Ecological Economics 105 (2014) 220–232

Contents lists available at ScienceDirect

Ecological Economics

journal homepage: www.elsevier.com/locate/ecolecon

Methodological and Ideological Options

Toward a neoclassical theory of sustainable consumption: Eight golden age propositions

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ARTICLE INFO

Article history:
Received 10 October 2013
Received in revised form 14 April 2014
Accepted 15 June 2014
Available online 5 July 2014

Keywords:
Sustainable consumption
Neoclassical growth
Golden Rule
Phelps
Leisure
Resource rebound

ABSTRACT

Popular trends in ecological economics increasingly consign neoclassical economics to the sidelines of modern-day relevancy. The neoclassical tradition is often seen as reliant for its authenticity on a presumption of human avarice – both unbridled consumerism and corporate cupidity – and demanding for its real-world applicability an assumption of continuous economic growth in a world of hard limits.

This article examines the question of whether neoclassical theory could instead provide keys to deeper understanding of sustainable consumption. By combining in a single framework neoclassical growth theory, general equilibrium theory and duality theory – and by explicitly considering leisure time – the analysis demonstrates that neoclassical economics yields several useful insights bearing on long-term sustainability. The analysis confirms several tenets of ecological economics and challenges others.

Eight propositions emerge from this analysis that could help speed the development of a robust neoclassical theory of sustainable consumption, here branded "golden age" propositions as they strongly echo the "Golden Rule" discoveries of Edmund Phelps.

1. Introduction

It is currently popular among a growing number of ecological and sustainability economists to dismiss neoclassical economics for its apparent sanctifying and legitimizing of corporate and consumer cupidity and a seeming requirement for its validity of unbridled never-ending growth.

This article seeks to help rehabilitate this image neoclassical economics has fallen victim to. In fact, it will be claimed that a world of sustainable consumption requires all the trappings of a competitive private ownership economy, including producer profit-maximizing behavior and consumer utility-maximizing behavior. And that neoclassical economics is indispensable to a correct understanding of a sustainable world.

The history of this evident disconnect is revealing. In a vigorous and entertaining debate found in the early pages of the present publication, Herman Daly (1997) used the device of appealing to the work of Georgescu-Roegen (1975, 1979) to challenge leading neoclassicists Robert Solow and Joseph Stiglitz on the fundamental underpinnings of their conception of economic growth. Solow (1997) and Stiglitz (1997) responded in a manner befitting the neoclassical tradition they helped create, but left unaddressed key issues raised by Herman Daly (1997). Robert Ayres (1997), in the same issue, offered a very precise, even surgical, dissection of the strengths and limitations (mostly strengths) of Georgescu-Roegen's arguments.

While at first brush these two camps may appear to hold virtually irreconcilable positions, this paper seeks to present a more robust neoclassical response to Herman Daly (1997) that purports to show that in fact both camps present valid arguments — and indeed may not be as far apart as some appear to believe.

In particular, it will be shown that a more comprehensively-conceived neoclassical formulation of sustainable consumption opens the door to a deeper understanding of the following: the prospect of indefinitely-extended fixed consumption levels; the prospect of natural "golden rule" consumption paths (in the Phelps sense) having not only indefinitely-extended fixed consumption levels, but ever-declining resource use and ever-increasing levels of leisure time; the sustainability implications of limited and depleting natural resource stocks; poverty elimination and consumption trends; and the surprising and counterintuitive effect of improvements in natural resource use efficiency gains. It is further shown that the framework delivers results that are in many ways confirmatory of the ecological economics tradition but in other ways challenge it.

2. Background

Given this heroic objective of marrying neoclassical economics to ecological economics, the theoretical framework here offered must by necessity call upon principles and methods developed by neoclassical

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http://dx.doi.org/10.1016/j.ecolecon.2014.06.011
0921-8009/

researchers in four different realms. To help assuage the concerns of the skeptic, the following descriptions attempt to highlight their commonsensical foundations:

First, general equilibrium theory: The framework relies heavily on the work of Gerard Debreu and Kenneth Arrow (Arrow and Debreu, 1954), who importantly and famously demonstrated that a competitive private ownership economy will naturally tend to evolve toward an equilibrium where all markets clear at prevailing prices using profit-maximizing and utility-maximizing principles in a way that maximizes economic welfare. In this world, individuals own the means of production and command the labor they offer to producers. The first of these is via the investments they (or their household) make, meaning the capital existing in the economy is in their hands. More importantly for present theoretical framing purposes, so is their choice over how much of their time they will allocate to producers, and how much to reserve as leisure time. General equilibrium provides a natural framework, and justification, for explicitly considering leisure time as a quantity in a general utility function.

Second, neoclassical growth theory: With insights about sustainable consumption economics the primary goal, the framework clearly must consider the long-term evolution of an economy. Fortunately, Robert Solow in 1956, working from a thorny conundrum that had plagued previous growth theorists, created a framework that both solved the problem and delivered important new insights about the nature of economic growth and the role of technology in creating it (Solow, 1956, 1988). For purposes of the present framework, the key implication is that long-term dynamics must be represented in a way that conforms to the principles and methods of neoclassical growth economics, including explicit consideration of technology gains.

A benefit follows from this. Of specific importance to the neoclassical growth theory is the work of Edmund Phelps, who established a central result known as Phelps' Golden Rule of Accumulation (Phelps, 1961, 1965). The present analysis shows that combining the general equilibrium piece with the neoclassical growth piece delivers substantial confirmation of Phelps' Golden Rule and leads to a modest extension of it.

Third, duality theory: To unite the production side and household consumption side of the economy, and to be consistent with both general equilibrium theory and neoclassical growth theory, physical quantities must be accompanied by their prices. Ronald Shephard in 1953 and later in 1970 developed the foundation for duality theory (Shephard, 1953, 1970), enhanced and made more broadly understood and accessible by Erwin Diewert (1974) and others in the decades thereafter. A proper framework must account for this tight connection, which as will be seen carries with it significant implications for consumption.

Fourth, neoclassical consumption theory: Neoclassical growth theory assumes a fixed-for-all-time relationship between savings and the productive value output of the economy (an assumption, it will be seen, that is generally warranted even within this extended framework). The rubric adopted by neoclassical consumption theorists is somewhat different. Specifically, the work of Franco Modigliani and his colleagues Richard Brumberg (Modigliani and Brumberg, 1954) and Albert Ando (Ando and Modigliani, 1963) on lifecycle consumption theory predicted that consumption behavior would depend not only on the value output of the economy, but also on the assets held by the household. The present framework instead shows that while household utility maximizing behavior delivers tight relationships between consumption/savings and both output and assets, these connections are delivered as a result, not an assumption, of the framework, thus explaining observed correlations.

Finally and not least, because a substantial part of the concept of "sustainable" is not only consumption itself but also the raw resource use required to enable it – including the associated externalities and limitations of such in the present-day world – the framework embodies on the productive side of the economy explicit consideration of this key input to production.

With these concepts in hand and attended to, a framework to address the notion of sustainable consumption from a neoclassical economics perspective can be assembled.

For theorists, four primary technical contributions purporting to be offered in the context of this growth framework are:

1. A broadening of the household utility function to include specific consideration of the value of leisure time.
2. Endogenization of savings behavior and resulting capital formation and endogenization of labor supply.
3. Explicit consideration of the duality principles that lock prices to physical quantities, allowing the system to be closed in a general equilibrium sense.
4. Formal consideration of physical resource use in the production of final goods and services (not in itself a new development, but new when introduced into such a framework).

The alleged overall technical contribution is the formal integration of these features into a framework that honors general equilibrium in each time period of a growth model: all factor markets (and the output market) clear at their endogenously-calculated prices each period; there is no need for labor or capital supply curves as labor supply and investment are determined endogenously from utility-maximizing behavior. The only exogenous inputs needed are the growth rate of the labor force (or population) and the physical deterioration rate of capital-in-place (depreciation rate).[1]

The article is organized as follows: The next section briefly describes the theoretical framework. The section thereafter outlines the simulation model, an instantiation of the theoretical frame in the form of specific functional representations of utility and production. After that, the resulting analytics are developed, leading to the proposed eight propositions offered in the section following thereafter. Then is offered a listing of cautions and limitations, followed by an attempt to re-cast the neoclassical–ecological economist debate in broader terms, and summarizing comments on the value of neoclassical economics to understanding sustainability. Appendices contain mathematical details.

3. Theoretical Framework — Briefly

The centerpiece of this article is a new theoretical framework purporting to integrate all the key neoclassical concepts relevant to a deeper evaluation of sustainable consumption, but as present readers may be disinclined toward neoclassical mathematics, a full description is left to online appendices, posted alongside this article.[2]

Nonetheless, to make sense of the results that follow, readers require a brief overview of the framework and the meaning of certain variables and parameters. More importantly, the following exposition is aimed at informing intuition and illustrating the commonsense foundations of

[1] That is, aside from any parameters associated with functional forms chosen for a utility function and a production function (including any technology change parameters employed).

[2] Notwithstanding this, the author eagerly welcomes reactions and criticisms to this formulation by neoclassical economists who, it is hoped, will engage the full formulation presented in the appendices.