A Neoclassical Approach to Behavioral Economics

International Journal of Economics, Business and Management Studies
Vol. 6, No. 1, 1-18, 2019
e-ISSN: 2226-4809/p-ISSN: 2304-6945

Siddhartha Mitra

Department of Economics, Jadavpur University, Kolkata, India
Email: mitsid@yahoo.com

ABSTRACT

The objective of this paper is to show that the behavioral mission of modeling a human being as an agent driven by economic as well as psychological impulses can be accommodated to a large extent within the neoclassical framework which consists of optimizing agents arriving at equilibrium. First, it attempts to show that the non-homoeconomicus is as capable of 'rationality' as a homoeconomicus (self-centered human); in fact being self-centered has no major implications for the ability to be 'rational'. Second, it shows that the systematic biases associated with neoclassical predictions of human behavior can be resolved in many cases by re-specifying the utility function to accommodate psychological factors. Thus, the contribution of the behavioral school would probably lie in altering the way in which neoclassical models are specified but not in rejecting the neoclassical methodology altogether. At the same time, it is pointed out in this paper that bounded rationality (satisficing behavior) of human beings in real life can often generate group behavior that is systematically different from predictions emerging from the neoclassical assumption of perfect rationality (optimizing agents).

Keywords: *Homoeconomicus, Neoclassical, Behavioral, Bounded rationality, Synthesis.*
JEL Classification: *A10, B41*
DOI: 10.20448/802.61.1.18
Citation | Siddhartha Mitra (2019). A Neoclassical Approach to Behavioral Economics. International Journal of Economics, Business and Management Studies, 6(1): 1-18.

Funding: This study received no specific financial support.
Competing Interests: The author declares that there are no conflicts of interests regarding the publication of this paper.
History: Received: 23 October 2018/ Revised: 28 November 2018/ Accepted: 31 December 2018/ Published: 25 February 2019
Publisher: Online Science Publishing

1. INTRODUCTION

1.1. Prologue: Neoclassical Versus Behavioral Economics – Thesis and Antithesis

It is said that human civilization, as well as the evolution of thought, follow the path of thesis-antithesis-synthesis[1]. This seems like the logically correct path to follow as any statement or theory which is untrue, extreme or biased would be gradually eliminated by the continuous propagation of this cycle. But in reality, this propagation is characterized by friction and often met by resistance. When a thesis is put forward and gains acceptance it results in the formation of a school of thought consisting of leaders and followers. Needless to say, the leaders have a vested interest in ensuring that the antithesis to their school never emerges.

Such power exercised by vested interests is the biggest threat to the evolution of human thought and civilization. It must be conceded though that vested interests arise from collusive impulses that come naturally to human beings and can only be reined in through a cultivation of intellect. The idea behind any science is to constantly re-examine its theories in the light of new emerging evidence, to retain what is useful and usher in new theories which fit the evidence better. It is therefore necessary for the true followers of a science to constantly and actively look out for new data that throws light on hitherto explored and unexplored facets of a theory, to embrace new theories which are improvements on old ones even if such new theories contradict old ones, while retaining the useful essence of what is old.

Sadly, human adherence to scientific methodology, especially in the practice of the 'dismal science' (economics), has been far from perfect. Thaler (2015) is quite right in saying that Adam Smith's earlier writings dealt mainly with behavioral economics. In the 20th century the psychological, moral and ethical aspects of human activity, emphasized by Smith in his book, *The Theory of Moral Sentiments* (Smith, 1759) which preceded the publication of his more widely read work, *The Wealth of Nations* (Smith, 1776) found inadequate space in neoclassical models dominating economics. There were, however, some remarkable though somewhat rare deviations from this neglect. One example which easily comes to mind is Becker (1976). In this book, he managed to successfully incorporate psychological and emotional concepts such as love and prejudice into models of neoclassical economics which relied on optimization of suitably constructed utility and other objective functions. One such work was Becker's paper on markets for marriage (Becker, 1976)[2] in which the author introduces a household production function associated with outputs such as love and companionship, among others. Thus, Becker showed that the neoclassical framework need not be associated only with tangible goods or marketed services but also with human emotions and relationships.

This paper is motivated by Thaler's normative cum predictive statement about the future of economics: economics should/ "eventually would" focus on the behavior of quasi-rational agents driven also by emotions and psychological factors rather than just 'economic motives' i.e. that the *homoeconomicus* in economic models would evolve into the *homosapien* (Thaler, 2000). The objective of this paper is to show that the behavioral mission of modeling a human being as an agent driven by economic as well as psychological impulses can be accommodated to a large extent within the neoclassical framework which consists of optimizing agents arriving at equilibrium.

This section and the next section of this paper attempts to show that the *non-homoeconomicus* is as capable of 'rationality' as a *homoeconomicus*(self-centered human); in fact, being self-centered has no major implications for the ability to be rational. Section 3 shows that the systematic biases associated with neoclassical predictions of human behavior can be resolved in many cases by re-specifying the utility function to accommodate psychological factors.

[1] See Schnitker and Emmons (2013) for an elaboration of Hegel's Thesis-Antithesis-Synthesis Model.

[2]Originally published in 1975 but later published in Becker (1976)

Thus, the contribution of the behavioral school would probably lie in altering the way in which neoclassical models are specified but not in rejecting this methodology altogether.

At the same time, it is pointed out in this paper that bounded rationality (satisficing behavior) among human beings in real life can often generate group behavior that is systematically different from predictions emerging from the neoclassical assumption of perfect rationality (optimizing agents). Thus, incorporation of the assumption of bounded rationality in future models of human behavior deserves the attention of economists.

It needs to be noted here that the debate being addressed here is not about the precise definition of 'neoclassical economics'. Indeed one can define this term as one wishes to since a discipline develops organically. To my knowledge, no official definition exists. Yet if one were to pick out a common characteristic of economic models that dominated the discourse in economics in the second half of the 20th century, it is definitely the assumption that agents 'optimize'. It is the contention of the paper that this assumption about optimizing behavior can be retained while incorporating the behavioral emphasis on the importance of psychology, fellow feeling, lack of self-control etc., in short, all those characteristics that make us human and not cold calculating machines. At the same time, the paper shows that it has to be conceded that optimization necessarily is approximate rather than exact in the case of humans and the traditional (neoclassical) argument that the use of 'exact optimization' rather than 'satisficing behavior' makes no difference to the prediction of human behavior is inaccurate.

Thus, the main challenge before economists is not to construct a whole new method of addressing economic questions based on behavioral considerations; rather it is to modify the old school that characterizes humans and human organizations, such as the firm, as optimizing agents so that it better addresses behavioral concerns. While behavioral economics has correctly been able to identify the essence of what is to be human, that essence and its implications for human behavior are best addressed, according to this paper, through a modified neoclassical approach.

1.2. The Distinction between Homoeconomicus and Non-Homoeconomicus

Note that one of the main assumptions of neoclassical economics is that a human consumer is 'rational'. The literal translation of 'rational' is 'logical'. But how far can logically take the man in choosing his own actions? Given his incomplete knowledge of science, the vast realm of the unknown and his own prejudices, it would be logical only to maximize one's satisfaction. However, the satisfaction that man draws from a vector of goods, services and actions would depend on his genetic endowment plus the human surroundings nurturing him which determine his biases and impulses; social norms; culture; and his own time variant knowledge of the consequences of his actions and choices. Given that our knowledge about the wide world is incomplete and would in all probability always be incomplete, it would be vacuous to consider preferences consistent with scientific 'truth' as 'rational' as that truth has not been fully determined. Nor is the common man aware of all existing scientific findings which pertain to the goods and services available for consumption[3].

Therefore, a useful definition of rationality in regard to human behavior would only imply that market purchases by the 'rational individual' are a function of (a) the intrinsic qualities of consumed goods and services as

[3] An innocent school boy might draw great satisfaction from eating a greasy hamburger while a Professor with the same taste buds would only get a fraction of that level of satisfaction as he would be deeply aware of the adverse health effects of greasy food. Faced by a choice between a greasy hamburger and a salad their choices might be different. But even the Professor's knowledge about nutrition is necessarily incomplete: every day in the newspapers we see new research findings that contradict earlier ones, causing us to be confused about what to eat and avoid; confused people may under such circumstances choose to work out a compromise between inclinations to pleasure their taste buds and cautiousness resulting from their knowledge of nutrition.

well as (b) mentioned factors such as the cultural background and psychological makeup of the individual. In fact it would be correct to say that perception of (a) is what matters and that is determined by (b) to a large extent. For example, there is no reason to conclude that ex-ante a person who consumes more sugar than another individual is more or less rational; there is a clear relationship between sugar consumption and the level of pleasure experienced from marginal amounts of sugar consumed net of 'guilt' which is in turn a function of 'nurture', 'culture' and accessed information. Such a definition of 'rationality' does not require any consistency with 'scientific truth' or ethical standards. A follower of religion A who does not buy from a nearby shop belonging to a follower of religion B but walks two miles to buy from the follower of his own religion is being 'rational' if buying from the first shopkeeper is distasteful because of his own communal bent of mind.

Given the above definition of rationality, the *homoeconomicus* or economic man is but one variety of the neoclassical agent. While it is possible to define the *homoeconomics* in variousways, existing literature points to the *homoeconomicus*as a human who maximizes his satisfaction but obtains no satisfaction exclusively from the satisfaction of others. In other words, the knowledge that another human being has benefitted as a result of her or any other person's actions or nature brings no satisfaction on its own to the *homoeconomicus*. However, the assumption that a human being optimizes her satisfaction or satisfices -- enhances her utility as much as possible, given the limitations of time available for choice and cognitive limitations in regard to processing of choices – without drawing any pleasure from the satisfaction of others does in no way rule out actions which yield satisfaction for others as (a) the market/society is an arena for 'reciprocity'/'exchange'; and (b) it might be impossible to completely internalize the benefits of one's actions[4].

Rational or boundedly rational human beings, who derive satisfaction from the satisfaction of others, are referred to in the rest of the paper as *non-homoeconomicuses*. In other words, the *non-homoeconomicus* is 'sympathetic', with the interpretation of 'sympathy' almost identical to that discussed in Sen (1977). The concept of 'sympathy' is not identical to Andreoni's concept of 'warm glow' which is obtained when people enhance their satisfaction from an increase in the welfare of others, only if such increase is brought about by their own actions (see Andreoni (1990)) and other papers by the same author).

Examples of satisfaction maximizing or neoclassical agents who are not *homoeconomicuses* could be a) a man who looks after his parents because an increase in their wellbeing has a positive impact on his own utility even after taking into account the costs that such "looking after" might involve; and b) the young woman who drags a chair in a mall so that an old man, whom she will never meet again, can occupy it as his comfort enhances her wellbeing. In the case of action a) only the man looking after his parents know his own motives for doing so and thus can correctly classify himself as a *homoeconomicus* or a *non-homoeconomicus*. It is quite possible that the man is looking after his parents because such "looking after" might enhance his reputation among his parents and relatives with possible important material consequences such as those relating to 'inheritance'. Action b), it seems, can be judged almost without doubt as an act of pure altruism and the woman classified as a *non-homoeconomicus* by others: it is unlikely that such small acts would result in any significant reputation effects. Therefore, there has to be some satisfaction gained from helping the old man as in its absence, the cost incurred from pushing the chair would not be worth bearing.

There is one glitch though: is it the case that a reason for the woman pushing the chair for the old man is the need to generate a warm glow for herself i.e. to assure herself that she is a nice human and generate additional utility in the process? Is it the case that her satisfaction would not have increased if somebody else had performed

[4] Optimization might imply that you play your stereo at a certain volume which might allow the music to be heard and enjoyed by others.

the act of dragging the chair for the old man? Strictly speaking, the young woman in this case can be classified as being 'sympathetic' only if the answer to the final question is 'no', irrespective of whether her answer to the first question is 'yes' or 'no'. However, mere actions do not inform us, in most cases, about the answers to questions such as the final one. It seems that assumptions are required. However, if we do not want to split hairs we can classify all humans with one out of the two following motivations as *non-homoeconomicuses*: (i) warm glow or satisfaction that emanates from being a nice person who has helped others rather than an increase in the satisfaction of others per se or (ii) a genuine sympathy for others which implies that an increase in the wellbeing of others brings about an increase in utility, irrespective of who takes the wellbeing enhancing action,[5].

The discussion in the previous paragraph hints that a *homoeconomicus* often acts in a manner which results in benefits to others. This is well known but is still worth illustrating through an example. As mentioned, 'reputation effects' might be generated out of acts of charity. In this case, 'reputation' and not the satisfaction of those benefitting from charity is an argument in the direct utility function of the donating individual. The court jester who is generously rewarded in gold coins whenever he enhances the king's happiness through the use of humor will almost surely employ such humor in enhancing the happiness of the king even if what enters as an argument into the jester's utility function is just money and not the king's happiness i.e. if somebody else makes the king happier the jester is not made any happier. The jester, in this case, is a *homoeconomicus* unlike the mother who tells her daughter bedtime stories, so that she sleeps happily and on time, and gains satisfaction from the wellbeing of her daughter. Thus, *homoeconomicuses* can help others and help others on the basis of the calculation that reciprocal actions will in turn confer benefits on them in excess of the incurred costs. Such calculations often result in mutually beneficial trades between two *homoeconomicuses*, for example between the jester in the mentioned example and a *homoeconomicus* king who rewards the jester whenever he is humored but with an amount which is less than the value of the happiness generated through humor. As mentioned, the discussion in this paragraph is not pointing to anything new: much of economics till date deals with the possibility of mutually beneficial trade between *homoeconomicuses*.

To repeat, this paper will show that the practice of neoclassical economics or that which recognizes human maximization or near maximization of utility functions is perfectly capable of taking care of both the satisfaction maximizing *homoeconomicus* as well as the satisfaction maximizing non homoeconomicus. Note that in case of the *non homoeconomicus*, we always also include, as arguments in the utility function, consumables which bring satisfaction or happiness to other human beings. This is not true of the utility function of the *homoeconomicus*. For example, a person located in Kolkata might donate $ 50 to flood victims in Karnataka as their material welfare enters her utility function as an argument. This person, a very common specimen, is clearly *a non homoeconomicus*. But she is quite capable of maximizing or nearly maximizing her satisfaction, even though that depends of a) goods and services consumed by her as well as b) satisfaction of others.

Thus, any behavioral critique of neoclassical economics which says that the latter can only be a depiction of the *homoeconomicus* would be quite overstated. It might be accurate to say that the practice of neoclassical economics has been predominantly engaged in the study of the behavior of the *homoeconomicus*[6]whereas neoclassical tools and

[5] In the case of (i) the utility function of the individual can be characterized as $U(x, g)$ where x is private consumption and g is charity undertaken by her. In the case of (ii) the utility function may be written as $U(x, G)$ where G denotes the level of a good which is of no direct use to the concerned individual but is of use to another individual or a community of individuals not including the concerned individual.

[6] This is almost exactly the point being made by Mullainathan and Thaler (2000) when they say that "neoclassical economics has defined itself as anti-behavioral": this statement is based on a review of models in traditional economics which illustrate how neoclassical economic methodology has been used rather than how it can

practice (the utility function and its optimization) do lend themselves to the study of another type of economic agent, the rational *non-homoeconomicus*. To that extent, the potential of neoclassical tools has not been fully exploited. Moreover, the ability to 'sympathize' with other human beings is but one of the major differences between the economic agent usually seen in neoclassical models and the *homosapien*. Other differences can be seen in the inability of the latter to let bygones be bygones (ignore sunk costs), her felt need for compartmentalization of the total budget, her lack of self-control etc.

The purpose of this paper is to offer directions for synergizing the unexploited potential of the neoclassical methodology with the lessons emerging from behavioral economics, thus helping to further advance the discipline of economics. In other words, the 'thesis' of neoclassical economics, as mostly practiced, has in due course of time been met by its so called 'antithesis', behavioral economics. But this paper contends that a meaningful and progressive synthesis of these two schools of thought can be attained. These thoughts are preliminary in nature and clearly have to be worked on by both theorists and empiricists if anything of great relevance to the future of the discipline is to emerge. But to the best of my ability I am trying to give some impetus to rescuing the 'baby of neoclassical economics' from its alleged and much criticized 'bathwater'. This is a daunting project but nevertheless, I feel, one that ought to be taken: a synthesis is in most cases better than a thesis or an anti-thesis as it draws on the strengths of both while doing away with, at least to a significant extent, their weaknesses.

There is one other reason for initiating this synthesis: while the neoclassical school has come under a lot of justified criticism no alternative general way of predicting the behavior of an economic system has been offered. Though one can justifiably criticize the neoclassical school there is no doubt that it offers a very elegant and rigorous methodology which enables us to start from the utility function of a representative consumer and the production functions of representative firms in different sectors of the economy and arrive at conclusions about outcomes in the entire economic system. It would indeed be unfortunate if this entire methodology has to be discarded without a suitable replacement because of criticisms from the behavioral school.

In the next section (Section 2) I will try to isolate the kernel of neoclassical economics as neoclassical models are of various types with assumptions such as perfect foresight and rational expectations often characterizing these. I argue that isolation of the kernel involves identifying the assumptions that are common to all neoclassical models. For example, the rational expectations school came into being only in the 80s after neoclassical economics was way past its infancy. Similarly, many of the neoclassical contributions are static one period models which are not based on any sort of foresight. Thus, neither 'rational expectations' nor 'perfect foresight' are assumptions which belong to the kernel of neoclassical economics.

In Section 3 I shall talk about some of the systematic deviations of actual from neoclassical behavior pointed out by the behavioral school and argue that suitable modifications of the utility function might ensure that neoclassical methodology can in fact ensure that neoclassical predictions are not characterized by such deviations from actual behavior. Section 3 constitutes the heart of the paper. Section 4 concludes and offers directions for further research.

---

be used. On the other hand, this paper examines the potential to construct neoclassical models -- i.e. models which are required to be consistent only with three assumptions, namely completeness, transitivity and the tautological property of reflexivity, which constitute the kernel of neoclassical economics -- to study the emotionally and psychologically rich economic behavior of *homosapiens*.

2. THE KERNEL OF NEOCLASSICAL ECONOMICS

2.1. Completeness, Transitivity and Rationality

All models of neoclassical/ traditional economics are characterized by optimizing agents as well as the concept of equilibrium. At the level of the individual consumer or producer, optimization itself is equivalent to the attainment of equilibrium. Consider a consumer who is faced with a menu of 3 choices: states A, B, and C. If (i) A is preferred to B and (ii) B is preferred to C but (iii) C is preferred to A , then the consumer's preferences are intransitive. This is because (i) and (ii) imply by transitivity that A is preferred to C which in turn contradicts (iii). The conclusion of intransitivity of preferences here implies that each state is revealed to be inferior to one other state. Thus, there exists no unambiguous optimum and the concept of optimization therefore does not make sense.

Neoclassical models also often assume completeness of preferences. Completeness implies that an individual consumer, when faced with a given choice set of states, is always able to compare any two states, *a* and *b*, by choosing one out of the following expressions as depicting her preferences: (i) a is preferred to b; (ii) b is preferred to a; and (iii) she is indifferent between a and b. Note that completeness is required in order to obtain a ranking of all the states in the choice set. As discussed next, completeness and transitivity are sufficient for generating at least one optimum when the choice set consists of a finite number of elements or is a bounded and closed set consisting of infinitely many choices[7].

This proposition for the case of a choice set consisting of a finite number of elements can be proved using the principle of mathematical induction. Consider any choice from a given choice set of N states where N>2. Let us call this choice set C. Without loss of generality we can label this choice as *1*. If a choice subset is constructed consisting of just this choice then it is tautologically true that this choice is as good as any other element in this choice subset as there are no other choices i.e. *1* is the optimum in the given choice subset. Now pick out any element from C other than *1*. Call this element *2*. It is easy to see that {1,2}has an optimum as 'completeness' implies that either (i) one of them is preferred to the other (in which case the former is the optimum) or (ii) the consumer is indifferent between the two states (in which case both 1 and 2 are optima). We can proceed in this manner to construct a choice set of n choices where n is any number such that $n < N$. Now we know that (a) the choice subset of $n \leq 2$ elements has an optimum. Further, we can also infer from the property of completeness that (b) if a choice subset of $n<N$ elements has an optimum then any choice subset of $n+1$ elements also has an optimum. To see this, let an optimum of the first choice subset (say B) be given by x^*. We can construct the second choice subset by adding an element, say x, from C (not included in B) to B. Given completeness, x is at least as good as x^* (Case I) or inferior to x*(Case II). In the first case, transitivity implies that x is at least as good as all of the elements in the newly constructed subset of $n+1$ elements. Thus, in the first case (Case I) either (i) both x and x^* are optima or (ii) only x is the optimum of the newly constructed subset of n+1 elements. In the second case (Case II), x^* is an optimum while x is not an optimum. Thus, proposition (b) is proved. Together a) and b) imply that a choice set of N elements will have an optimum where N is any natural number[8].

[7] Note that neither completeness nor transitivity is a necessary condition for an optimum to exist. Consider a choice set in which a subset (the inferior set) and its complement (consider the choice set to be the universal set) are such that each choice in the former is revealed to be inferior to each choice in the latter. Now consider the dyadic preferences involving the choices in the second subset. Completeness and transitivity in regard to these preferences help to generate at least one optimum which by definition is superior to all choices in the inferior set and is hence an optimum for the entire choice set. We do not need any sort of information about dyadic preferences in regard to any pair of choices in the former set to obtain a meaningful optimum (or optima).

If one or more goods are characterized by perfect divisibility then the choice set, say a budget set, will be characterized by infinitely many elements. However, such as set is, more often than not, closed and bounded (a budget set definitely is). A utility function in this context can be defined as any function which assigns a unique and finite number representing utility or satisfaction or its ranking to each and every element of the choice set. The construction of such a utility function ensures that the properties of completeness and transitivity are satisfied as real numbers obey the properties of transitivity in regard to strong and weak inequalities and completeness in regard to weak inequalities. The properties of closedness and boundedness result in optimization being made possible: just imagine a three-dimensional object with a base given by the budget set and the height giving the utility corresponding to each point (choice) in the base (budget set). It is clear that the choices (points in the budget set or base) which correspond to the maximum height can be identified. These are the optimal choices. In many cases, we might have a single optimal choice. But if one excludes the boundary from the choice set one can have a situation in which one moves towards greater and greater heights as one moves closer to the boundary. In this case, there is no optimum.

Note that there is nothing that prevents the preferences of the *non homoeconomicus* from being complete and transitive. Just consider one short interaction with no possibility of reputation effects or reciprocity in which a person divides a cake into two parts, x and y, the first to be eaten by her and the second by another person. It is quite clear that there could be an infinitely many utility functions which satisfy the conditions for the person to be classified as a *non-homoeconomicus*, examples being min(x,y) in which case the cake is split into two halves, x +y which results in the person being indifferent across all distributions of the cake, and $\sqrt{x} + 2\sqrt{y}$ in which case the individual allocates one fifth of the cake to herself and the rest to the other person. Note that if we assume net positive marginal utility of own cake consumption for the first person for consumption levels less than or equal to the size of the cake[9], the person concerned can be labeled as a *homoeconomicus* who will always choose to consume the entire cake herself. As we have shown through examples, this is in most cases not true for the *non-homoeconomicus*. Also because any choice of x and y by the *non-homoeconomicuses*, described by one of the mentioned utility functions, generates a unique number which is a measure of utility or preference, the mentioned properties of real numbers guarantee completeness and transitivity in preferences. In other words, it is perfectly possible to have 'rational' *non-homoeconomicuses*.

2.2. Bounded Rationality: A Critical Discussion

We end this section by pointing to the work done by Herbert Simon who in the 1950s gave the initial but often forgotten thrust to behavioral economics. I shall illustrate Simon's apprehensions about the neoclassical school with an example. Consider the setting where there are N commodities and the amount of income available with a consumer is *M*. To be more specific, consider the special case of 3 commodities which have the same price equal to $1/10^{th}$ the magnitude of the consumer's income. Moreover, only positive integer amounts of these commodities can be bought. The reader can easily verify that even in this very simple case there are as many as 121 states which exhaust the budget completely and need to be ranked by the consumer through her preferences as the straight forward application of 'more is better' cannot be used to compare any 2 of the mentioned states. But a consumer ranking of all these 121 states is virtually impossible, given limitations in cognitive power and processing time. In the real world the number of commodities might exceed 100. The number of axiomatically incomparable commodity bundles can run into millions. Ranking of bundles which is necessary for optimization is therefore not

[9] For any utility function $U(x, y)$ and a normalized size of the cake equal to unity this net marginal utility is given by $U_x - U_y$.

possible, given the processing capabilities of the human brain as well as time constraints faced by humans. One can of course say that given a utility function in this large number of commodities, one can with the help of a computer locate the optimum. But we know that such utility functions do not exist in our brains and furthermore we do not use computers to make our monthly consumption choices in real life. In other words, while the optimization underlying neoclassical economics is elegant it would be unrealistic to assume that such an exact process of optimization is actually undertaken by humans.

However, one can say that human beings do exercise conscious choice in selecting consumer bundles on the basis of experience and learning, thumb rules and analytical powers. This enables them to choose a consumption bundle out of many axiomatically incomparable ones. A good utility function is one whose maximization predicts such human choice accurately apart from a non-systematic random error term. The implication is that group choice is predicted accurately.

It can also be argued that we should think about rationality being exercised in regard to what is going to be bought or consumed immediately. But even here the existence of multi-characteristic or hedonic goods (the level of each characteristic affects utility) implies that the choice of one good, say a dress or a food item from a restaurant menu, can encounter time constraints and be limited by cognitive power. Simon therefore introduces the concept of satisficing. An appreciation of satisficing is best obtained through an example. Imagine a consumer who walks into a Chinese restaurant for a meal and is confronted by a long menu with a description of each dish. If the consumer is extremely hungry he or she will ask the waiter whether a certain popular dish is available and if the answer is affirmative (which it probably will be because it is 'popular') will instantly order it. In this case the choice of the consumer may be quite distant from the optimum in terms of the offered utility but is satisfactory. The distance will not be that large if the consumer has around 10 minutes to spare but even in this case it is unlikely that the consumer will be able to comprehend the various descriptions in the menu, rank the various items and then choose the optimum. Thumb rules, such as elimination of costly dishes, might be used and the consumer might spend a certain significant proportion of the 10 minutes in wading through the list till she arrives at a choice which she can deem as 'satisfactory'.

Now consider the purchase of essential items such as potatoes or milk if these are practically one-dimensional i.e. only one variety is available and therefore the only relevant dimension is quantity. One can contend that a satisficing consumer will undertake a choice of quantity which will differ from the optimal choice by a non-systematic random term. These random terms will cancel out when added across consumers in a large enough group. Thus, the assumption of the optimizing consumer, while not corresponding exactly to reality, will result in accurate predictions for a group of consumers. But the crucial assumption is that the items are one-dimensional. If we relax the assumption, then the sequence in which the candidates for choice are placed in the menu matters. If the optimal choice, defined as the choice that would be made in the absence of time constraints, is located far into the interior of the menu of the Chinese restaurant of our example, we can easily comprehend that tens of identical consumers walking into the restaurant will depart after making sub-optimal choices. Thus, the neoclassical model of optimization will result in an inaccurate prediction of group behavior. It will make an accurate prediction in special cases such as the choice being located on the first page of the menu as then all the identical consumers will be able to make the 'optimal choice'. Clearly, if we consider hedonic goods, Simon's critique of neoclassical economics is not as harmless as certain proponents of that school make it out to be.

3. DEALING WITH SYSTEMATIC PREDICTIVE BIASES RESULTING FROM THE NEOCLASSICAL METHODOLOGY

3.1. Sunk Costs

One of the basic features of all neoclassical models is that these compare the marginal benefit of an incremental amount of an action (say production or consumption) to its marginal cost to determine the equilibrium magnitude of that action. A cost whose incurrence constitutes a precondition for initiation of an action and therefore precedes such initiation (sunk costs) are not considered to have any influence on the equilibrium magnitude of an action. The basic assumption is that the human being considers bygones to be bygones. Therefore, costs incurred in the past are not assumed to have a lingering impact on the human being.

If a human being was identical to a robot this would indeed have been the appropriate way to model her behavior. However, we now know that humans are as much driven by the goals in front of them as they are by their emotions, even if these are retrospective. While neoclassical models till date have assumed the irrelevance of sunk costs for human decisions, empirical data and experiments reveal that they do matter. Let us consider the following examples:

1) Casual Empirical Observation 1 (from Thaler (2015)): Suppose you buy a pair of shoes. Later you realize that your feet are extremely uncomfortable even after wearing the shoes once or even twice. It has been observed that that people often do not immediately discard such shoes but if the pain is bearable continue to wear these for some time. The number of times an uncomfortable pair of shoes is worn would depend on the price that has been paid as well as the extent of discomfort. Consider how a standard neoclassical model would treat such a situation: when a person starts wearing a pair of shoes the expenditure incurred on it is considered an event in the past and therefore is not supposed to have any bearing on the extent of its use. Yet in real life, we find that it does.

2) Empirical Study (Gourville and Soman, 1998): Consider the use of gyms. A standard neoclassical model would project that after the payment for a given period has been incurred the extent of use would depend only on the satisfaction the person draws from use. In other words, the expenditure incurred is a sunk cost which should not influence the extent of gym use. However, the authors of the study found that people who have registered for gym memberships use gyms much more intensively in the period that immediately follows the payment. Thus, for a prepaid membership which is renewed every 6 months, the intensity of use in the first month following the payment is much greater than in the next 5 months. It is quite obvious that the guilt from not using the gym when one has paid for that use is the highest immediately after payment but diminishes with use.

3) Casual Empirical Observation 2: People tend to eat more at buffets which are higher priced than at those which serve free food or are nominally priced. Again standard neoclassical models would predict that the amount of food eaten by a person should not be determined by the fixed cost that she has paid for the right to eat unlimited food. In other words, the person should keep on eating as long as the marginal utility from an additional morsel, usually assumed to be diminishing in the amount of food already eaten, exceeds zero.

The contention is made in this paper is that the utility framework need not be discarded while modeling human behavior which in reality attributes significant importance to sunk costs. Thus, utility from the use of a good or service can be expressed as

$$Total\ Utility = Functional\ Utility\ from\ use + Psychological\ Disutility\ from\ Non\ Use - Opportunity\ Cost\ of\ Use$$

In the traditional neoclassical framework, it is only the first term or the first and third terms which are accounted for. Consider an American student who has spent a significant amount of money to enter a program but finds the classes useless. If we use the traditional neoclassical framework, the functional utility (i.e. in this case, the

utility derived directly from listening to the lectures) would be 0 and the opportunity cost of use would be non-negative. The traditional framework would therefore predict that the student will not attend the class in the presence of positive opportunity cost. But the reality is often not consistent with this prediction. This can be explained through the above equation i.e. if the second term is significant due to guilt induced by non-attendance of lectures for which a fee has been paid, and opportunity cost reasonably low, the formula for total utility predicts that the student would attend the class. Of course, such opportunity cost might vary on a day to day basis. For example, if the student's girlfriend is flying into town for the day, the opportunity cost of attending the class would be high enough to overwhelm the psychological disutility from non-attendance. Thus, the student would not attend the class on that day.

Example 3 can be modeled in the following manner, with an explanation of example 1 being similar. Let $MU_f(x)$denote the marginal functional utility i.e. the marginal functional satisfaction that results from hunger alleviation plus pleasure to the taste buds as a result of consumption of x quantity of food in a buffet. It can be assumed that if a significant price is paid for a buffet it leads to guilt which can only be alleviated by consuming more food i.e. registering for a buffet is associated with accumulation of guilt which drains away as more and more food is consumed. The draining away of guilt as result of consumption of food at the margin therefore is associated with the generation of marginal psychological utility. Thus, there is a marginal psychological utility, $MU_p(x, G(P))$, from food consumption in addition to the marginal functional utility[10], with the individual not attaining equilibrium as long as the sum of the two marginal utilities is positive. Here P denotes the price of the buffet and G denotes the amount of guilt accumulated as a result of the promise to pay P.

It would be sensible to assume that $MU_p(x, G(P))$ has non-negative first partial derivatives with respect to its two arguments, with the first of these derivatives assumed to be strictly positive to begin with and zero thereafter with an increase in x, and the second of these derivatives always strictly positive. For high enough P it would quite reasonable to assume that $G'(P) > 0$ i.e. guilt accumulated is increasing in price. This enables us to write marginal psychological disutility simply as$MU_p(x, P)$. It follows that $\frac{\partial(MU_p)}{\partial P} > 0$ for high enough price i.e. an increase in price leads to an upward shift in the MU_pcurve. In the traditional neoclassical framework price paid for the buffet does not matter as the equilibrium consumption of food, x^o, is given by equating $MU_f(x) = 0$ (see Figure). Let us assume a price,P^0 for the buffet. It can be argued that the neoclassical equilibrium x^o, would not always correspond to actual guilt-laden human behaviour because of the possibility that$MU_p(x^o, P^0)$> 0. This is assumed in the Figure: at x^o the individual has still not shed his entire guilt and therefore needs to consume more food in order to take $MU_p(x, P^0)$ to zero. If that is the case, the equilibrium on the incorporation of psychological utility from guilt alleviation into the utility function is $x^* > x^0$ where $MU_p(x, P^0) + MU_f(x)$= 0. This is the behavioural equilibrium condition. Given $MU_f(x^*) = 0$[11] it must be true that $MU_p(x, P^0) = 0$.

[10]In other words, food consumption not only gives pleasure to the taste buds and alleviates hunger but also leads to guilt alleviation

[11]In the figure we have assumed that for $x \in (x^0, x^{**},], MU_f(x) = 0$; the behavioural equilibrium condition, therefore, implies that $MU_p(x^*, P^0) = 0$; however it might be possible that the individual experiences functional disutility on consuming food beyond x^0i.e. $MU_f(x^*) < 0$, in which case the straightforward inference would be that$MU_p(x^*, P^0) > 0$

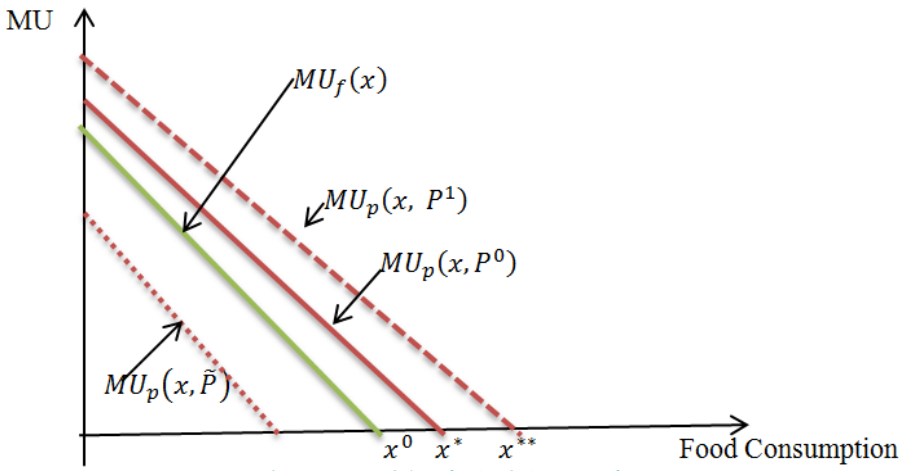

Figure-1. Resolving the Sunk Cost Paradox.

Now consider a price for the buffet, $P^1 > P^0$. In this case, while the marginal functional utility curve remains unchanged, the marginal psychological utility moves upwards resulting in an equilibrium level of consumption $x^{**} > x^* > x^0$. Note that for a low enough level of price, $\tilde{P}$, the marginal psychological utility curve would lie everywhere below the $MU_f(x)$ curve and thus intersects the horizontal axis at a level of consumption less thanx^o. In other words, neglecting the psychological component of utility would not make a difference to the prediction (which would conform to reality) for low prices.

3.2. The Endowment Effect

The endowment effect is a term coined by behavioral economists, in particular Thaler, to capture the phenomenon that an individual's valuation of a good increases when she gets to own it herself. Thus, imagine my valuing a bottle of wine, costing $140, in a shop window at $145. Therefore, I buy it. According to the endowment effect, my valuation of the good rises as soon as I start owning it. Thus, it is possible that my valuation of the wine bottle rises to $161 as soon as it comes into my possession. Thus, any price in the range $145-160 (which should have, in the absence of the endowment effect, incentivized me to part with my bottle of wine) is inadequate to make me do so in real life. The positive impact that ownership has on the valuation of a good is not incorporated by economic theory as it has been traditionally practiced and can only be attributed to psychological factors.

Evidence for the endowment effect has been unearthed through several experiments, one of which involves tokens, coffee mugs and candy bars conducted by Kahneman *et al.* (1990;1991)[12]. Consider the part of the experiment involving tokens. Each person is assigned an induced value so that if at the end of this part she possesses a token she gets the induced value on selling it to the experimenter. Now each of the N (even number) subjects in this part of the experiment is assigned a different induced value. Subsequently tokens (one each) are handed out to N/2 subjects are random. One would expect that if multiple rounds of this part of the experiment were played it would be the case that on an average 50 percent of the tokens would go to those belonging to the upper half of the distribution of induced values and the rest would go to those belonging to the lower half. Each of N/4 people in the lower half with tokens would pair up with one of N/4 people without tokens in the upper half as this would enable the former to get a price higher than her induced value, i.e. the price that is promised to her at the end of this experiment on retention of the token, and the latter would also gain by buying the token at a price lying between the former's induced value and her own induced value. Thus, over multiple rounds we would expect the

[12] Also see Thaler (2015) for a friendly exposition of the endowment effect and related experiments.

average number of transactions per round to be N/4 as a token has no intrinsic value. This was exactly what happened.

The same procedure was now repeated for coffee mugs (also ball point pens) except that consumers were now told to value objects on their own with the promise that at the end, each consumer would be able to sell her mug (pen) at the value named by her if she possessed one. It was found that in this case the average number of transactions per round was significantly less than N/4. This could only be the case if there was a systematic tendency for the consumer to raise her valuation once she came to possess the mug (pen) i.e. the endowment effect was present.

An earlier experiment (Knetsch and Sinden, 1984) also provides strong evidence for the endowment effect: subjects were split into two halves, those given a lottery ticket each and then offered different amounts to part with it, and those asked to name sums to obtain a lottery ticket. A very large, positive and statistically significant difference was seen between the average minimum price leading to a successful transaction for the first sub group and the average maximum price offered by the second sub-group. Kahneman *et al.* (2008) survey an impressive body of evidence which demonstrates the validity of the endowment effect. This effect can be elegantly explained on the basis of the value function in Kahneman and Tversky (1979) according to which equal losses and gains are valued quite differently, with the valuation higher for the loss. Thus, the gain of a wine bottle is associated with a significantly smaller change in value than its loss.

How do we incorporate the findings regarding the endowment effect into the practice of neoclassical economics? The utility from 1unit of an object should probably be expressed as $U(1,d)$ where $d=1$ if the person already owns the object and $d=0$ if the person does not own the object. Thus, a person would buy 1 unit of an object at price p if $p<U(1,0)$ but if offered a price P such that $U(1,1)>P>U(1,0)$would refuse to sell it. Note the underlying assumption that our expectations about the usefulness of the good are not diminished greatly once we come to possess the good. This might not be true of cars and many other durable goods. In this case it might be true that $U(1,1)<U(1,0)$ i.e. while possession does tend to raise the valuation of the good the information acquired due to possession might diminish it. The net effect is that a person who pays a price p for a car may want to sell it off at a price $P<p$. However, this does not mean that the endowment effect is non-existent. Rather, there is an 'information effect' resulting from possession which might supplement the 'endowment effect' in some cases but in many other cases counter it. In the case of small items such as mugs and ballpoint pens, the change in valuation due to new information acquired on possession is small and therefore it is only the 'pure endowment effect' which comes into play.

3.3. Self Control Issues

In his book, Thaler (2015) criticizes neoclassical economics for assuming that individuals exhibit perfect self-control when in fact they do not. He recounts an incident in which removing cashews from the reach of guests at a party, after a certain amount of time had elapsed, had actually made them happier. The argument being made is the following: a) If individuals exhibit perfect self-control then they would not eat an amount of cashews which is significantly different from the quantity that is good for them and therefore removing cashews should not make them any happier; and b) the observation runs counter to neoclassical prediction: a bigger choice set always dominates a smaller one, at least weakly, in regard to the maximum attainable utility.

After Simon (1955) we now know why the neoclassical prediction mentioned in b) is not valid: a larger choice set is associated with greater processing time and therefore cost associated with the process of choice, resulting possibly in lower utility. Note that preferences are often formed after viewing the choice set and not before. Given

time constraints, the individual picks out a subset of a maximum of n elements for choice out of a choice set of N elements. The value of n depends on the specific choice problem. The individual makes her choice by ranking only these n elements if $N>n$ but all the N elements otherwise. Now imagine two choice sets, A and B, with the number of elements in the former exceeding n and in the latter, a subset of A, falling short of n. Further let us assume that A and B are such that if time was not a constraining factor and there were no cognition problems in regard to choice, the element chosen from the two sets would have been the same, say x*. If due to these constraints, a subset of n elements is picked out for choice from A the optimal choice from that subset might well be inferior to x*. To summarize, more elements in the choice set, may, beyond a point, introduce some randomness in the process of selection with negative implications for utility.

Thaler's empirical observation that the individual in real life does not exhibit perfect self-control is true. However, the assumption of perfect self-control does not have anything to do with the discussed kernel of neoclassical economics. In fact Becker, a staunch neoclassical economist, proposed the theory of rational addiction: a cigarette or heroin addict may prefer a shorter life characterized by great ecstasy than a longer one bereft of it.

In Becker's model addiction is a rational/calculated decision, not a sign of weakness where an individual succumbs to his impulses. Thaler's explanation of the occurrence of addiction/ binge consumption or the ability to refrain from such behavior is based on the interaction between a person's impulsiveness and her capacity for planning without being influenced by the emotion generated on exposure to an environment. Thus, inside the brain of each individual there resides a doer who just responds to the environment around her, for example, one succumbing to the temptation of eating cashews or drinking alcohol when these items are placed close to her; and a planner who in the 'cashew story' arranges beforehand for these things to be removed after a suitably small length of time.

In cases where the planner is capable, addiction or overconsumption is avoided; otherwise impulsiveness takes over. Two anecdotes appropriately illustrate the ability of the planner to discipline the doer. The first relates to a personal experience and the second relates to Greek mythology as recounted by Thaler (2015).

The personal experience is a follows. I have acquired a fascination for a particular brand of lozenges. If these lozenges are stored in a box at home I find myself approaching the box for a lozenge not long after consuming the previous one. On a given day I can consume 6 to 7 of these. The other day I bought a fresh supply of lozenges and put them in a pocket in my car. As I got off the car I reached out to take the packet home when the planner in me took charge: I reasoned that leaving them in the car would greatly limit the time for which the doer in me would have access to the lozenges, thus regulating my sugar intake.

The story from Greek mythology is better. A group of female singers called the *Sirens* resided close to the sea near some rocks. Sailors who heard them singing would try to get closer to the music and find themselves shipwrecked. Odysseus wanted to both hear the music and live to tell the tale. He asked his sailors to plug their ears with wax while he got himself bound to the mast. This way the impulse to get closer would not be generated in the case of the sailors; in his own case it would be generated by the music reaching his ears but not get manifested in suicidal actions. Odysseus managed to hear the music and remain alive after hearing it. This was a clear case of Odysseus, the planner regulating the impulses of Odysseus, the doer.

Shefrin and Thaler (1981;1988) discuss the interaction between the planner and the doer and the implications of such interaction for human behavior, especially self-control. The basic idea is that if no effort is undertaken to change the environment, the doer maximizes a current period utility function without any regard for what is going to happen in subsequent periods, leading to overconsumption in the current period and possible under consumption in subsequent periods. The planner recognizes the myopia of the doer and therefore incurs an expense to change the

environment. The modeling is done in a specific context i.e. the exercise of self-control in preventing over-consumption of lifetime wealth/income in a given period. If the individual is considered to be a producer of environmental change, a higher efficiency of the producer is associated with a marginal cost curve which yields a lower level of marginal cost at every level of environmental change, resulting in a greater chosen level of environmental change and therefore facilitating a consumption plan that is closer to the most efficient one which maximizes the sum of present discounted values of utilities under zero costs of environmental change. The extent of change in the environment actually undertaken can be labeled as the extent of self-control.

In what follows I illustrate a very simple but more general way of looking at the planner-doer interaction using the utility function approach: it sees the doer as falling under the spell of an environment and the planner as using his discretion to prevent/facilitate entry into undesirable/desirable environments. The choice set of environments is assumed to be given exogenously. It is also assumed that the planner spends the same amount of time in choosing an environment irrespective of the final choice. Therefore, the amount of time spent in planning does not affect choice once the planner decides to make a conscious choice of environments.

In other words, I bypass the problem of self-control. In regard to my experience with lozenges, an exercise of self-control is not very significant for environmental choice; it becomes more important in checking consumption of lozenges during a period in which lozenges are available. In this model we do not consider self-control to be a choice variable. However, one can imagine cases such as that of a person addicted to a drug or tobacco in which the very choice of an environment, say checking oneself into a de-addiction clinic, requires a huge exercise of self-control.

When an individual is faced with an environment she gives vent to her impulses such as gluttony and aggression. However, different environments do not provide the same scope for these impulses. Let x represent the action taken by the individual where α is a vector representing the environment in which the individual finds herself. Now the simplest form of change in α could be that in the choice set facing the individual: for example, when Thaler takes the bowl of cashews away, each commodity bundle in the choice set facing an individual is associated with zero quantity of cashews; in the absence of Thaler's action this would not have been the case. However, a change in the choice set is the not the only environmental change possible: for example, I can alter the environment in my office by playing soothing music so that I do not get angry with visiting students and shout at them. But the option of shouting is still available to me.

The environment specific utility function is given by $U(x,\alpha)$; when an individual maximizes this utility function by choosing an optimal level of x, given the environment α, it is assumed that she gives vent to impulses triggered by the environment. But in many cases, the planner in the individual can act beforehand and choose the environment which results in her taking the action that either maximizes her own wellbeing or minimizes the difference between optimal and attained wellbeing. There is a distinction being made here between 'wellbeing' captured by $G(x)$ and satisfaction from giving vent to one's impulses in an environment,$U(x,\alpha)$.
Mathematically the problem that the planner solves is:

$$\max_{\alpha} G(x(\alpha))$$

where$x(\alpha)$ solves the problem:

$$\max_{x} U(x,\alpha)$$

Note that for wellbeing to be optimized, there has to exist a vector $\alpha*$ in the environmental choice set of the individual so that $x(\alpha*) = x*$, the value of x which maximises G. This need not necessarily be the case. But one can get close to $x*$ by planning. The gain in wellbeing from planning will be significant only when (a) G is

sensitive to x and $x(\alpha)$ is sensitive to variation in environment, α; and (b) one of the mentioned variations is significant.

There are obvious limitations in regard to planning: it only applies to situations in which the environment can be controlled. Further, the choice set for α, the environment under which the choice of x is made, might vary across individuals. A good planner would expend both time and effort to contemplate and be adequately informed and one would expect the choice set for α known to her to include that value which induces a choice of x that maximizes or comes close to maximizing G(x).

Clearly, the above is a Stackelberg game: the planner knows the reaction function of the doer which provides a unique choice of x for each environment, α, and uses that knowledge to choose α such that G is maximized subject to the environmental choice set.

Effective planning of life would correspond to intervening only in those cases in which environmental choice is critical, given that time is limited and there actually has to be some doing if such choice has to bear fruit. Our simple model can be used to illustrate 'planning of planning' in a very easy manner. Consider n actions that can potentially be executed in a day. To control the extent of each action one can choose from a set of environments with multiple elements. There could be a trade-off between planning and doing for busy people. A finite amount of time per day could imply limiting doing or planning or both: the individual might not attempt to involve herself in all possible actions, and/or plan all actions chosen for execution but cherry pick depending on the relative sizes of improvements made by planning of various actions to wellbeing.

The number of activities chosen for doing and the number planned are obviously related. Individuals with propensity for packing more activities into a day will automatically plan a lower proportion of their actions; hyperactivity might lower wellbeing, especially if some of the activities could have yielded a much higher level of utility when planned. A wise public figure, for example, might, therefore, limit his public appearances even though greater visibility might ostensibly seem to be better. A woodcutter living in a log cabin who undertakes the same activities day after day can be a doer through all his active hours.

3.4.Of Buckets and Budgets

In traditional neoclassical models it is assumed that one's money income is fungible: if on allocating one's money income among expenditures in a certain way, an individual finds that she can increase her total satisfaction by shifting some amount of money from one use to the other she would do so. In other words, it is assumed that there are no restrictions on reallocating one's income across different uses and people undertake such allocation so as to enhance their utility or satisfaction.

Thaler (2015)[13] points out that in reality, people impose certain restrictions on themselves in regard to the expenditure of income i.e. they allocate their income to certain broad but compartmentalized uses and avoid transfer across compartments. This is akin to putting cash income in different amounts in various jars, each carrying the label of different broad use. What is encouraging for neoclassical economists is that each compartment corresponds to a certain broad use of income. Therefore, each broad use consists of a large number of narrowly defined uses among which substitution can take place in the event of a change in relative prices or influences emanating from the surrounding environment. Therein lies the potential to combine Thaler's findings regarding human behavior concerned with allocation of individual income across broad uses with the neoclassical utility framework. In neoclassical economics, the Cobb Douglas function has been used to good effect to characterize spending which

[13]Also see papers by Heath and Soll (1996) and Hastings and Shapiro (2013)

corresponds to fixed proportions of income spent on various goods. The same function can be used to characterize compartmentalized spending. Thus, individual decision making in regard to spending can be seen to consist of 2 different stages. In the first stage, the individual allocates his income to broad uses. The proportion of income spent on a given broad use can vary with income. For example, if a broad use carries the label of 'entertainment, including eating out' one would expect the proportion of income devoted to it to increase as one moved from a low-income class to the middle-income classes. To come back to the central theme of this paragraph, the mentioned allocation can thus be seen as the maximization of the following Cobb Douglas function:

$$\max_{x_i} \prod_{i=1}^{n(M,P)} {x_i}^{\alpha_{i(M,P)}} s.t \sum_{i=1}^{n(M,P)} x_i = M$$

where x_i is the money expenditure on broad use i,P is a price vector with components reflecting the unit costs of acquiring various goods and services, and $n(M,P)$ is the number of broad uses at a given M and P. In the second stage, the individual may be seen as undertaking the following utility maximization problem for each compartment i.

$$\max_{x_{ij}} U_i(x_{i1}, x_{i2}, \dots x_{ij} \dots \dots \dots x_{ik_i}) \; s.t. \sum_{j=1}^{k_i} p_{ij} x_{ij} = x_i$$

wherex_{ij} is the quantity consumed of each good or service bought using the ith class of expenditure and k_i is the number of products corresponding to compartment i.

4. CONCLUSIONS

The objective of this paper is to show that the behavioral success in drawing attention to the psychological motives underlying human economic behavior, though laudable, does not imply that the neoclassical methodology of optimization should be discarded. Psychological impulses or actions such as sympathy for others, not letting bygones (read 'sunk costs') be bygones, compartmentalization of expenditures, and the human allowing the atmosphere or surroundings to get the better of her can possibly be successfully incorporated in a neoclassical model (which assumes 'optimizing agents') so that many of the systematic biases hitherto attributed to such models can be eliminated. Yet it is emphasized that bounded rationality does have implications for group behavior which cannot be captured by the neoclassical assumption of perfect rationality. Future research may deal with constructing models in which agents are motivated by 'bounded rationality' based on both economic and psychological motives. Finally, it should be emphasized that we are not falling prey to the temptation of constructing a utility function, which when maximized would lead exactly to the observed individual behavior. Such an approach has no predictive value as it can be implemented only after an action has been undertaken. Rather our approach is to construct a utility function for a representative individual which is able to capture both economic and psychological impulses governing her behavior. The idea is to ensure that the utility function of an actual individual differs from that representative function by an idiosyncratic term which is random and non-systematic. The representative utility function can then be used to endeavor to correctly predict group behavior. However, the elimination of systematic biases in the specification of the representative utility function is itself an onerous task.

REFERENCES

Andreoni, J., 1990. Impure altruism and donations to public goods: A theory of warm-glow giving. The Economic Journal, 100(401): 464-477.Available at: https://doi.org/10.2307/2234133.

Becker, G.S., 1976. The economic approach to human behavior. Chicago and London: The University of Chicago Press.

Gourville, J.T. and D. Soman, 1998. Payment depreciation: The behavioral effects of temporally separating payments from consumption. Journal of Consumer Research, 25(2): 160-174.Available at: https://doi.org/10.1086/209533.

Hastings, J.S. and J.M. Shapiro, 2013. Fungibility and consumer choice: Evidence from commodity price shocks. The Quarterly Journal of Economics, 128(4): 1449-1498.Available at: https://doi.org/10.1093/qje/qjt018.

Heath, C. and J.B. Soll, 1996. Mental budgeting and consumer decisions. Journal of Consumer Research, 23(1): 40-52.Available at: https://doi.org/10.1086/209465.

Kahneman, D., J.L. Knetsch and R.H. Thaler, 1990. Experimental tests of the endowment effect and the coase theorem. Journal of Political Economy, 98(6): 1325-1348.Available at: https://doi.org/10.1086/261737.

Kahneman, D., J.L. Knetsch and R.H. Thaler, 1991. Anomalies: The endowment effect, loss aversion, and status quo bias. Journal of Economic Perspectives, 5(1): 193-206.Available at: https://doi.org/10.1257/jep.5.1.193.

Kahneman, D., J.L. Knetsch and R.H. Thaler, 2008. The endowment effect: Evidence of losses valued more than gains. Handbook of Experimental Economics Results, 1(7): 939-948.

Kahneman, D. and A. Tversky, 1979. Prospect theory: An analysis of decision under risk. Econometrica, 47(2): 263-292.Available at: https://doi.org/10.2307/1914185.

Knetsch, J.L. and J.A. Sinden, 1984. Willingness to pay and compensation demanded: Experimental evidence of an unexpected disparity in measures of value. The Quarterly Journal of Economics, 99(3): 507-521.Available at: https://doi.org/10.2307/1885962.

Mullainathan, S. and R.H. Thaler, 2000. Behavioral economics. National Bureau of Economic Research, Working Paper No. 7948.

Schnitker, S.A. and R.A. Emmons, 2013. Hegel's thesis-antithesis-synthesis model. Chapter 690, In: Encyclopedia of Sciences and Religions edited by Anne L. C. Runehov et al, Berlin: Springer.

Sen, A.K., 1977. Rational fools: A critique of the behavioral foundations of economic theory. Philosophy & Public Affairs, 6(4): 317-344.

Shefrin, H.M. and R.H. Thaler, 1981. An economic theory of self-control. Journal of Political Economy, 89(2): 392-406.

Shefrin, H.M. and R.H. Thaler, 1988. The behavioral life-cycle hypothesis. Economic Inquiry, 26(4): 609-643.Available at: https://doi.org/10.1111/j.1465-7295.1988.tb01520.x.

Simon, H.A., 1955. A behavioral model of rational choice. The Quarterly Journal of Economics, 69(1): 99-118.Available at: https://doi.org/10.2307/1884852.

Smith, A., 1759. 1981. The theory of moral sentiments. Reprint edited by D.D Raphael and A.L. Macfie, Indianapolis: Liberty Classics.

Smith, A., 1776. 1981. An inquiry into the nature and causes of wealth of nations. Reprint edited by D.D. Raphael and A.L. Macfie. Indianapolis: Liberty Classics.

Thaler, R.H., 2000. From homo economicus to homo sapiens. The Journal of Economic Perspectives, 14(1): 133-141.Available at: https://doi.org/10.1257/jep.14.1.133.

Thaler, R.H., 2015. Misbehaving: How economics became behavioral. W.W. Norton & Company, Inc, 87.