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Lexicographic Preferences, Rationality and the Fallacies of Behavioral Economics

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Abstract:

In this paper the differences between traditional economic theory and the relatively newer behavioral economic theory, which is a blend of economics and psychology, is discussed. The traditional assumptions regarding consumer preferences are explained and elaborated upon. This includes reflexivity, completeness, transitivity and continuity. Auxiliary assumptions, such as local nonsatiation and strict convexity, regarding preferences are also introduced. Lexicographic preferences in a two good world are explicated and demonstrated to encompass rational behavior even though they do not generate a well defined utility function. If a consumer has lexicographic preferences behavioral economists can be mistaken in thinking that consumer behavior is irrational.

Keywords: Lexicographic Preferences; Behavioral Economics; Rationality.

Introduction

The traditional view in economics assumes that individual decision makers such as consumers and managers within business firms act in a rational manner while trying to optimize an unconstrained or constrained objective function. This maximizing (or minimizing) behavior is assumed to occur across all individuals. Rationality is a key assumption in any optimization situation. With regard to consumer preferences the traditional assumptions include reflexivity, completeness, transitivity, and continuity. Throughout this paper it will be assumed that we have a two good world consisting of goods x_1 and x_2. The consumption bundle will be shown as a bold typed x, such as **x, x'** or **x".** The entire set of consumption bundles is shown as X. Reflexivity states that for all consumption bundles in X, $\mathbf{x} \succsim \mathbf{x}$ (where $\succsim$ means weakly preferred to, $\succ$ means strictly preferred to). This is an inconsequential assumption. Completeness assumes that for all **x** and **x'** in X either $\mathbf{x} \succsim \mathbf{x'}$ or $\mathbf{x'} \succsim \mathbf{x}$ or both. This implies that consumers are not paralyzed by indecision, they can easily make choices. Transitivity assumes that for all consumption bundles in X, if $\mathbf{x} \succsim \mathbf{x'}$ and $\mathbf{x'} \succsim \mathbf{x"}$ then $\mathbf{x} \succsim \mathbf{x"}$. This implies that there is a logical consistency present in preferences. Continuity implies that the set of strictly preferred consumption bundles is an open set and the set of weakly preferred consumption bundles is a closed set. This also means that thick indifference curves are ruled out. With these four assumptions it can be shown that an ordinal utility function exists.

Other assumptions that are sometimes made regarding preferences are local nonsatiation, strong monotonicity (which implies local nonsatiation) and strict convexity. The first two imply, independently, that more is always preferred to less. A good never becomes a "bad" in other words. Strict convexity is used to generate smooth looking demand curves. It incorporates the ides of diminishing marginal rates of substitution.

Behavioral Economics

The relatively new fields of behavioral economics and behavioral finance take issue with the traditional type of models. Behavioral economics is a blend of economics and psychology. The adherents to these fields believe that decision makers do not always behave in a rational manner and thus the models that make that assumption are faulty and can lead to incorrect conclusions about actual behavior in markets. Behavioral economists make use of a small set of beliefs that include prospect theory, framing, and endowment effects.

The behavioral economists point to a variety of anecdotal situations (many contrived in a laboratory type setting) where individuals do not make optimizing decisions. This is supposedly due to the irrationality of the agent making the decision. Some examples of their work follow below.

Classical economics assumes that individuals make decisions based on the well-known expected utility theory. Behavioral economists claim otherwise. They developed a theory called prospect theory that, in their mind, better explains the decisions made by individuals. Prospect theory assumes that a value function exist that plots utility on the vertical axis and gains/losses on the horizontal axis. The function itself is cubic and crosses the origin. In quadrant three (losses and less utility) of this Cartesian plane the function is increasing at an increasing rate. In quadrant one (gains and more utility) the function is increasing at a decreasing rate. This assumes that a $100 loss takes away more utility than a $100 gain would add. This phenomenon is entitled loss aversion.

Behavioral economists have devised a number of different studies regarding loss aversion. The typical study asks individuals to choose between a sure gain of say $200 (option A) or a 50% chance of gaining $400 and a 50% to gain/lose $0 (option B). The expected value of option B is $200. Most studies show the majority of individuals choosing option A. A similar question is then posed such as option A being a sure loss of $200 and option B being a 50% chance to lose $400 and a 50% chance to lose/gain $0. Again the expected value of option B is $200. Here most people choose option B. In the first case individuals demonstrate risk averse behavior as predicted by traditional economics, but in the second situation they exhibit risk seeking behavior which is not rational according to traditional theory. Behavioral economics point to this as evidence backing up their prospect theory which is based on their assumption of loss aversion which fuels the shape of their value function explained above.

The field of behavioral economics utilizes a different concept of utility than does the traditional school of thought. Behavioral economists break utility into two different types: acquisition utility and transactional utility. Acquisition utility is similar to the concept of consumer surplus used by traditional economists. Transactional utility is the difference between some reference price which consumers identify as the "normal" price and the price they are actually expected to pay. This suggests that business firms can impact sales simply by framing the reference price in an advantageous manner. For example, by inflating the suggested retail price (reference price) they can trick consumers into thinking they are getting more transactional utility even though the good itself has not changed. This would, according to the behavioral school of thought, cause sales to rise. The behavior is viewed as an irrational decision by consumers.

Consumers are also thought to behave irrationally when making intertemporal choices. According to the "behavioralists", consumers and investors do not discount in a rational manner. The list goes on and on as far as examples of supposed irrational behavior by agents in markets. Behavioral economics produces much anecdotal "evidence", but no concrete, general theories.

Lexicographic Preferences

Perhaps no general theories exist because behavioral economics is itself faulty. If individual agents making decisions have non-traditional looking indifference curves due to a variety of different reasons then the decisions that they make might not actually be irrational at all. They might be quite rational and quite adaptive to explanations via traditional economic theory. One such case is when individuals have lexicographic preferences or modified forms of lexicographic preferences.

Lexicographic preferences exist when **x**, consisting of two goods x_1 and x_2, and **x'**, consisting of x_1' and x_2' have the following relationship. **x** is lexicographically weakly preferred to **x'** ($\mathbf{x} \succsim \mathbf{x'}$) if and only if either $x_1 > x_1$' or $x_1 = x_1$' and $x_2 \geq x_2$'. The strong version would simply be $\mathbf{x} \succ \mathbf{x'}$ if and only if $x_1 > x_1$' or $x_1 = x_1$' and $x_2 > x_2$'. Lexicographic preferences are reflexive, complete and transitive. The preferences also reflect local nonsatiation, strong monotonicity and strict convexity. These preferences do however lack continuity and thus cannot be represented by any discernable utility function. The lack of continuity implies that in a two good world the upper contour set is neither closed nor open and thus no significant indifference map exist. Indifference curves would only be shown when the upper contour set is closed. Each unique combination of any two goods would have a different level of utility. The lack of the existence of a utility function does not mean that individuals cannot make decisions among various consumption bundles. They indeed can and do. Kohli and Jedidi (2007) find considerable evidence that consumers exhibit various degrees of lexicographic preferences. Their preferences still are reflexive, complete, transitive, monotonic and convex.

An example of lexicographic preferences is as follows. Assume a consumer is deciding between two goods, x_1 being red M&M's and x_2 being green M&M's. Further assume that the consumer has lexicographic preferences such that the consumer prefers more M&M's to less M&M's and the consumer has a preference of red over green M&M's. Hence (x_1, x_2) $\succsim$ ($x_{1'}$ $x_{2'}$) if either ($x_1 + x_2 > x_{1'} + x_{2'}$) or ($x_1 + x_2 = x_{1'} + x_{2'}$ and $x_1 > x_{1'}$) holds. Also assume a consumer with a "normal" utility function which exhibits continuity among the other usual assumptions of completeness, transitivity and local no satiation. This function can take a simple additive form such as $U = x_1 + x_2$. Further assume that red and green M&M's can be purchased separately and the price of each kind of M&M is identical. This implies that the indifference curves for this consumer would be identical to their budget lines. Numerous utility maximizing choices exist in this

situation. Assuming each utility maximizing consumption bundle would have an equal probability of being chosen it would be extremely rare to have a corner solution where all of one type of M&M is chosen. An economist would have expectations of a consumer choosing some combination of red and green M&M's in this case although it is possible to see a consumer choosing all red or all green M&M's. This would be especially true if we assumed a market for M&M's with all consumers having the same additive utility function. It approaches a probability of zero that all consumers would end up with the same corner solution. Yet if all consumers had lexicographic preferences like the one above we in fact would see all consumers purchasing red M&M's in this case. A behavioral economist seeing such behavior would suggest that the consumers are irrational when in fact they are not. As suggested above, evidence found by Kohli and Jedidi (2007) seems to indicate that lexicographic preferences are not as rare as one might think.

Even if prices were not exactly equal, situations could be imagined where if relative prices were near unity and individuals had slightly "thick" indifference curves (implying that preferences were not strictly continuous) then the same market choices above could prevail. The identical mistakes could then be made by behavioral economists.

Conclusion

It might be the case that where behavioral economists think they are seeing irrational behavior might simply be a case where individuals are exhibiting quite rational behavior which is somewhat masked by having lexicographic preferences instead of the more standard preferences normally assumed in economics and finance. This is especially true when the relative price ratio of the two goods is near unity. The presence of a utility function implies rationality, but it is not a necessary condition for rationality.

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