

Models and Pseudo-models: Economists' Artifice

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Global Research, February 22, 2009

22 February 2009

Theme: [Global Economy](#), [Science and Medicine](#)

Models can be built by using data gathered from the real world or by using imaginary data. But the distinction between mathematics and reality lies in interpretation. Equations and their solutions are just mathematics; their interpretation in terms of everyday experiences is what makes them useful. Yet economists emphasize the mathematics and ignore the interpretation.

When I was a boy, a very popular toy was a model kit. Model kits consisted of a number of drawings of something, such as an airplane, a number of blocks of balsa wood, a carving knife, paint, decals, brushes, and a pot of glue. The task was to carve the wood to match the drawings, decorate the pieces, and glue them together. A child who did that created a model of an actual airplane. But bright children quickly realized that they could alter the drawings, sometimes in highly imaginative and even fantastic ways, and build models of unreal airplanes. The children that did this were often highly praised for their imaginative powers and skills, but that anyone thought that these contraptions would actually fly if built by Curtiss-Wright (a major airplane manufacturer at the time) is doubtful. The children who built models following the directions built models; those who didn't built pseudo-models, but they had a lot more fun. The point is that models can be built by using data gathered from the real world, like an actual airplane, for instance, or they can be built by using imaginary data.

When Johannes Kepler sought to mathematically model planetary motion, he sought out Tycho Brahe who had assembled the most extensive and most accurate data on planetary motion available at the time. Using Brahe's data, Kepler discovered that the planets traveled around the sun in elliptical orbits and devised formulas which could not only be verified by further observation but could be used to predict the position of planets on future dates. Kepler created a model.

Of course, and analysis of economic models is hampered by numerous obstacles. Any model is object, event, or problem specific. Not much can be learned about an F4U Corsair from a model of an F4F Wildcat. What economists consider a model is also unclear. For instance, is Ricardo's discussion of comparative advantage a model? What about Schumpeter's principle of creative destruction? If not, what are they? For discussions of these, see my papers *Creative Destruction and More Economic Nonsense* (http://www.jkozy.com/Creative_Destruction_and_More_Economic_Nonsense.htm) and *Specious Econo-Think* (http://www.jkozy.com/Specious_Econo_Think.htm). Without any firm criteria that define an economic model or how models are to be constructed, a critic is unable to know that an analysis of this or that "model" provides results that are general enough to be probative. Someone can always say, "Oh well, the results you have gotten only apply to that specific model." Since there is no authentic list of economic models, no one can possibly know that all the models have been analyzed, so any generic criticism can

always be dismissed.

Yet it does appear that many economic models share a common design. First, read any history of economic thought. Purely imaginary data are used to either support or illustrate the theories. (Often which of these two purposes the data serves is unclear.) Ricardo's discussion of comparative advantage is an excellent example of this practice. Second, the models appear to be little more than an elucidation of a "favorite idea" even when counterexamples are prevalent. Favorite ideas, however, are dangerous things. Michael Faraday noted that "By adherence to a favorite theory, many errors have at times been introduced into general science which have required much labour for their removal." And Clausius, discovering the second law of thermodynamics, noted that the caloric theory "has become more like a religion than a science." Third, the models appear to be entirely deductive, examples of what philosophy professors call *a priori* reasoning which experimental sciences discarded long ago. A very good example of such model building is to be found in Krugman's *Increasing Returns, Monopolistic Competition, And International Trade* (http://www.princeton.edu/pr/pictures/g-k/krugman/krugman-increasing_returns_1978.pdf), one of the papers for which he received the Nobel Prize.

Krugman's paper consists entirely of deriving theorems from postulates which he labels "assumptions." It looks and reads much more like Euclid's *Elements* than Kepler's model of planetary motion. Krugman's reasoning is purely deductive. No empirical data are to be found in the paper; the "assumptions," often written in mathematical formulas, seem to be taken as obviously true, since no justification for even a single one is provided, and Krugman even qualifies the paper's results with sentences such as. "This is a view of trade which *appears* [emphasis mine] to be useful in understanding trade among the industrial countries." He even draws conclusions from some of the formulas about how human beings will act. Krugman writes, "consider the behavior of a representative individual. *He will maximize his utility* (1) subject to a budget constraint," and "this will lead entrepreneurs to start new firms." But no mathematical formula can constrain either "representative individuals," (whatever they are) or "entrepreneurs" to do anything, unless, of course, Mr. Krugman has a voodooish ability that can be likened to sticking a pin in a doll and causing the person the doll represents to feel pain. This kind of model building gives new meaning to George H.W. Bush's term "voodoo economics"

Much has been learned about formal deductive reasoning since mathematicians began to investigate the foundations of arithmetic, the development of Bolyai-Lobachevskian geometry, and mathematical (symbolic) logic. One of the lessons learned is that only conditional statements can be derived from formal systems. The theorems are true only if the assumptions are. And a logical principle known as *modus tollens* says that if the consequent of a conditional statement is false, the antecedent is also false. The every recurring dismal state of the worldwide economy strongly supports a claim that the theorems of economic models are false. The only logical conclusion is that the assumptions are also false.

All that can be derived in a formal system is what the postulates have built into them. So a formal system can be used to prove anything desired; all that is required is that the appropriate postulates be assumed. That Krugman and others consider formal systems "models" is interesting. Has Euclid's *Elements* ever been referred to as a model? Hilbert and Ackermann's formal presentation of mathematical logic is not a model of anything and has

never been referred to as one. Yet both of these serve as paradigms of formal systems.

Abstract formal systems are easy to build; any bright child can build them. First, write a formula containing a number of variables, for instance, $A=B+C$. Then define both B and C in other formulas, say $B=D/2$ and $C=2E$. Then replace either the B or C in the first formula with these definitions and solve the equation for B, C, D, or E. Child's play! But what has been proven? Absolutely nothing! The difficult part for economists is not the derivations; it is the choice of assumptions. But Mr. Krugman's paper says nothing about them.

I suspect that Mr. Krugman would say that he hasn't said anything about them because they are either commonly accepted principles of Classical/Neoclassical economics or variations of such commonly accepted principles. But that's a dodge. Because something is commonly accepted doesn't mean it's true. And when someone questions the validity of a model, the truth of the assumptions is what is being questioned, not the derivation of their consequences; yet formulas not derived from or verified by empirical data are merely definitions. So Mr. Krugman has created nothing but a pseudo-model.

Some economists claim that they don't get things right because economics is so difficult. After having spent most of my life in classrooms, I can confirm that that is exactly what intellectually challenged students say when they find mastering a subject formidable. So are economists intellectually challenged?

No, but there is another possibility which orthodox economists never address. Consider the problem of modeling planetary motion. Between sometime in the fifth century BCE and Johannes Kepler's publication of *Astronomia Nova* in 1609, the best mathematical minds tried to find a model to explain the irregular motions of the planets. All the models were based on Aristotle's assumption that celestial bodies were attached to concentric celestial spheres which implied that celestial bodies traveled in circular paths. Observational data belied this assumption, but mathematicians continued to assume it and tried to alter the basic circular paths by adding more and more elements to the model. Mathematicians first added component spheres to the simple concentric spheres, then added eccentrics (points and axes located elsewhere than at or through the geometric center), then epicycles (circles on the circumferences of circles), then equants (points placed directly opposite the Earth from the center of larger circles), then the Tusi couple (a small circle which rotates inside a larger circle twice the radius of the smaller circle) was devised, and finally, Tusi couples were combined with epicycles to eliminate both the eccentrics and the equants, but the combination required numerous epicycles and Tusi Couples. No matter how complicated the models became, no model ever provided a satisfactory explanation of planetary motion.

Surely during this long period, some mathematicians believed that the problem was just too difficult. They were wrong, of course. Given the ideas the models were based upon, the problem wasn't too difficult, it was impossible. All models based upon false assumptions make their problems impossible to solve. When Kepler realized the impossibility of any solution based on Aristotle's assumptions, he discarded them and found the solution that had eluded mathematicians for two millennia.

The theory of celestial spheres, introduced by ancient Greeks, was the mainstay of the geocentric system. Copernicus and the others were somehow unable to dismiss a theory that was officially accepted. Our economists act just like Copernicus. They should ask whether they can't get things right because all of their ideas about economy are wrong. If they are, continuing to apply them will never get anything right. No number of models, no

matter how complicated and interesting intellectually, will suffice. Paraphrasing Gibbon, "Are economists sacrificing the happiness of millions to a fond partiality to a worthless idea since most of the crimes that disturb the internal peace of society are produced by the theory's confining to a few the possession of those objects that are needed by all?" Edward Gibbon and Adam Smith were contemporaries. That's how long this question has been crying out for an answer. How much longer must humanity wait?

Classical/neoclassical economics has now held sway for more than two hundred years, and mathematical models have been built to support it for at least half of that time. But the basic consequences of the theory have not changed materially. The cycles of boom and bust continue to reoccur. Wealth is created and then destroyed. People get jobs and lose them; get homes and lose them; save money and lose it. It is an idiotic system. How would we describe a person who built an edifice in a part of a river's floodplain that is inundated every year or so and watched his edifice disappear during each flood but continued to rebuild it in the same place? Didn't Einstein call doing the same thing over and over again and expecting a different result a form of insanity?

The most difficult thing to explain is why apparently intelligent people are either unable or unwilling to recognize the idiocy. Is it because they are not greatly affected by the busts? Is it because they merely don't care what the system does to most people? Or is it because their minds are constrained by a commitment to a worthless idea? What economics needs is a Johannes Kepler.

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