



Rensselaer

Working Papers in Economics

Department of Economics, Rensselaer Polytechnic Institute, 110 8th Street, Troy, NY, 12180-3590, USA. Tel: +1-518-276-6387; Fax: +1-518-276-2235; URL: <http://www.rpi.edu/dept/economics/>; E-Mail: keenak@rpi.edu

Ecological Economics at a Crossroads

John Gowdy

Rensselaer Polytechnic Institute

Jon Erickson

University of Vermont

Number 0417

June 2004

For more information and to browse and download further *Rensselaer Working Papers in Economics*, please visit: <http://www.rpi.edu/dept/economics/www/workingpapers/>

Commentary

Ecological Economics at a Crossroads

John Gowdy
Department of Economics
Rensselaer Polytechnic Institute
110 8th Street
Troy, New York, USA 12180-3590
e-mail gowdyj@rpi.edu

Jon Erickson
Rubenstein School of Environment and Natural Resources
344 Aiken Center
University of Vermont
Burlington, Vermont USA 05405-0088
e-mail Jon.Erickson@uvm.edu

Abstract

During the past decade theoretical and empirical advances in neoclassical economics have resulted in the virtual rejection of the two pillars of traditional welfare economics--rational economic man and perfect competition. Surprisingly, many ecological economists are moving closer to the discredited neo-Walrasian welfare model just at the time it is being replaced within the mainstream. We call for a return to the roots of ecological economics and an engagement with current developments in mainstream theory.

Ecological Economics at a Crossroads

Theory evolves by succession or surrender. By succession, one theory leads to the next iteration – the version is updated but the platform remains intact. By surrender, the old yields to the new based on refutation of theory inconsistent with observation. Similarly, the speed in which hard won knowledge enters new texts, educates new practitioners, and informs new management and policy ranges from gradual transition to revolutionary shifts. Both the path and speed depend on the structure of social institutions, in particular the public affinity for and entrenched power of the status quo. Evolution by natural selection, the invisible hand of a market economy, and the environmental movement were all ideas “in the air” long before they crystallized in the minds of Charles Darwin, Adam Smith, and Rachel Carson. Even good ideas must wait until the socio-political climate is ripe in order to fuse into the public conscious.

In economics, the path and speed of theory has been characteristic of painfully slow succession, reinforced by a status quo inseparable from the elite of the industrialized world. Economic theory taught in 21st century undergraduate and graduate programs is barely distinguishable from the last revolution in economics, the neoclassical era ushered in over 100 years ago with the elegant mathematical justification of free market capitalism by the likes of Marshall, Walras, and Pareto. Twentieth century challenges to the mainstream were most often characterized as anomalies to assumptions of consumer and firm behavior (e.g. Veblen’s conspicuous consumption and the Allais, Boadway and Scitovsky paradoxes); or as being easy to deal with through minor government intervention to correct market failure consistent with the general equilibrium framing of the problem. Some new ideas were absorbed into the mainstream, as long as they didn’t challenge the bedrock principles of isolated individual rationality, material consumption as utility, perfect competition between firms, and the primacy of efficiency through free market enterprise.

However, evidence is mounting that the current era of mainstream theory is coming to an end – and by surrender. Mainstream economic theory is changing so fast that the previously narrow descriptor “neoclassical” is now hard to define. Perhaps the surrender of a “neo-Walrasian model” is the best portrayal given a decades-old reliance on the general equilibrium model in economic theory, practice, and policy advice. While theoretical critiques of general equilibrium theory have been brushed aside, a more recent era of empirical tests of the predictions of general equilibrium theory could be the proverbial nail in the coffin. Most notably, during the past few years, Nobel prizes have been awarded to economists holding beliefs considered heretical in the 1970s and 1980s.

Looking back it is difficult to understand how the Walrasian model held sway for so long. Its two foundations include a model of behavior (*Homo economicus*) that makes every living human “irrational” and a model of production (perfect competition) that makes every existing firm and market “imperfect”. These two pillars are essential to the general equilibrium framework. But without them it cannot be demonstrated that competitive market outcomes are Pareto optimal (the First Fundamental Theorem of Welfare Economics) and thus intervention to correct “market failures,” that is to establish the “socially optimal” Pareto position (the Second Fundamental Theorem of Welfare Economics), has no theoretical basis. This leaves no reference point to use in cost-benefit

comparisons. It's not enough to say that neo-Walrasian assumptions are "close enough" – either Pareto optimality can be established or it cannot.

Two recent Nobel Prize winners in economics highlight the growing rejection of these caricatures of consumer and firm behavior. Daniel Kahneman (2003, p. 1457) writes:

Utility cannot be divorced from emotion, and emotions are triggered by changes. A theory of choice that completely ignores feelings such as the pain of loss and the regret of mistakes is not only descriptively unrealistic, it also leads to prescriptions that do not maximize the utility of outcomes as they are actually experienced – that is, utility as Bentham conceived it...

Joseph Stiglitz (1994, p. 28) is equally critical of the neo-Walrasian model of market behavior:

It is the first welfare theorem [asserting the efficiency of competitive markets] that provides the intellectual foundation for our belief in market economies. Like any theorem its conclusions depend on the validity of its assumptions. A closer look at those assumptions, however, suggests that the theorem is of little relevance to modern industrial economies.

If the mainstream is truly changing, at least amongst its theorists, then this presents an interesting challenge to ecological economics. Ecological economics was, and for many remains today, an outright rejection of the Walrasian general equilibrium framework. Herman Daly laid the foundation of ecological economics in two books published in 1973 and 1977. The first was a reader containing several now-classic papers including two by the intellectual fathers of ecological economics, Nicholas Georgescu-Roegen (*The Entropy Law and the Economic Process*) and Kenneth Boulding ("The Economics of the Coming Spaceship Earth"). Georgescu's work, dating back to the 1930s, stressed that consumer theory should be consistent with actual human behavior and production theory should be consistent with biophysical laws. Boulding succinctly pointed out the absurdity of believing that economic growth could continue indefinitely on a finite planet. In the second book, Daly refined his criticisms of neoclassical theory and presented his blueprint for a steady state economy, including the three-tier goals of sustainable scale, just distribution, and efficient allocation.

The economic process is a social, not individualistic, phenomenon taking place within a finite biophysical universe. This simple observation constitutes the core belief of ecological economics and has great relevance for recasting social policy (Gowdy and Erickson, in press). Consider the two approaches to environmental policy advocated in every standard environmental economics text: the Coasian assignment of property rights and the Pigovian application of taxes and subsidies. Both approaches embody all the assumptions of *Homo economicus* and both have been shown to be flawed. According to the Coase theorem the optimal allocation of resources among individuals who can freely bargain at no cost should be independent of the initial assignment of property rights. Experimental evidence clearly shows this theorem to be false (Kahneman et al. 2004).

Individual choice is consistently influenced by an “endowment effect” where higher value is placed on things already in possession (Thaler 1980), a particular example of “loss aversion,” where people are more averse to taking a loss as to enjoying an equal gain (Kahneman and Tversky 1979).

The success of Pigovian policies depends on rational actors responding in predictable ways to price incentives. Here again the empirical evidence fails to support the behavior implied by the model’s assumptions. The effect of incentives on behavior is mixed at best and is frequently perverse. When people are paid to do something that was previously part of their social norms – donating blood for example – the amount of the social good provided can decline (Gneezy and Rustichini 2004). The presence of an award (or penalty) may actually have an opposing (or reinforcing) influence on what cognitive psychologists refer to as intrinsic motivation. This calls into question the relative importance of “getting the prices right” in environmental policy, over potentially more effective non-price adjustments. For example, rather than assume exogenous preferences that respond in predictable ways to price signals, economists have begun to stress the pervasiveness of endogenous preferences and the importance of an individual’s personal history, interaction with others, and the social context of the individual choice (see the papers in Camerer, Lowenstein, and Rabin, 2004). Economists have only “discovered” what advertisers have known for a long time, consumer tastes are ever changing and changeable.

Given the current revolution in economic theory, there is good reason to believe that economic textbooks will look entirely different 10 years from now. For example, the wildly varying assumptions about human behavior currently held by economists, psychologists, anthropologists, and sociologists are in the process of being reconciled (Gintis, 2004), and when this process is completed, *Homo economicus* will only be a historical anecdote in the classroom, and ultimately, abandoned in the policy arena. The realization that previously dubbed “anomalies” of market behavior may actually be more representative of the human condition has fueled the current revolution sweeping mainstream economics.

This realization was the result of one simple step: economists began to empirically test their theory’s most basic assumptions. When this was done in cooperation with other disciplines and with emerging approaches from game theory and behavioral economics, general equilibrium failed its own test of success – its basic assumptions failed to predict real economic behavior (Gintis 2000). Even the most sacred “laws” of supply and demand are now subject to intense scrutiny, putting into question the mantra of every economics course ever taught: “incentives matter”. Incentives do matter, but not only *price* incentives. In fact, price incentives may not be the most efficient means to change market behavior and, at times, can have quite perverse consequences. Broadly rational actors respond to a variety of incentives in a variety of ways.

What is the relevance of all this to ecological economics? On the negative side, too many ecological economists are still applying optimization models that assume *Homo economicus* and perfect competition. Too many ecological economists are still using simplistic forms of cost benefit analysis embodying assumptions on value and incentives known to be empirically invalid and theoretically flawed (Gowdy 2004). Too many ecological economists are falling into the trap of “right prices”, calling upon irrational

agents and imperfect markets (as defined by reigning theory) to somehow correct market failures.

On the positive side, ecological economics has a critical role to play in the current revolution in economic theory. Of the many heterodox approaches currently taking shots at the neo-Walrasian model, ecological economics is the only approach treating the human economy both as a social system *and* as one imbedded in the biophysical universe (Gowdy and Erickson 2004). While the social and psychological critique of general equilibrium models that is now sweeping the mainstream has long been integral to ecological economics, we also bring to the revolution the sorely needed biophysical critique grounded in the harsh realities of the laws of thermodynamics. All aspects of the economic process require low entropy matter and energy, and all aspects produce high entropy waste. Environmental externalities are the rule, not the exception.

And so, ecological economics is at a crossroads. We can embrace the revolution in economic theory – inspired by recent empirical tests of the core assumptions of neo-Walrasian theory – or we can turn our backs to both the turning tide of the mainstream and our own roots in the social and psychological critique. We can abandon the narrowly conceived *Homo economicus* model of behavior and reliance on correcting market prices as the primary policy lever, or we can further wed ourselves to a marginal cost and benefit framework built upon the fundamentally flawed postulate of isolated individual response. We can recognize the pliability of preferences and the importance of a myriad of non-price influences on human behavior, or we can depend on an outdated, unrealistic model of human behavior that the forefathers of ecological economics took great pleasure at picking apart. We can lead the charge to merge the social and biophysical critiques, or we can fall prey to a caricature of ecological economics as Walrasian wine in a new bottle.

Acknowledgements

For valuable comments and critique, thanks to Jeroen van den Bergh, Robert Costanza, Herman Daly, Faye Duchin, Herbert Gintis, Rich Howarth, Neha Khanna, Karin Limburg, Dick Norgaard, David Stern, and Arild Vatn.

References

Camerer, C., Loewenstein, G., Rabin, M., (Eds.), 2004. *Advances in Behavioral Economics*. Princeton U. Press, Princeton, NJ and Oxford UK.

Daly, H.E., (Ed.). 1973. *Toward a Steady State Economy*. W. H. Freeman, San Francisco.

Daly, H.E., 1977. *Steady State Economics*. W. H. Freeman, San Francisco.

Gintis, H., 2000. Beyond *Homo economicus*: Evidence from experimental economics. *Ecological Economics* 35, 311-322.

Gintis, H., 2004. Towards a unity of the behavioral sciences. Santa Fe Institute Working Paper 03-02-015 (March).

Gnezy, U., Rustichini, A., 2004. Incentives, punishment, and behavior. In Camerer, C., Loewenstein, G., Rabin, M., (Eds.), pp. 572-589.

Gowdy, J.M., 2004. The revolution in welfare economics and its implications for environmental valuation and policy. *Land Economics* 80, 239-257.

Gowdy, J.M., Erickson, J., in press. The approach of ecological economics. *Cambridge Journal of Economics*.

Kahneman, D., Tversky, A., 1979. Prospect theory: an analysis of decision under risk. *Econometrica* 47, 263-291.

Kahneman, D., 2003. Maps of bounded rationality: psychology for behavioral economics. *American Economic Review* 93, 1449-1475.

Kahneman, D., J. Knetsch, Thaler, R., 2004. Experimental tests of the endowment effect and the Coase theorem. In Camerer, C., Loewenstein, G., Rabin, M., (Eds.), pp. 55-74.

Stiglitz, J., 1994. *Whither Socialism?* MIT Press, Cambridge, MA.

Thaler, R., 1980. Toward a positive theory of consumer choice. *Journal of Economic Behavior and Organization* 1, 39-60.