Modifying the Neo-Classical Approach to Technology Adoption With Behavioral Science Models

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Abstract

The dualistic nature of humans has been recognized for centuries. The intriguing question is the extent to which the human being with her/his display of concern for others can simultaneously act as an egoist, the latter being descriptive of the *homo oeconomicus* rendition of the human. Multiple utility theory suggests a way to approach research on such issues. A test case of water conserving technology adoption behavior by Florida growers is examined. Empirical evidence supports moving toward an expanded version of the mono-utility or I-utility model to include a We-utility.

Key Words: behavioral economics, conservation technology, meta-preferences, multiple utility, socioeconomics, technology adoption.

The search for ways to improve on the neoclassical economics model came about in a somewhat fortuitous manner. A PhD student by the name of Leandro Rola and I were funded by the Florida office of the U.S. Soil Conservation Service to help set a cost share level that would lead to Florida Panhandle area farmers adopting soil conserving practices. We approached the problem with derived demand and profit maximizing behavior theory. Mr. Rola did his best to apply this model with limited success. Especially unsettling was the fact that any one of several "socioeconomic variables" such as age, education, perceptions, and attitudes commonly used in the conservation adoption literature, see e.g., Ervin and Ervin (p. 287) improved the statistical properties of the derived demand model, even though derived demand theory did not suggest why this may be the case. Dr. Rola went back to the Philippines and I embarked on an odyssey, more specifically a shopping trip, into the behavioral science literature.

The journey led into anthropology, psychology, and sociology, eventually settling into social psychology. Maybe it was the frustration revealed in the latter literature that intrigued me. The social psychologists were suffering a crisis in the discipline (See Ajzen and Fishbein, 1977) which by now I was convinced we in Ag Econ should be having especially with respect to the conservation technology adoption literature. While they had spent decades evolving the concept of attitude and relating it to behavior, the empirical evidence was sparse that there was much of a relationship at all. This was especially disturbing in that the attitude concept is a close kin to the utility idea, in that attitude reflects and measures latent utility. It was singularly significant in that the Ag Econ adoption

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literature also had not established there was much of a relationship at all between adoption and the variables suggested by derived demand theory.

Looking back, the Ajzen and Fishbein (1977) contribution went a long way toward saving the social psychology discipline by clarifying the need to carefully align action, target, time and context. Both the socioeconomic variables, e.g., attitude and the action "install a conservation practice," had to be measured at the same level of specificity. As they note (p. 889), "a given action is always performed with respect to a given target, in a given context, and at a given point in time." Thus, a general attitude favoring conservation practices being applied in the Great Plains cannot be expected to predict a specific farmer action like buying a minimum tillage grain drill in North Dakota in March in order to reduce soil erosion during the upcoming spring wheat season on a particular field: the levels of specificity need to match. This was extremely insightful. Possibly even more importantly, they argued the need to account for that part of context pertaining to the social norm, i.e., that perhaps the North Dakota farmer's perception of what others in the community think is appropriate behavior may well affect a decision. The problem in the conservation adoption literature became clear: variables with widely different levels of specificity were being used, and modeling was being accomplished without due regard to measuring community influences. These pseudo-neoclassical frameworks in the sense that variables such as age, education and perception were making there way into the models were leading to predictably low explanatory power. The conservation adoption literature (see Nowak's review) is lacking in theoretical justification for such variables which also leads to mistakes in selecting the levels of specificity.

Significantly, a few economic researchers have been recognizing something is missing. To their credit, Ervin and Ervin included the variables "SCS cooperator" and "whether the farm is in an organized watershed" and thus implicitly recognized the need to account for perceptions about the social norm. These analysts were clearly thinking about something beyond the neoclassical theory of derived demand.

The social psychologists and a few economists seemed to be on to something: the shopping trip started to produce usable fruit. Findings in Lynne, Rola and Shonkwiler and Lynne and Rola provide evidence of the need to be careful with specificity, and possibly even more importantly, that there was some community influence beyond self-interest affecting farmers. The search was refocused for even better ways to account for how the "We" affected the "I" in the decision to install technology. The "I" and "We" terminology parallels the use in Etzioni (1988b).

Problems With the Self-Interest Formulation of Behavior Motivation

This problem is not new. We have to go back at least to Adam Smith and need to recognize (see Kolm) Hume, Edgeworth, Marshall, Walras, Bentham and not the least, John Stuart Mill. All have had concerns about the dualistic nature of the human. This duality led Smith to write two books: the Wealth of Nations with its appreciation of the self-interest seeking, "I" nature of humans, and the Theory of Moral Sentiments, with its recognizing the attention that the individual pays to the "We" captured poignantly in Smith's words (cited in Kolm, p. 22)

> How selfish soever man may be supposed, there are evidently some principles in his nature, which interest him in the fortune of others, and render their happiness necessary to him, though he derives nothing from it, except pleasure of seeing it.

Yet, the Wealth of Nations suggested that it was not benevolence but rather the pursuit of self-interest guided by the invisible hand, that leads to national wealth. Kolm (p. 22) notes this contradiction between Smith's two works was even given a name by German scholars, "Das Adam Smith Problem." In effect: How can the human with her/his concern for others simultaneously display the egoistic behavior of *homo oeconomicus*? And, could a society based on egoistic action truly become wealthy while denying any interest in the fortune of others? These are important questions: at the largest scale, at stake here is the technology we

adopt and subsequently how we organize ourselves to live together on this planet. Much of the debate over sustainability and the need to have not only a socioeconomics but also an ecological economics is at base about these matters.

Recent Writing on Alternatives

Three especially significant papers need attention, Sen, *Rational Fools: A Critique of the Behavioral Foundations of Economic Theory*; Hirschman, *Against Parsimony: Three Easy Ways of Complicating Economic Discourse*; Etzioni (1986), *The Case for a Multiple Utility Conception*, and the book by Etzioni (1988b), *The Moral Dimension, Toward a New Economics*. The titles suggest an ongoing remodeling of neoclassical theory will require us to sacrifice the simplicity of the single utility model, and to rethink the strict adherence to the narrowness of the neoclassical rationality assumption. Importantly, a not insignificant portion of the profession is starting to recognize this need: there are well over 100 derivative works from the Sen paper alone.

Sen is concerned that egoism, i.e., that the "I" is activated only by the pursuit of self-interest, while persistent in economics is not particularly realistic. Even Edgeworth, who clearly favored the eogistic model, argued (cited in Sen) "the concrete nineteenth century man is for the most part an impure egoist, a mixed utilitarian." The 20th and 21st century man may be no less so.

Sen (p. 318) wonders why Edgeworth in his 1881 Mathematical Physics book still retained the unrealistic assumption of egoistic humans in pursuing general economic questions, much like modern economics. Might it be just that economics can consider only certain types of decisions? Many decisions will then fall outside the realm of economics, including (I suspect) virtually all technology adoption decisions. Sen (p. 318) points out that even if one does not wish to address the broad social interest it still may be necessary to do so in the large middle ground between the claims of oneself (the self-interest) and the claims of all (the community interest), with that middle ground including the claims of many groups, "...families, friends, local communities, peer groups, and economic and social classes."

Maybe modern economics has been narrowed so that it can address only that set of behaviors where the "We" does not matter. For the day-to-day purchases of personal items, like toothbrushes, a hamburger for lunch, and gasoline for the car, for example, there may well not be a substantial "We" component. In fact, just maybe many questions addressed in Ag Econ simply do not command attention to the "We." Not true, however, for the Ag Econ resource economist trying to estimate contingent values, the Ag Econ rural development economist assessing community cohesion in the face of economic change, and the Ag Econ production economist trying to understand how a veal grower might react to animal rights groups protesting hanging calves in straps or an environmental group calling for the regulation and maybe even the banning of certain pesticides.

Sen introduces the ideas of Sympathy, Meta-Ranking, and Commitment. He notes how an "I" may be sickened when s/he hears of torture, which uncovers sympathy for the "We", and may indeed do something about it, disclosing commitment to the "We". Both cases suggest action which does not serve the "I" self-interest. Sympathy describes the case where the "I" is psychologically dependent on someone elses welfare, as captured in the idea of interdependent utility. Commitment is substantively different, revealing a dimension of the human psyche pertaining to personal welfare, as unique from personal choices. Sen(p. 329) notes how commitment "drives a wedge between personal choice and personal welfare, and much of traditional economic theory relies on the identity of the two" ... the wedge demonstrated by (p. 327) "...a person choosing an act that he believes will yield a lower level of personal welfare to him than an alternative that is also available to him." Sen (p. 330) notes how commitment is probably not important for consumer good purchases although commitment may enter more indirectly in the need for honesty in market trades. For the public goods, people are not always free riders: there is in fact commitment. Sen's meta-ranking adds the further idea of the ranking of preference rankings, or meta-moral ranking (p. 338).

Sen's (p. 323) bottomline is straightforward enough. The neoclassical model has too little

structure. It tries to do too much, in that choice may often reflect a compromise already made between I and We considerations. It also does too little, in that the model presumes that one can observe choice to know preferences.

What structure do we need? Sen is suggestive. There must be some way to account for what is good from both the social (We) and the individual (I) point of view. The structure needs to provide ways to consider rankings of preference rankings (p. 336).

This idea is reinforced and further developed in Hirschman (p. 18) who draws on Hirsch:

> once a social system such as capitalism convinces everyone that it can dispense with morality and public spirit, the universal pursuit of self-interest being all that is needed for satisfactory performance, the system will undermine its own viability which is in fact premised on civic behavior and on the respect of certain moral norms to a far greater extent than capitalisms official ideology.

Social norms matter. He makes the case that the pursuit of self-interest may be what is revealed in choices, but then again maybe not in that it depends on the type of decision. Many if not most decisions also involve complex psychological and cultural processes involving pre-decision reflection, which is a part of the meta-preferences idea. A farmer may have a meta-preference favoring soil conservation over profit seeking and a self-interest preference for profit. The one wining out depends upon how these are weighed.

Hirschman sees meta-preferences as reflecting broader social values, e.g., against wasting soil and water. As a result, legislators may "legislate" these values at the meta-preference level, with the hope that farmers will also change their meta-preference for conserving water. Thus, legislators will not usually favor pollution taxes or emissions credits markets, or water markets, because such market-like and market processes are seen as operating at the preference level where more fundamental value issues are not being addressed. This is a hypothesis needing testing in light of the fact that it may explain why corrective taxes and emissions/resource markets are simply not often used. Witness the extensive technology regulation, generally, in the resources/environmental improvement arena (e.g., water, fisheries, pollution).

Hirschman (p. 18) also warns, however, that meta-preferences reflected in the public spirit while they may atrophy "when not adequately practiced and applied" which leads to the self-destruction of a system of individuals pursuing only the self-interest, may also actually become scarce "when preached and relied on to excess." Thus, there is a need for a creative tension between the self-interest and the public interest. Too much of either may hurt the economy.

George provides a way to symbolically represent the meta-preference idea. Consider the Florida strawberry grower who is examining the adoption of new water conserving technology (N) over using the older higher profit irrigation technology (O):

Meta-preference	NO > ON
Preference	ON
Choice	O

This grower meta-prefers "a preference for new technology over old technology" to "a preference of old over new water saving technology," i.e., NO > ON, so s/he is a conservationist at heart. The preference however is for ON, because more money can be made. The farmer chooses to be a non-adopter, choosing O. The farmer is rational in that preferences and choices are consistent. The meta-preference was not sufficient to override the preference. There is chronic discord, however, or "intrapsychic conflict" and "stress," which may actually reduce the capacity for rational choice (Etzioni, 1986, p. 177), due to meta-preferences not matching preferences.

There is another possibility. This same grower may in fact choose N. Is this farmer irrational, as would be suggested by the neoclassical model, in that preference does not lead to choice?

The answer is clearly no: the farmer has just rationally given her/his meta-preference for doing the right thing more weight.

Etzioni helps us take the next step by linking the sympathy, commitment and meta-preference ideas to standard utility theory by arguing that people pursue at least two irreducible utilities, pleasure and morality. The former reflects the pursuit of self-interest, the latter the public-interest, the "I" and the "We" as he refers to it. Mono-utility is too parsimonious (p. 159). Etzioni (p. 166) draws on Sen and Hirschman: Etzioni's moral dimension is Sen's commitment and Hirschman's meta-preference. Etzioni's (p. 169) main concern is that pleasure seeking acts (e.g., more profit from irrigating strawberries) and moral commitment (e.g., saving water is right for the community) are sometimes incompatible. Methodologically, add as many utilities as needed as long as each addition significantly increases our explanatory power without introducing so many as to experience conceptual anarchy (p. 171): he settles on two.

The need to account for interaction is a recurrent theme in this literature, in simplest terms, "There is no We without a Me, but a Me needs a We to Be," paraphrasing a colleague, Professor Chris Andrew. Etzioni (1988b, p. 9) suggests, "--- people are like porcupines in the cold: They freeze if they get too far apart, but stick each other if they get too close." There is likely significant interaction between these utilities.

Why Should Agricultural and Applied Economists Care?

It may not be necessary that all care, but which technology a farmer chooses is a decision with broader social consequences, as well as having implications for the farmer's immediate family. The need for a new look at adoption modeling is suggested by several anomalies and paradoxes.

Just why is it that farmers have obviously non-profitable soil conservation practices like terraces and contours on their farms? Why don't they just simply mine out those farms and do something else? The meta-preference for long-term sustainability may be at work here. Regarding farm equipment: why is it that farmers drive green tractors when the just as functional and lower cost red ones will do the same job? Might the meta-preference for group identity be at work? Pertaining to fertilizer and pesticide use decisions: why do many farmers use chemicals in socially responsible ways (granted some do not, why not)? Might the commitment (or little commitment) to doing the right thing be at work?

There may also be another reason to care. Never before in the history of American agriculture have there been so many regulations which set out to control "what goes on down on the farm." Florida growers speak of this activity disparagingly as "micro-management." The reason for discord can now be explained, especially when the meta-preference is imposed from the outside. The meta-preference idea can also be helpful in exploring whether the imposition of more external control could actually lead to less technology adoption (as in Lynne et al., in press)

Ways to Empirically Test and Otherwise Implement These Alternatives: Look to the Social Psychologists

All fine and good, but how are agricultural and applied economists to assess such abstract ideas as commitment, metapreferences and the moral dimension in empirical work? Sen (p. 342) has noted the empirical importance of commitment has yet to be established. Here enter the social psychologists.

Expectancy-value/valence models are the link. As Feather (p. 1) notes, the model goes by a number of names, with decision theorists calling it the "subjective expected utility model." As Feather (p. 1) summarizes,

> The terms expectation and expectancy are used interchangeably and they are indexed in terms of the perceived likelihood that an action will be followed by a particular consequence -- that is by a subjective probability that the consequence will occur given the response. Similarly, there is a high degree of overlap in the terms used to refer to the

> subjective value of the expected consequences. Among the concepts that have been employed are incentive values, utilities, valences, and reinforcement values --

In general terms, the expectancy value model becomes the expected utility model in the economist's vernacular, and suddenly we discover that social psychologists and economists, indeed, have much in common.

The most recent version of the expectancy value model gaining considerable attention in social psychology is the Theory of Planned Behavior Model(Ajzen)

$$B \sim Int = \gamma_1 \sum_{i=1}^{i} b_i e_i + \gamma_2 \sum_{j=1}^{j} n_j m_j + \gamma_3 \sum_{k=1}^{v} c_k p_k$$

$$= \gamma_1 A + \gamma_2 SN + \gamma_3 PBC \qquad (1)$$

the first term reflecting the self-interest or I-utility as measured in the Attitude, the second reflecting the commitment, meta-preferences or the moral dimensions or the We-utility, called the Subjective Norm by the social psychologists, and the third the Perceived Behavioral Control. The last term reflects the extent to which the individual has control, i.e., volition, free-will, ability, capital, over the ultimate behavior. In the vernacular of neoclassical economics, there are constraints. The components are defined as,

B	=	behavior, or action
Int	=	intention to act
b_i	=	belief or probability about consequences of an action
e_i	=	evaluation, utility of the consequence
n_j	=	perceived beliefs or probabilities about social norms
m_j	=	motivation as measured by utility from complying with norms
c_k	=	beliefs or probabilities about control
p_k	=	power to comply.

Specifically, b_i is the probability scale measuring the degree of belief about whether that consequence will occur as implemented by the Expectation operator in expected utility E(U). The e_i is the utility received if the consequence occurs. Thus, $b_i e_i$ is measuring the underlying latent utility pertaining to the self-interest. Notice these individual components are summed to establish the Attitude, which is a measure of latent I-utility, U^I. The social norm is composed of the n_j as perceptions of what others believe, or again, a probability scale. The m_j represents the utility arising from acting on the I-perception about what others believe. Multiplying the two gives the expected utility from paying attention to or otherwise being influenced by the social norm, the sum being a measure of the latent We-Utility, U^{We}.

It may be that the individual has free choice in paying attention to this U^{We}. The extent to which there is free choice is examined in the third term. This control term addresses at least three distinct ideas described as volition (free to choose, as Friedman says, and free-will), ability (e.g., education, level of inherent ability) to actually partake in such an action, and the resources or capital available.

There will be important interactions, so more generally,

$$B = f(U^I, U^{We}, \text{Constraints}) \qquad (2)$$

Compare this with derived demand theory, where

$$B = g(\mathbf{R}, \mathbf{P}, \text{Capital Constraints}) \qquad (3)$$

where **R** = vector of input prices, and **P** = vector of product prices. For a local area problem, e.g., strawberry growers within the local Plant City area of Florida, **R** and **P** are essentially identical for all growers, so

$$B = g(\text{Constraints}) \qquad (4)$$

As suggested by Equations (3) and (4), there is no indication from derived demand that one needs to add variables such as age, education, perceptions, activity with the Soil Conservation Service or whether a farmer lives in an organized watershed. Multiple utility theory, however, suggests such variables.

An important aside: the fact that utility is latent suggests working with an unobservable variable of theoretical interest for which we seek proxies, much like physicists use proxies in their tests of whether quarks really exist. Utility is the economists quark, useful in thinking and theorizing and for guiding development of proxies.

Experience With Testing

The case examined here involves Florida strawberry growers being asked, persuaded, "educated" and in varying degrees required (coerced may be too strong a word, but is also somewhat illustrative) by the local water management district to change irrigation technologies. It might be anticipated the social norm will be a significant variable.

Measuring the Latent Utilities

Ajzen and Fishbein (1980) suggest the design of the questionnaire. Bagozzi outlines many important considerations in designing the scales and testing for salient components. The farmers were personally interviewed, for a sample size of 44 from a population of 110 (see Hodges et al.).

Behavioral beliefs are measured with statements such as "A drip irrigation system results in decreasing the amount of water withdrawn from groundwater" on a likely... unlikely, 7-point scale. The associated evaluative statement is "Less crop maintenance water withdrawn from groundwater is... important..., unimportant to me," another 7-point scale. With two 7-point scales, the product ranges from 1 to 49 for each component. A total of 11 components were measured (Hodges et al.). The global attitude "My installing a drip irrigation system is" was also measured on three 7-point semantic differential scales, wise-foolish, harmful-beneficial, good-wise. Multiple regressions were then accomplished on the global attitude measure as a function of b_i, e_i, and b_ie_i interaction components. The component was retained in the I-utility index if the interaction term was significant (see Bagozzi). The salient components are detailed in table 1. Notice how saving water was not an element of the I-utility: the statistically significant elements all represent different dimensions of profit, and one might reason, the self-interest.

The proxy representing the We-utility was constructed from belief statements like "My family thinks I should install energy and water conserving technology, The water management district thinks I should install ..." on a 7-point likely, ..., unlikely scale. The evaluative component was measured by "In general, what these groups "Family, Water Management District.." think I should do is important..., unimporant (7-point scale) to me. The index measuring the latent We-utility represents the sum of the 12 components detailed in table 1.

Control was measured with operated acres as a proxy for the (also latent) variable financial capability. Various ways of measuring control were also explored (see Hodges et al.; Lynne et al., in press).

Results and Discussion

Table 2 shows Type I tobit (Ameniya, chp. 10) regression results. The first column is the derived demand, mono-utility model: the producer gains utility only from maximizing profits, i.e., from spending income. The capital variable is highly significant at the 0.01 level (table 2). Adding the I-utility would not be expected to add any power in explanation in that the capital variable already captures the preferences pertaining to profit seeking. As expected, results were not improved by adding the I-utility (χ^2 =0.20, not significant).

It was expected a particular level of U^I would take on meaning within the context of a particular level of U^{We}, a synergistic effect as represented in the "I needs a We to Be" idea. Ajzen argues that interactions will be important in explaining both intentions and behavior. This is borne out in the third column of table 2.

The measures of latent I-utility, and We-utility are all statistically significant. In addition, introducing the We-utility also lowered the parameter size on the capital variable. This suggests the capital variable (and profit seeking) was carrying too large a burden of explaining what was really going on. The role of I-utility is also now better understood: the parameter on I-utility is now significant at the 0.02 level.

Table 1. Components of the Attitude and Subjective Norm Variables

Independent Variables	Components of Each Variable
I-utility	reducing energy for pumping, increasing labor and management effort, reducing yield, increasing equipment investment, reducing farm profit
We-utility	family, water management district, state energy office, extension and experiment station, growers association, county environmental protection agency, farmers and growers in the area, environmental groups, irrigation equipment dealers, others in the community (e.g., homeowner water users), farmers and growers with whom associate frequently

Table 2. Water Conservation Technology Adoption Behavior, Strawberry Growers, Plant City, Florida, 1982 to 1992

Variable	Capital Constraint		Adding I-Utility		Adding We-Utility	
	Parameter	SE	Parameter	SE	Parameter	SE
Constant	15151	4564[a]	22421	16829[ns]	119236	45501[a]
Capital Constraint	77.50	22.94[a]	80.50	23.82[a]	62.82	23.41[a]
I-Utility			-45.66	101.88[ns]	-707.09	285.37[b]
We-Utility					-282.96	139.22[c]
I-We Interaction					1.93	0.83[b]
Log of Likelihood Function	-436.01		-435.91		-409.21	
χ^2			0.20[ns]		53.4[a]	
df			1		2	

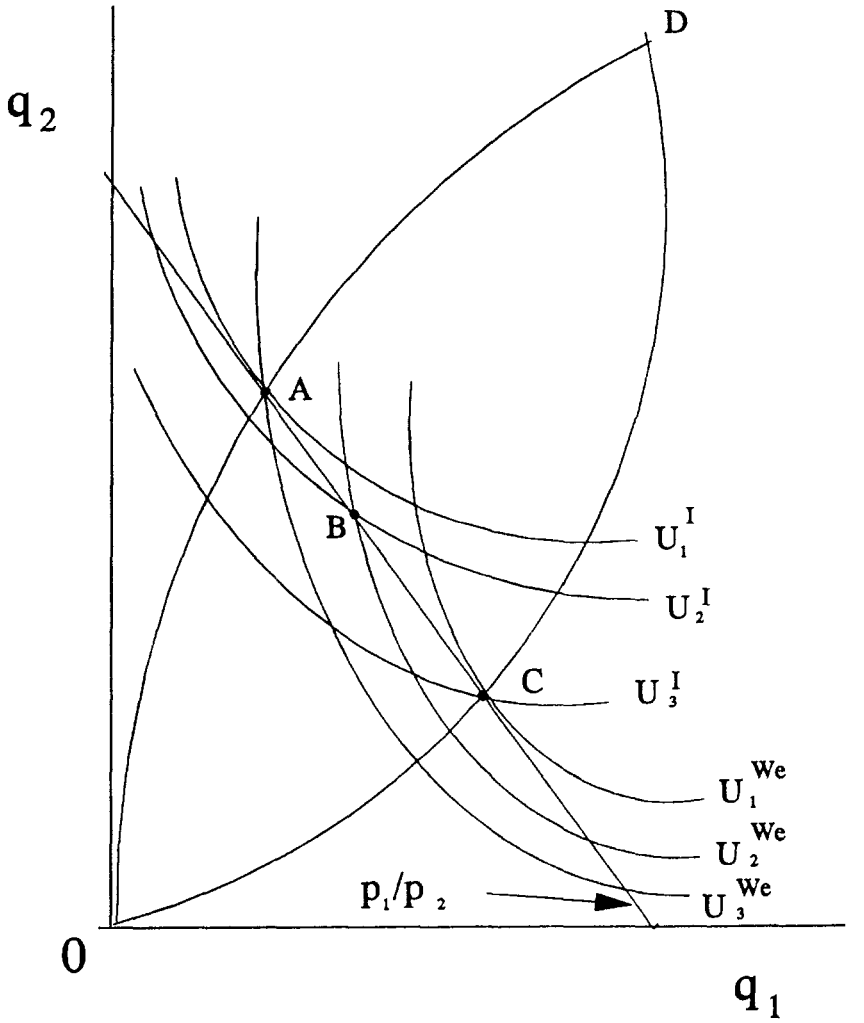
Dependent variable is dollars invested in drip irrigation technology. Based on 40 observations.
[ns] Not statistically significant
[a] Significant at the 0.01 probability level
[b] Significant at the 0.02 probability level
[c] Significant at the 0.05 probability level

As a group, adding measures of the latent We-utility was significant with a $\chi^2 = 53.4$ suggesting significance at the 0.01 level. Conservation technology adoption behavior is more than strictly a capital constrained, profit driven phenomenon. The claims of other groups ...family, equipment dealers, water district... also influenced the decision.

Theoretical Implications

The empirical results suggest two sets of curves now grace the indifference space, one each for I-utility and We-utility (figure 1). The first set $U_1^I,...,U_3^I$ is the standard personal choice family of curves found in any micro-economics text. The second set U_1^{We}, ..., U_3^{We} can be taken to represent personal welfare in Sen's commitment, Sen and Hirschman's meta-preferences, and Etzioni's moral dimension. The We-utility arises jointly from the consumption of two goods q_1,q_2: notice it is *not an allocation* of the two goods that enters the I- and We- utility functions, but the *entire sum of the goods consumed.* Consumption of 1-loaf of bread, the *same* loaf of bread, generates *both* I- and We-utility: consumption at point A generates I-utility level U_1^I and We-utility level U_3^{We}.

Figure 1. I (U^I) and We (U^{We}) Indifference Curves for Goods q_1 and q_2



The budget constraint and relative price ratio are represented in p_1/p_2. The mono-utility model suggests points along path 0AD, such as at A. It seems reasonable, however, that if this particular individual put great stock in the We-utility, i.e., put larger relative weights on the social norm as s/he perceives it, that the path is 0CD with combinations such as at point C where U^{We} is maximized and I-utility is only U_3^I. I-utility is subservient to We-utility for this person in that I-utility is lower at C than any point to the left of C. If the person is at A, I-utility dominates, as We-utility is the lowest at that point.

For these strawberry farmers, apparently path 0AD was not chosen, but neither was path 0CD. Rather, we found the personal choice was conditioned by the We-utility at points like B. Farmers did not ignore their personal choice, in that they chose $U_2^I > U_3^I$. By the same token, they did not ignore the social norm, in that $U_2^{We} > U_3^{We}$, the personal welfare. In neither case did they maximize the U^I nor the U^{We}: rather they sought the level of joint utility at point B.

Sen's idea that commitment means choosing an act that s/he believes will give a lower level of personal welfare than some alternative choice can be analyzed with the model. Any point to the right of A satisfies this condition. Sen does not recognize that choosing greater personal welfare is constrained, however, in that the rational chooser would never venture beyond point C. Beyond C (and beyond A) both I- and We- utility decline.

Sen (p. 327) also raised the more difficult question of "when a person's choice happens to coincide with the maximization of his anticipated personal welfare, but that is not the reason for the choice." To handle this case, envision the We-utility curves lying *coincidentally, identically on top of the I-utility curves*: moving along U_1^I would be identical to moving along U_1^{We}, in the U^I space. In this case, the optimal path is along 0AD = 0CD now being identical with 0AD at points like A but the *reason for being there could be due to relatively more weight on the personal welfare than on the personal choice.* A mono-utility analysis would just attribute this to personal choice and that the "I" is motivated strictly by the chance to increase I-utility from doing good things. This is not a serious shortfall, in that we can comfortably predict the neoclassical analyst will do little harm, even though the reason for being at A is misrepresented.

The neoclassical economist tends to deal only with the private goods, for which it might be the case that I-utility and We-utility curves do in fact often overlap identically. For strawberry farmers, the I-utility and We-utility for buying tractors, arguably more of a private good than is an irrigation system, might well coincide. They would diverge for the decision to buy water conserving technology, which has a certain publicness to it because it draws on the common property aquifer. The problem is that the entire area of the p_1/p_2 budget line to the right of A might also obtain in the real world, especially for the public goods.

Sen's (p. 337) idea of some preference ranking being *more* ethical can also be handled. Any set of I-utility curves closer to the We-utility curves satisfies this condition. One would also move from points to the right of C back toward more ethical points like C, in this case both I-utility and We-utility are increased. The We-utility curves serve to meta-rank preferences in this sense.

The We-utility could represent something other than internally perceived social norms by the "I" as well, e.g., it might represent an external ideology, or political priorities, or class interests, using Sen's words (p. 339). It might also be taken to represent things like, again, Sen (p. 339), "I wish I liked vegetarian foods more," or "I wish I didn't enjoy smoking so much." The We-utility can be conceived as the ideal personal welfare indifference set, something the individual may be trying to move toward over time, and once there, personal and social welfare are again identical, which again gives coincident I-utility and We-utility curves. Maybe the ultimate is reaching point D, as suggested by philosopher, colleague Professor Jeffrey Burkhardt.

The We-utility idea also can help address self-command. The Schelling (1984a, p. 1) example of the patient asking the obstetrician to withhold anesthesia during delivery and to not put a facemask with access to nitrous oxide nearby suggests the patient has chosen point C after considering the relationship to the welfare of the unborn child or perhaps the relationship with friends who believe in natural child birth. Point A may be chosen during the birthing process: the patient asks others to honor the personal welfare choice at C.

The We-utility seems a way to represent Hirschman's meta-preferences as the starting point. Personal I-utility exists in the context of these meta-preferences which we interpret to mean the We-utility. So, we start with the meta-preferences path 0CD and decide how far we will move toward A. In effect the meta- and personal-preferences are traded-off against each other, with the individual stopping at some intermediate point like B.

Etzioni's ideas really stimulated the perspective offered here. The We-utility indifference set is a way to represent Etzioni's idea of a moral dimension (Etzioni, 1988a,b), which conditions whether an individual selects point A or something instead toward point C because it is the right thing to do.

As does Etzioni, the idea of interdependent utility often introduced to claim the neoclassical model does account for social phenomenon is rejected. This idea does not square with the invisible hand theme in neoclassical economics. As Etzioni (1986, p. 163) notes,

> if people can derive pleasure directly from serving others and the community, there is no need for an invisible hand to tie their individualistic pursuits to the common good. Moreover,

> problems that might arise in coordinating nonselfish actions effectively would not necessarily be handled effectively by the invisible hand. It thus seems, on grounds of sound conceptualization, that the quest for self-satisfaction seeking to serve others (the public included) out of a sense of moral obligation, are best kept apart.

This seems most reasonable: including the utility of others in the I-utility function suggests there is some conscious, noninvisible (visible) action at work, but yet the invisible hand idea suggests it is not necessary to have any such conscious action by the "I." The multiple utility model, on the other hand, still facilitates (but does not require) the assumption of an invisible hand ordering social relations.

A more useful notion of interdependence operating even in a market, i.e., the invisible hand is at work, is suggested by figure 1. With anything less than complete overlap of I- and We-utility curves we can reason that either the I-utility or We-utility will be a function of the weight put on the other as well as depending upon the price ratio of the products: it is useful in that the focus can now be on measuring weights, and possibly even made the focus of policy, i.e., to change the weights with educational efforts, or legislating weights (values) as it were. This multiple utility model and the kind of interdependence it depicts also does not require that an individual know the utility gained by someone else, a seemingly intractable requirement: the multiple utility model is afterall focused on own utility, just like the mono-utility model.

In the extreme case of coincident indifference curves only the price ratio is important. This case might describe something like justice and anti-slavery, the two so joint that no weights are discernible, and certainly not subjected to continual reweighing and new choice in anything short of a revolution (enlightment?) in thinking. Under nonseparability conditions, i.e., coincident I- and We-utility curves, personal choice and personal welfare need to be assessed simultaneously.

It is also now easier to understand Smith: recall the notion "...interest him in the fortune of others... though he derives nothing from it, except the pleasure of seeing it." This individual might be interpreted as being at point C deriving nothing or at least little I-utility from it while experiencing We-utility U_1^{We}, the "pleasure of seeing it."

Critiques of Multiple Utility

The neoclassical response to the possibility of multiple utility is usually based in utilitarianism (see especially Brennan and comment by Lutz). That is, people do or should if they do not mediate the I and We dimensions into the self. Importantly, the multiple utility model does not deny this possibility. This phenomenon is perfectly understandable in the internal v. external locus of control idea (see Ajzen). If one leans toward the I-utility, one is said to have in internal locus of control: the I and We are mediated into the self-interest just as described under utilitarian philosophy. The multiple utility model, however, also allows the possibility that the We may not only influence but could well dictate the direction of the mediation process, and could in fact tilt the decision toward We considerations, not unlike that described in Kantian philosophy. Seemingly, the multiple utility model can help in testing just what kind of philosophy an individual is operating under.

Even utilitarians might be convinced of the possibility of multiple utility because of the phenomenon of the multiple-self. Brennan, for example, argues (pp. 205-206) "individual decisions should be viewed more as collective choices or conflicts among different selves within the same person." He notes the phenomenon of "the daily temptation not to go running..." and "...cheating on a diet" as indicative of the problem. He cites Schelling (1984b):

> Possibly the human being is not best modeled as a unique individual but as several alternatives according to the contemporary body chemistry. Tuning in and tuning out perceptual and cognitive and affective characteristics is like choosing which "individual" will

> occupy this body and nervous system.... that people can usefully, for some purposes, be viewed *as if* there were two or more alternative selves... (note: and maybe should not even exclude in modeling) the literal possibility.

Seemingly, then, even the most stringent neoclassical analysis consistent with utilitarian precepts, and possibly even an analysis guided by Austrian economics ideas, could find the multiple utility model useful. In these cases, the meta-preference can simply be viewed as an aspect on a locus of control affecting choice by the freely choosing individual.

A Note on Emotion: The Affective Dimension of Action

The idea of a multiple-self suggests that while the relative weighing of I-utility and We-utility might entail a reasoning, rational process it does not require it. Some might indeed "feel" it right to put emphasis on the We and deny the I. Feeling may especially dominate for short periods of time even for the logical, rational thinker.

Etzioni (1988a, p. 126) claims a much larger role for both norms and affect, arguing that most choices reflect feelings. This raises the possibility that pursuing I-utility might be all at once affective, rational and normative. Another way to think of this phenomenon is that rational action takes place in an emotive context driven by the will. That is, rationality is conditioned by the will and the emotions. This idea also allows, however, that some actions may be dominated by the will or norms and/or emotions, and rationality in the narrow sense of the term as used in neoclassical economics may not play a substantial role.

Conclusions

Hirschman cites Schelling (1984b, p. 342) "the human mind is something of an embarrassment to certain disciplines, notably economics... that have found the model of the rational consumer to be powerfully productive." Hopefully this paper has helped in seeing how to reduce the embarrassment. The empirical evidence suggests that accounting for meta-preferences may be important, especially for certain kinds of decisions. Admittedly, the multiple utility model adds complexity, and more expensive data collection, but just maybe the modern model of economic behavior is too parsimonious and thus these costs must be faced.

It appears desirable to embellish standard utility theory in order to help in understanding and explaining cases where people seem to be influenced by and indeed often continue to live with incompatible meta-preferences and preferences (see Schelling, 1984a). It highlights the possibility of rational action even when choices differ from preferences. The individual might indeed be simply putting relatively more weight on the We-utility in the cognitive, rational thinking process, or may be responding to emotions or norms. At minimum, applying the multiple utility model allows that one can test for the influence of the We. Also, by not examining what lurks behind preferences one denies not only the possibility of discord, but also the role of discord in stimulating changes in preferences over time. Not accounting for meta-preferences may be the reason for the dismal record of economics in forecasting, due to missing these dynamics.

If tests support multiple utility, we may need to modify the conventional wisdom that acting more in accordance with a perceived social norm or even an emotion is somehow irrational and by implication bad, and move instead toward the perception that a decision may well be emotionally or normatively based and could indeed be good, and even rational. It may be necessary to broaden the concept of rationality (also see Sen, p. 343). In fact, the long term survival of a society with respect to sustaining environmental resources which generally entails more emotional, feeling based technology adoption activity may depend upon it.

The multiple utility model also highlights the need to recognize and examine the role of internal v. external control: how does the We-utility arise, i.e., does the individual simply observe an external social norm, and then volitionally choose to not pay much attention to it, having a tendency, then, toward internal rather than an external locus of control, or is the social norm given a lot of weight (i.e., an external locus of control), or, indeed, is it

imposed from the outside? The meta-idea also suggests a way to think about the dynamics of preference evolution which is missing in neoclassical theory, see Etzioni (1986, p. 165) possibly involving evolution toward congruence at point D in figure 1.

The multiple utility model also helps us square Smith's two books: the dualistic nature of the individual is represented in the I- and We-utility indifference curves of figure 1. Humans can, indeed, have both moral sentiments and individual self-interest, and pursue both simultaneously as illustrated at every point within the rational region 0ADC in figure 1. Said somewhat differently, humans can, indeed, be concurrently both egoistic and altruistic, and thus not only pursue their self-interest but can also consider the moral dimension of their acts. Yet, we do not have to abandon the invisible hand assumption and thus individuals can still be viewed as taking autonomous and anonymous actions.

It is peculiar why so many neoclassical analysts reject the possibility of multiple utility. Could it be based in political philosophy, i.e., most analysts probably do not wish to have a world in which the "I" is regulated, mandated, or otherwise controlled by an outside "We?" Might such a research program actually lead to control? Possibly so. While this may be a legitimate concern, it does not seem to also justify not considering the possibility of both a self and norm affected multiple-self. There is the possibility that even the self-interested "I" with mainly an internal locus of control might also pay at least some attention some of the time to the "We" in making choices for some kinds of decisions, e.g., conservation technology adoption decisions. On a practical note, the noticeable increase in agricultural regulation may on its own justify more concern for the role of the "We" in farmer decision making. It may well be the time for more agricultural and applied economists to join in the quest to develop the structure of a multiple utility theory as is the focus of the new socioeconomics (see Etzioni, 1988b, for starters). Shopping trips in the other social sciences can prove useful.

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