuals: big heads and big arms. Say also that there are three possible production techniques. Two of these production techniques require acquiescence among individuals; these two techniques are equally efficient in the sense that when all workers are used, 100 units of output are brought forth by either technique. Technique A, however, gives a MP of $\frac{3}{4}$ to big arms and $\frac{1}{4}$ to big heads, while Technique B gives a MP of $\frac{3}{4}$ to big heads and $\frac{1}{4}$ to big arms. Techniques A and B require acceptance from both groups; if no agreement is reached, Technique C must be used, which gives a MP of $\frac{1}{2}$ for both, but has a total output of only 40.

Clearly, each group will be better off with choosing either Technique A or Technique B, but neither technique dominates the other. How do they decide which technique to use? The obvious answer is to make an inviolable social compact, embodied in an institution, to use one of the two techniques. But to get such a social compact agreed to would require that big arms receive certain side payments, perhaps 25, from big heads. (Of course, big arms would want more since no compact is inviolate, but let me ignore that complication here.) In a complex environment where complexity is reduced to manageable proportions by institutions, marginal productivity is only part of the theory. The point is that what exists currently cannot be seen independent of its history, and that social norms, and even government regulations and government transfer payments, may be part of the intertemporal optimization process; they cannot be assumed to be a priori inefficient.

In the simple neoclassical economics explanation, such side payments resulting from prior deals cannot be considered; there is no history and no institutions. Thus, it misses the tension that these side deals resolve. In institutional economics, to judge any outcome, it is not enough to look at marginal productivities at a point in time; production has a social and historical component, and a particular result can only be interpreted in its historical and social context. The neoclassical model makes the implicit assumptions that all these complications do not matter - that the time inconsistency problem is not dealt with by individuals, and that, somehow, all institutions are simply plopped down upon individuals.

Conclusion

The formal analysis of the need for institutions is grounded in the complexity of the economy. As a mathematics has developed to deal with that complexity, the relationship between institutionalists and ultra mathematicians is changing. They are becoming allies, both arguing against the simplicity of even the most complex neoclassical economic model. The result will be a variant of the old chestnut about socialism being the longest path from capitalism to capitalism. In that spirit, neoclassical economics is the longest path from institutionalism to institutionalism.

Notes

1. I should make it clear that I am not advocating a doctorate in mathematics for all economists - only for those developing formal grand themes. As I have

argued in other work [Colander 1991], most economists do not do grand theory; they accept a world view, and they fill in pieces, adding intuitive insights about the implications of a world view for a particular area.

2. These justifications have led some pundits to say that the economic equivalent to the statement that "justice is a perfect cube" is that "fairness is a linear homogeneous production function."

3. The neoclassical marginal productivity theory is hard for many neoclassicals to accept as a complete theory of distribution. For example, Alfred Marshall [1920, 519] writes: "This doctrine (of marginal productivity) has sometimes been put forward as a theory of wages. But there is no valid ground for any such pretension. The doctrine that the earnings of a worker tend to be equal to the net product of his work has by itself no real meaning; since in order to estimate net product, we have to take for granted all the expenses of production of the commodity on which he works, other than his own wages."

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