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# **Socially Endogenous Modifications of Utility Functions**

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## **INTRODUCTION**

Recent international agreements are further evidence of modifications of the very form of individuals' utility functions as concerns for conservation of natural resources have progressed and increasingly become a major point of discussion within many levels of the global society. While the various policy issues resulting from environmental concerns have been analyzed in a broad spectrum of forums, the major social changes stimulating these policy discussions remain ignored.

In a simplistic neo-classical framework, behavioral changes can be explained as simple responses to price and income changes over time. But these endogenous changes do not fully explain why the United States was among the most conservative nations at the recent Kyoto treaty conference. Following traditional consumer theory structures, if neither price nor income changes explain behavioral modifications, then the only explanation remaining is a change in the utility function.

Recent policy and behavior changes at all levels of decision making require causative explanation. Individual, local, regional, national and international decisions have been moving in relatively new directions in the latter part of the 20<sup>th</sup> Century. From recycling programs to local air quality policies concerning woodstoves to California's automobile requirement to the Endangered Species Act to the Kyoto negotiations, altogether new types of decisions are being made. Some of these decisions can be explained as price and income responses, but not all. Following the diverse writings of Greenhut et al., Norgaard, Parsons and Trosper, this paper attempts to sketch a theory explaining the alterations in what might be termed the distribution of individual utility functions and how this change influences society's decisions.

Greenhut et al. argue the multifaceted aspects of prices, which can be extended to the concept of income. Norgaard presents a framework to understand the interaction between social activity and the consequential changes in the environmental systems. He further argues that environmental changes stimulate endogenous changes in social activity. Parsons provides an understanding of the interactions between various sub-systems of society, and most importantly for current purposes, the interactions between the sub-systems and the individual's utility function. Linking Norgaard with Parsons leads to Trosper's discussion of how differing worldviews not only explain individuals' utility functions but also determine the types of economic activity that are viable within a society. More recently, Bowles also contends that the form of the economic system influences the structure of individuals' utility functions. Bowles further argues that further investigation must be conducted involving the formation of utility functions.

This paper is organized as follows. The next section provides a background showing that the environmental movement cannot be easily explained using income and prices as the only explanatory variables. Norgaard's coevolutionary theory is briefly explained and then Parsons' theory is detailed. Trosper's discussion of worldviews is then synthesized into the developing theory. The resulting theory is then applied to recent aspects of social policy and interaction within the realm of the environmental movement. Some secondary data analysis is utilized to point towards evidence of alterations in utility functions. The article concludes with a discussion of further applications.

## THE 20TH CENTURY AND UTILITY FUNCTIONS

The 20<sup>th</sup> Century produced extraordinary events and developments literally unimagined at its beginning. As detailed eloquently by Carson (1962) and Abbey (1988) and more formally by Randall (1987) among others, one family of the most unforeseen consequences of the various developments during the Century was the impact of human activities on the planet's physical and biological environments. Although there is still strong disagreement on the various levels of environmental harm and change across the planet, there is no doubt that there has been an interaction between human society and the environment.<sup>1</sup>

These real or perceived environmental influences have increasingly stimulated interest and concern - both for and against environmental protections and regulations. An increase in the amount of resources specifically devoted to environmental concerns has resulted from these changes. For example, the National Parks and Conservation Association has increased its membership from 23,000 to over 500,000 in the last seventeen years. (Pritchard, 1997) The public's investment in time and money in many other organizations within the environmental movement has also increased. According to traditional neo-classical consumer theory, the increase in expenditures on environmental consumption results from either price or income changes. This section argues that some other influence is causing the consumption changes.

In order to understand this possibility it is important to fully define the price and income dimensions. Utilizing a spatial economics framework, Greenhut et al. (1987, page 3) explain the multidimensionality of the pricing spectrum:

When we talk of the consumer's location in a spatial sense, we can equally talk of the country in which the consumer is located, the time of day, month or year at which the consumer would prefer to purchase the commodity, or the consumer's most preferred product variety in the sense of Lancaster (1979). When we refer to the producer's location, we can equally consider the country in which the product is produced, the time of day, month or year at which it is produced, or the product variety actually manufactured by the producer. In place of transport costs, we can substitute tariff barriers, waiting time or storage time, or the utility lost consequent upon the consumer being offered a product other than the most preferred product.

Spatial economics also differentiates between the delivered price and mill or net price by taking into account transportation costs. This differentiation allows focus on the consumers' behavior based on the delivered price and the producers' decisions based on the mill price. Greenhut et al. (1987), Philips (1983), Greenhut and Smith (1993) among others have used this framework to analyze a variety of imperfect competition issues.

Borrowing this generalization, decisions regarding environmental issues can be analyzed. Of course the concept of marginal external costs or benefits is a first example of how the multidimensionality of commodities presented by Lancaster (1979) and Greenhut et al. (1987) extends to the current context. However, price changes regarding environmental goods are complex to analyze. Methods and concepts such as contingent valuation, hedonic pricing and willingness to pay/accept analysis are all used to evaluate individuals' preferences with regard to environmental issues. But these methods are lacking at the operational level. Randall (1987, p 268), although expressing hope, indicates: "Unfortunately, no general procedure for estimating implicit Hicksian demands has yet been developed." But the concept of a price spectrum is clearly recognized.

The pricing spectrum can be applied to both income and product space. Smith (1994) argues that income or "(r)esources may be measured in dollars, hours, sheep, physical energy, or interest." The combination of resource and price dimensions determines the choice space for any consumer.

As decades passed in the 20th Century, much of the world's population realized rapidly increasing incomes. Increased tourism, such as visiting National Parks, can be easily explained via these income changes. Increased participation and funding for various organizations such as the Nature Conservancy, National Parks and Conservation Association, National Audubon Society among others can also be partially explained via income increases. However, incomes in sub-Saharan Africa have been stagnant at best, yet public policy programs have led to the creation of wildlife reserves, anti-poaching programs and other conservation measures. These programs generate limited income via foreign donations by governments, tourism and environmental organizations like the

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<sup>1</sup> This paper will not take a position on any single environmental issue. Rather, the paper focuses on the fact that these issues have become an important discussion point for the global society.

World Wildlife Fund, but from a monetary perspective, they are not generally considered cost effective. In particular, due to funding problems many anti-poaching programs are in danger of being canceled, but never quite reach cancellation. This anecdotal evidence shows that income changes do not fully explain the increased devotion of resources to environmental issues. Other examples would be environmental clean-up programs, such as the Superfund, during the relatively income stagnant 1980's.

What about price changes? Decreasing relative prices would also help explain increased consumption. As mentioned above, operationalizing price changes is very difficult in the current context. Indeed in some dimensions the price changes are difficult to conceptualize: Did the price of a single condor increase or decrease as the population decreased to the point where the species was listed as endangered? Has the price increased or decreased as the population recovered to the point of wild releases in northern Arizona?

Using anecdotal interpretation, the following examples explain how some prices have in fact increased. During the 20<sup>th</sup> Century, the American and Canadian populations expanded and became far more dispersed across the landscape. More and more land was used for production, residences and transportation. Yet, although land was becoming relatively scarce, vast expanses have been set aside as national and state/provincial parks or designated as wilderness areas. Indeed, the Alaska National Wildlife Refuge and the Escalante Staircase controversies revolve around the apparent high value of the land for various productive uses other than their environmental use.

Another example of increasing prices involves air quality and the various enacted and proposed solutions to air pollution. Early improvements in air quality were fairly simple and low cost. The marginal cost of improving air quality has increased since the days of moving to lead-free gasoline and catalytic converters. Yet, communities continue to search for ways to further improve air quality as evidenced by the re-enactment of the U.S. Clean Air Act.

Recycling programs are a further example of price changes. Although many such programs respond to increasing landfill fees, many communities have not explicitly introduced the increased disposal price into the individual household's price matrix. Indeed, many recycling programs are voluntary in nature. Although the full price of trash disposal has increased due to the household's sorting of various paper and plastic types and the storage of garages full of various recyclables, these voluntary or quasi-voluntary programs have become quite popular. In many cases, the community actually faces financial losses from these programs, which results in *de facto* higher taxes for those who do (and do not) recycle.

One last example warrants attention. The global treaty negotiations at the Kyoto conference provide some interesting issues. Clearly, a successful implementation of the negotiated treaty will potentially result in decreased incomes and output as the various restrictions go into effect. The reduction of effluent will clearly increase various prices, but the international community seemingly accepted these price increases and income decreases. Yet, the countries most conservative in their willingness to face these costs were the nations with the higher incomes.<sup>10</sup> The United States was seen as a difficult participant in the negotiations due the lack of willingness to accept restrictions. Alternatively, poorer developing nations were willing to accept stricter restrictions. Although many of these poorer countries have worse air quality than the U.S., not all do. Furthermore, since the negotiations involved global warming effluents which are not particularly involved with local and regional air quality issues countries had no incentives based on local concerns.

The following assertion is sketched in the remainder of the paper: price and income changes are not sufficient to explain the increased resources devoted to environmental issues. Therefore, following neoclassical economic theory concerning individual behavior, the only remaining explanation is a change in the utility functions of individuals. It is further asserted that this perceived change is an *endogenous adjustment of the social structure*.

Since the adjustment is a departure from traditional neoclassical consumer theory, the sketch is only rudimentary. Neoclassical consumer theory has basically ignored the form of consumers' utility functions. As long as the basic axioms of consumer behavior are satisfied and the mathematical form of the function is homothetic, the analysis progresses by focusing on prices and incomes. Consequently, the behavior of consumers' utility functions has purposely been left unchallenged:

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<sup>2</sup> More recent events, just as this paper is being finalized, include the collapse of the conference at the Hague aimed at implementing the Kyoto agreement. Once again, the United States took the most conservative stance and obstructed an agreement. (AP, 2000)

The increasing criticism of this {19th Century} psychological theory (known as hedonism), and the closer role of utility in the economic analysis, led economists to abandon everything but its substance. The simple measurements of utility, the comparisons of utilities derived from different people, the use of utility arguments to support public policy proposals - all were gradually abandoned in part or whole. (Stigler, 1966, page 46-47).

Allen (1938, page 290) predates Stigler's discussion. In the process of operationalizing the idea of utility functions, he indicated: "It is quite immaterial which utility function is used to represent the dependence of utility, as a non-measurable magnitude, on the individual's purchases."

Silberberg (1978, page 215) goes one step further when stipulating, "(w)e therefore stick our necks out and assert, boldly, that all consumers maximize some utility function subject to constraints..."

Samuelson (1983, page 91) extends the discussion of utility functions toward a hollow limit:

Indeed, so far has the reaction gone that it is the belief of many that nothing remains but an empty convention. Others, who do not admit the hollowness of utility, have in some cases embraced a formulation of the analysis which is meaningless in any operational, empirical sense. The result is a curious jargon of dogmatic precepts.

Recent analyses involving utility functions include mathematical formulations to study a variety of problems concerning the *form* of demand functions, stationary strategies, and a variety of other issues<sup>3</sup>. For example, indirect utility functions are derived from a corresponding demand set. However, these works do not address the question put forth here: what determines the *form* of an individual's utility function?

Bowles (1998) argues that individual utility functions, still unmeasurable, vary depending upon the economic system under which the individual makes economic decisions. Individuals evidence differing kinds of preferences under a market, impersonal system than they do under a more personal non-market system. In this sense, Bowles argues that preferences are endogenous based upon the rules of the economic system.<sup>4</sup>

Borrowing from Silberberg, the current paper also "sticks it's neck out" by boldly asserting that price and income changes do not sufficiently explain certain changes in behavior evidenced during this Century. Therefore, the only other explanation is the utility function, which has been (almost) completely ignored. Furthermore, just as prices and incomes are treated as endogenous variables in a general equilibrium context, the bold assertion extends to endogenizing consumers' utility functions.

### NORGAARD'S COEVOLUTION THEORY

Norgaard (1994 and elsewhere) develops a body of thought based on "coevolution theory" that states that various aspects of society coevolve in conjunction with the environment. Changes in the environment influence changes in the overall society and vice versa. One example involves the historical interactions between "Pests, Pesticides, Politics and Policy". (1994, page 23ff) As DDT and other pesticides were introduced to combat various pests, it was quickly recognized that pest populations developed pesticide resistance. The creation and introduction of new pesticides followed. The environmental problems, including non-target species effects, resulted in various political discussions and new policies.

Norgaard further points out:

(I)n the coevolutionary paradigm, the environment determines the fitness of how people behave as guided by alternative ways of knowing, forms of social organization, and types of technologies. Yet at the same time, how people know, organize and use tools determine the fitness characteristics of an evolving environment. At any point in time, each determines the other. (Norgaard, 1994, page 46)

Although coevolution theory is essentially historical in nature since it cannot definitively predict the various natural or social mutations to come, it can determine some prescriptive remedies to obvious problems. Norgaard's

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<sup>3</sup> See Besley (1989), Brady and Ansolabehere (1989), Daniels and Keller (1992), Evans and Viscusi (1991), Galanter (1990), Lewbel (1995), Monticino (1991) and Viscusi and Evans (1990) for a sampling of these works.

<sup>4</sup> More will be said below concerning Bowles' endogenous preferences concept.

focus on “ways of knowing” and “forms of social organization” explains the interaction between the environment and the economy. The severe discord and deteriorating coevolution of the universe of man due to environmental damage, call for new “ways of knowing” as well as new social organizations:

the emphasis shifts from flows of materials to flows of values, ways of thinking, technologies, ways of organizing people, and natural genetic material. Do not think of these flows, however, as mundane economic exchanges typical of modern trade... If the newly introduced value, way of thinking, technology, way of organizing, or species prove fit, it will subsequently affect the fitness of other components of the system and thereby change the coevolutionary path of the system, cultural and biological. (Norgaard, 1994, pages 175-6)

On one level, Norgaard’s theory could be limited to a discussion of prices and incomes. Humans’ interactions with the environment, and the corresponding environmental response, during the recent past have significantly altered the price matrix as discussed above. But his ideas go beyond simplistic (mundane) price changes.

For example, as various environmental realities came to bear, extensive research was conducted to ascertain causation and correlation between human activity and environmental response. New disciplines and technologies developed to conduct this research. The often contradictory results led to new policies and practices. Perhaps most importantly, the changes came about due to increased (supposed) knowledge concerning the interactions between human activity and environmental responses. These altered “ways of knowing” clearly resulted in changes in individuals’ utility functions as evidenced by the implementation of various and extensive environmental policies such as the Endangered Species Act.

Using the sophomoric determinants of individual demand functions, individuals’ “tastes and preferences” were altered. Considering the theoretic derivation of Marshallian demand functions, “tastes and preferences” dictate the form of the individual demand function. So, apart from any price and income changes, the altered ways of knowing, due to the environmental responses to human activities, also influenced changes in consumption. The manner in which individuals value goods, including environmental activities, changed; thus, marginal utilities changed which in turn changed marginal rates of substitution and therefore the resulting demands.

For example, Hotelling’s (1931) seminal paper eventually led to a major reevaluation of natural resource depletion<sup>5</sup>. Subsequently, the World Bank developed a policy based on the optimal depletion rate of renewal forest products and the replanting of cleared forests based upon a Hotelling-styled growth rate versus discount rate. However, the resulting monoculture forests limited biodiversity and were susceptible to disease and pests - the environmental response - and this result was supported by further research and commentary. Further analysis of this environmental response to human activity resulted in the World Bank reevaluating the Hotelling-styled policy. The newly structured policy now supports multiculture replanting, which seemingly contradicts Hotelling’s dogma of optimal resource use.

Following another seminal paper by Coase (1960), the spawn of which lead in two distinct directions. The so-called Coase Theorem<sup>6</sup>, based on the assumption of zero transaction costs, led directly and indirectly to the private property rights school of thought: individual actions can lead to efficient allocations as long as property rights are designated. This portion of Coase’s paper has led to a variety of policy alterations and political altercations.

Coase’s real purpose was quite the opposite. “The world of zero transaction costs has often been described as a Coasian world. Nothing could be further from the truth. *It is the world of modern economic theory, one which I was hoping to persuade economists to leave.*” (Coase, 1988, 174, emphasis added.) He realized the importance of transaction costs. When transaction costs are relevant, as is the case in most of the currently appropriate areas of discussion, Coase argued against the private solution. The recognition of transaction costs, in essence a price increase, not only alters consumption behavior, but also changes our way of knowing and forms of social organization by requiring non-market institutions to intercede in the decision processes.

Norgaard’s coevolution theory is consilient with Parson’s neo-evolutionist concept of social evolution. The next section focuses on structural differentiation and the evolutionary aspects of articulation between the various social sub-systems.

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<sup>5</sup> This discussion is borrowed from Norgaard (1990).

<sup>6</sup> Stigler first coined the term “Coase Theorem” to explain the theory of internalizing externalities. (Stigler, 1966, 113). See Medema (1994) for a retrospective on Coase’s paper and his own thoughts of the aftermath.

## PARSON'S NEO- EVOLUTIONARY THEORY

Parsons (1957 and elsewhere ) explains how culture is a dynamically moving set of social sub-systems, and that when any one sub-system is knocked out of equilibrium, then the whole set of sub-systems must adjust to the new structure.<sup>7</sup> Parsonian sub-systems can be briefly described as involving sections of the social fabric. For example, extending Parsons' own work, sub-systems include the economic system, religious system, familial system, artistic system, and for current purposes, the environmental system. Equilibrium is obtained when the various sub-systems reach a point of stasis. This by no means implies that the social structure has reached a point of unconstrained or even constrained optimization; rather, given the governing body of constraints and interactions, the system has reached steady state. This theory of social change has been dubbed "neo-evolutionary."<sup>8</sup>

Parsonian theory also indicates that society is in ever-evolving and fluid movement as the various sub-systems constantly strive for compatibility. This point is furthered by Morse (1961, page 125):

A basic distinction is drawn between the *production* of wealth and income and their actual use for the attainment of system goals. This seems to mean that there is conceived to be a basic distinction between (1) the allocation of resources and (2) the distribution of income. Economic theory treats these as two aspects of a single process. When Parsons implies that the former is the function of the Economy, the latter of the Polity, he is therefore making a sharp but perhaps important break with a well-established intellectual position. (Emphasis in original.)

Thus using parsonian theory, the very form of an individual's utility function is determined, in part, by the interaction between the various social sub-systems since a distinction is made between production and goals. Furthermore, the interaction between the economic sub-system and the remaining sub-systems in part determines the very methods of production and distribution of output. Of particular importance is the interaction between the economic and environmental sub-systems.

Following Norgaard's co-evolutionary theory, the changes in the environment caused by the economic system in the 20<sup>th</sup> Century have severely changed aspects of the environmental sub-system. The following is an exemplar of how neo-evolutionary theory helps explain how society has searched for a new point of compatibility.

The economic evolution due to the rapid expansion of petroleum use has been very well documented. Although controversial results are still present, the environmental consequences of the expanded use of petroleum and its derivatives are also well documented. This exemplar uses these two bodies of literature to continue the sketch of endogenizing utility functions. In order to maintain simplicity, the issue of U.S. urban air pollution is the focus.

The rapid development of the U.S. economy included the drastic reduction in automobile and gasoline prices. The extensive explosion of automobile use resulted in deteriorating air quality in many urban areas. Of course, the vast increase in effluent strained the environment's ability to cleanse itself. As the economic system continued to impact the environment, society's environmental sub-system (how society interacts and interprets the natural environment) began to change in a Parsonian manner. Various local, state, and national policies were enacted via the political sub-system. Simultaneously, the scientific sub-system was adjusting to a newly available research avenue. As the medical, chemical, environmental and other research results became known, more policy was enacted. The economic sub-system also adjusted due to the new policies.<sup>9</sup> More importantly, and this is the crux of the matter, other aspects of the social fabric also adjusted.

As the results of scientific research became known via academic, scientific and subsequent popular press, social activities began to change. Borrowing from Freud, Mühlmann (1996, page 3) calls this phase the ecological humiliation:

This made producing peoples of the industrial age realize to their disappointment that the earth does not have unlimited resources at its disposal and unlimited space for waste products.

This endogenous social humiliation is passed from society and its sub-systems to the individual, thereby changing behavior.

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<sup>7</sup> See Black (1961) for a detailed introduction to parsonian theory.

<sup>8</sup> See A. Smith (1973) for a critique of neo-evolutionary social theory. He disagrees with the construct since it is an "endogenous paradigm of change." (Page 149) Of course, this characterization makes it an even stronger tool for use herein.

<sup>9</sup> This vastly simplified exposition skips over the influence of the OPEC oil crises and increased automobile imports.

## TROSPER'S WORLD VIEWS AND SOCIAL CHANGE

Trosper (1992) discusses the importance of various mind sets and the success of economic development programs. In terms of environmental mind sets, he develops a spectrum of worldviews. He distinguishes six differing worldviews depending on nine dimensions. For example, humans either live in harmony with nature - a Native American perspective - or humans have a mastery over nature - a mainstream perspective. Trosper further argues the form of a society's predominant world view influences the very type of economic activity that will be viable within a society.

Trosper (1995, page 67) furthers his ideas with a discussion of what he calls "respect" toward the world around us. In this sense, he indicates four aspects of respect regarding the relationship between human activity and the environment. These facets include: 1) the relationship between individuals within a community, where the community includes "human-to-animal and human-to-plant relationships"; 2) the connectedness within the community which provides a source of obligation; 3) the obligation to pass on the legacy of past generations to future generations "as far as the seventh generation"; and 4) the need for humanity to be humble toward the natural world.

Once the need for respect is realized, Trosper concludes:

(T)he implications, for economic development, of an attitude of respect suggest that traditional Indian economic policy should be very different from what historically has been called economic development, namely high rates of increase in per capita income, combined with population growth and structural transformation. (1995, page 76)

Trosper is echoing Boulding's (1966, page 10) comment that "(t)his idea that both production and consumption are bad things rather than good things is very strange to economists."

More recently, Trosper (1998) extends the ideas of differing worldviews and respect for the environment by studying land-use institutions and ecosystem management. As his theory has developed, he has gotten more detailed in the consequences of differing worldviews on economic activity. Trosper's ideas are consistent with Parsonian and Norgaard perspectives. One can see the linkages between ways of organizing, ways of knowing or worldviews, economic activity, and environmental interaction influencing the outcomes realized by society.

## ENDOGENOUS UTILITY FUNCTIONS?

Failing the argument that consumer changes are fully explained from a price and income perspective, neoclassical consumer theory leaves only changes in individuals' utility functions as explanatory vehicles. Merging Norgaard, Parsons and Trosper's views allows for an understanding of how the utility function can become an endogenous portion of the analysis. Before further sketching the theory, the failings of existing analysis are explained by Eriksson (1995, page 33):

I think that it is not an overstatement to claim that there has been a tendency among social scientists and especially economists themselves to reduce economic choices to a mechanical action which is quite independent from its cultural context. I do not mean here only the strict optimizing approach in microeconomics textbooks, but the substantial emptiness which economists and perhaps also other social scientists tend to attribute to the economic agent. *Homo oeconomicus* seems to have to do with 'brute satisfaction' of *simple* (individualistic) biological needs while *homo sociologus* is considered to be involved in the satisfaction of *meaningful* ('social') needs. (emphasis and parentheses in the original)

Norgaard essentially endogenizes the relationship between *homo oeconomicus's* actions and the environmental feedback. Parsons endogenizes the relationships between *homo oeconomicus's* actions and the remaining sub-systems of society. In other words, the richer analysis results in what Eriksson calls *homo sociologus*.

The operational aspects of endogenizing utility functions are beyond the scope of the current paper; however, some of the issues need addressing. Readily recognizing differences between individuals, one might think of a "distribution" of utility functions across a given population. One of the difficulties in operationalizing the concepts herein concerns the time span required for the evolutionary aspects of social change. As such one might further the endogenous changes in the "distribution" of utility functions moving across time and generations. In this framework, not only does a single individual's utility function change over time, but as new generations replace older generations, the family of utility functions for the overall population also changes.



Perhaps this last point is more important. Although rapid change can be confusing to any one individual, the vast increase in information, knowledge and understanding concerning society has resulted in very different worldviews as the generations passed through the 20<sup>th</sup> Century. Trosper recognizes this idea:

The fact that many non-Indians are becoming more interested in Native American worldviews may be a result of the fact that the consequences of modern economic growth have made several of the assumptions of traditional Indian people seem more relevant. The ubiquity of problems generated by the disposal of waste products has made the assumption of connectedness seem important. The possibility of major catastrophe based on global warming has given the assumption of humility more appeal. Difficulties based on mistaken application of technology seem to have the potential in the near future. The basis of the fears, however, is still limited to the impact of unintended consequences on human livelihood and on this generation and the next. (1995, page 90)

Trosper is essentially arguing that individuals' utility functions are determined, at least in part, via worldviews. He further recognizes the importance of education and knowledge in the formation of worldviews.

However, as previously mentioned, it is not the intent of this paper to argue the need for more environmentally friendly worldviews; rather, the intent is to show how utility functions are indeed an endogenous aspect of the social and individual decision process. The distribution of utility functions has not simply shifted in one direction.

The social changes have not been without protest and controversy. Although many of these protests can be easily argued via price and income changes, there has also been increased activity that is not as easily explained. Cloaked in the guise of property rights and the Constitutional prohibition on the taking of private property, i.e., price increases and income decreases, many organizations have become important political and social actors. For example, the Wise Use Movement is an important political force in the western States.

In other words, social changes resulting from the coevolution of social sub-systems and environmental changes have yielded a new distribution of utility functions. The continuing adjustments within society will continue to ebb and flow in a Buchanan sense.

### **SOME EXEMPLAR EVIDENCE**

Recent survey reports offer some insight on the distribution of utility functions. Dunlap, Gallup and Gallup (1993) conducted an extensive survey in two dozen countries to evaluate environmental viewpoints. Ellis and Thompson (1997) surveyed distinct factions with regard to their environmental views. These cross-sectional studies can be applied in the current context.

Dunlap et al. (1993) found some surprising results in their survey. These results were surprising in that they did not support the usual assumptions concerning income differences and class status. Using a division of "industrialized nations" and "developing nations" the data were segmented.

The seeming normality of environmental quality as a consumption good was not supported by their results. They conclude that the results "contradict the conventional wisdom that citizens of the industrialized nations are more concerned about such problems than are those of the developing nations." (page 13)

The authors also suggest that environmental concerns have changed in the United States between earlier surveys in the 1970s and 1980s and their survey. This change points to an evolving distribution of utility functions between generations.

Presenting further suggestions of how the proposed theory influences individuals' utility functions, they find that individuals' concerns typically increase with respect to time. When asked about environmental concerns (health influences) ten years ago, now, and twenty five years hence, the concerns generally increased over time.

Moving from perceptions and concerns, the authors then evaluate the duality of economic growth versus environmental protection.

Even more surprising is the fact that there is not a major difference between the industrialized and the developing nations in relative emphasis on environmental protection over economic growth. (page 34)

The surprise comes about because the "conventional wisdom" is that developing nations are more concerned with development and growth. Recall the discussion above concerning the negotiations on the Kyoto treaty.

Keeping in mind the drastic income differences between the populations in the sample, the authors were further surprised when investigating a willingness to pay higher prices if necessary to control for environmental protection.

Although residents of the industrialized nations are clearly more likely to say they are willing to pay higher prices for environmental protection than are residents of the developing nations, the *differences are not as large as one might expect* in view of the much larger variation in the “ability” to pay and the residents’ relative impact on the environment. (page 34, emphasis added)

Dunlap et al. conclude that the results do not support “widely held theoretical perspectives” with regard to price and income differences and to individuals’ environmental concerns. “(E)nvironmental quality is no longer seen as a postmaterialist value and that environmental degradation is increasingly recognized as a direct threat to human health and welfare.” (page 37) Which is exactly what would occur when utility functions are endogenous as described above.

Responding to Dunlap et al., Ellis and Thompson attempt to investigate a more probing issue. Instead of simply “what” individuals’ views are, they tried to determine “why” individuals hold different views by studying the “cultural sources of environmental attitudes and beliefs.” (page 885) The authors segmented their data according to participation in various environmental activist groups. They included a “control” group of environmentally “inactive” citizens.

The authors rank the various environmental organizations based upon a perceived level of activism. The data segmentation also includes a distinction between a respondent being a member versus being a leader. From this ranking, it might be implied that members of the control group spend relatively fewer resources - in a Greenhut sense - on environmental activism than members and leaders of the more extreme groups.

One of the results from their survey studies differences in - using the Trosper term - worldviews with respect to egalitarianism, hierarchical structure and individualism. The authors find the expected results that the higher the level of environmental concern, the higher the cultural bias toward egalitarianism. “(T)he cultural gap becomes more pronounced as one moves toward higher activism and leadership... the more active members consistently express greater antipathy to individualism, greater support for egalitarianism and more distrust of hierarchical authority relations.” (page 891)

Interpreting this result, one sees that one’s worldview has a strong influence on the form of individual utility function and the resultant behavior. As the authors conclude, “once an individual opts for a particular set of ideas and institutions, a wide range of other attitudes and behaviours follow.” (page 893)

The two cross-sectional studies support the theory developed above: with respect to environmental concerns, income and price differences do not fully explain differences in behavior. Further, differences in worldviews directly influence individuals’ behavior.

A much less robust study by Reynolds (1998) was based on a very small sample of 16 self-selected students. Using holistic measures of behavior, he evaluated the students’ environmental perception at the beginning of a semester and again at the end of the semester. Although the course covered the topic of Environmental Management, the data appear to show that perceptions were modified during the course. If further study shows these results to be valid, then there is clear evidence that individuals’ utility functions are indeed endogenous in the sense described above.

## CONCLUSIONS AND POTENTIALS FOR FURTHER RESEARCH

Simply put, price and income changes do not fully explain the altered consumption behavior witnessed during the 20<sup>th</sup> Century. Greenhut et al.'s concept of multidimensional prices can be extended to the concept of income and thereby used to better understand individual decision behavior. Combining Norgaard's coevolution theory with parsonian neo-evolutionary theory fills the void in knowledge by explaining how utility functions are endogenously changing due to the other changes in society. Accordingly, in a general equilibrium sense, not only are prices and income endogenous, but individuals' utility functions are as well.

Trosper's discussion of worldviews extends this understanding by showing how differing utility functions not only influence individual behavior but also the very type of economic activity within a social structure. Of course, this further explains the endogenous aspects of the system.

Due to environmental issues, Boulding argued in 1966 and Dietz and van der Straaten voiced in 1992 that a reformulation of the basic economic problem needs to be designed. This paper has sketched a background for endogenizing the utility function into the basic economic problem. This introductory sketch leads to several additional issues.

As discussed above, one of the reasons why the determinants of utility functions have been left unanalyzed is due to the very difficulty of doing so. Recalling Stigler's discussion of 19<sup>th</sup> Century utility analysis, only the naked substance of utility is left. The formalization of utility functions, such as defining a measurable unit of measure, still begs much more contemplation. Regardless of the problems with operationalizing endogenous utility functions, which have been ignored anyway, this sketch has several obvious applications.

Trosper (1995) and Smith (1998) both argue for understanding the importance of a Native American worldview when analyzing economic development within an environmental framework:

Although many people agree that traditional Indian values are relevant, the study of the implications of those values for contemporary management issues has just started (Trosper, 1995, page 90).

Within the mainstream economy, the environmental sub-system has been one of choice: exploit a resource or leave it alone. As discussed above, many pre-contact Native American societies had extensive and complex economies while living in harmony with the environment. The Native American environmental views did not ask the question of whether to exploit or not; rather, the question was one of how to live within the environment (Smith, 1998).

Clearly, these recent analyses extend Martin (1981, 13): "So it was in the heat and froth of the 1960s environmental movement, yet another title – 'ecological Indian' – was conferred on the idealized Native American, who was paraded out before an admiring throng and hailed as the high priest of the Ecology Cult." As Trosper points out, further analysis is called for.

Apart from extending the current application into further analysis of environmental issues, this concept of endogenous utility functions has some additional explanatory possibilities. Four examples come to mind.

Bowles (1998) argued that endogenous preferences obtain due to differing economic systems. Perhaps Bowles' endogeneity should be extended to the economic and political systems. Recent turmoil in Russia points to interesting points of departure. One interpretation of the turmoil is that the communist members of parliament yearn for a return to a system similar to the former Soviet Union.<sup>10</sup> This is due to the stability of the former system. Since a democratic system is completely new to this culture and instability is obvious, the politicians wish for a return to the past. However from environmental and other perspectives, the collapse of the economic and political systems of the former Soviet Union was endogenous. Following Norgaard's ideas, the experiment with communism resulted in a dynamically unstable parsonian structure. The environmental and other problems created by this system resulted in its overthrow. This is not dissimilar to the problems faced by the global economy discussed earlier.

Bowles would argue that the new economic system has altered preferences which have been endogenously modified following Parsons, Norgaard and Trosper,. At this writing the outcome of the Russian turmoil is unknown, but following Boulding's forethought, perhaps the "Spaceship Earth" endogenizes the very social structure.

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<sup>10</sup> This discussion is based on a news report on *All Things Considered* on National Public Radio, August 31, 1998. The report considered the failure of the Russian Parliament to agree to a new Prime Minister.

The next extension of the endogenous utility theory involves a better understanding of the civil rights movement in the United States using the framework herein. In particular, the civil disobedience and violence of the 1960's could be explained by an endogenous distribution of utility functions. Although a different set of dimensions would be used within Trosper's analysis of worldviews, the framework can be adapted. The framework could also be used to help comprehend the more recent changes in South Africa.

A third extension is also apparent. Recent catastrophic social unrest in Eastern Europe and sub-Saharan Africa has evidenced drastic changes in behavior. In Eastern Europe's case, the changes can be thought of as primarily endogenous in nature since the initial shifts occurred following internal political change. Alternatively, the African shifts can be thought of as due the de-colonization period.

Another example involves a very different type of analysis. An essentially new society is developing on the Internet. The technological advances of recent decades have created new possibilities for studying social behavior in general and economic decision making - in a Greenhut sense - in particular in this burgeoning new mode of discourse.

Two last examples return to the environmental facets of social decision making. The implications of these examples truly shows that utility functions, and therefore social and individual decisions are endogenous.

BP Amoco is the sole owner of BP Solarex, which is the largest producer of solar panels in the world. One page of their web site is a calculator showing the cost of various sizes of solar panels based on location and utility rates.<sup>11</sup> The calculator includes the estimated monthly cost and the *annual estimate of carbon dioxide reduction*. In other words, to make the purchase preferable, the company is appealing to the individual's environmental consciousness of global warming issues.

The most recent edition of *The Academy of Management Journal* (August 2000) is a special research forum on "The Management of organizations in the Natural Environment." In their introduction to the edition, Starik and Marcus explain:

Two common explanations of the emergence and study of 'greening organization' are (1) that this development was the *evolving* outcome of the environmental and social movements that received considerable attention in the 1960s and 1970s and (2) that the perception that organizational entities have or could have significant impacts, where positive or negative, real or imagined, on their respective ecosystems, become increasingly widely held, providing *various motivations* for organizational change. (page 539, emphasis added)

This final quote includes several important aspects. The first is the active verb of 'greening,' since this implies that organizations are undergoing substantive change. The second is the idea that organizations are undergoing this change *and* therefore require study. The last point is that organizations are undergoing these changes based upon the responses of their customers, whether or not those responses are based upon scientific knowledge or public opinion: whatever sells as long as the customer gets the largest marginal utility per dollar spent. The idea of endogenous utility functions is actually being practiced in corporate boardrooms even if it has been ignored by social scientists!

In conclusion, this sketch of endogenous utility functions has been developed in order to understand the changes in individual and societal behavior as our human culture and the environment continue to co-evolve. To borrow Eriksson's term, perhaps the time has come to begin studying *homo sociologus*.

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<sup>11</sup> <http://www.bpsolarex.com/calculator/default.htm>. An example of the calculation is: A 1 kW photovoltaic system in Flagstaff, AZ will cost \$22 per month and eliminate 2,151 lbs of CO<sub>2</sub> emissions in the first year. Assumptions: \$8,200 cost is reduced to a \$7,480 net cost after all economic incentives, \$1,200 per year electric bill, APS Standard Plan rate schedule, system financed with 8%, 30-year loan with tax-deductible interest for a residential customer with a taxable income of \$80K (Form 1040, Line 38) filing as married joint.

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