Behavioral Economics

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Homework 3 - Autumn 2018

Due Friday 14th December

Question 1 (Endogenous Reference Points) Consider the following model of choice with reference points. There exists:

- 1. A utility function $u: X \to \mathbb{R}$
- 2. A set \mathcal{U} of real maps on X
- 3. A 'reference map' $r: 2^X \setminus \emptyset \to X \cup \Diamond$ such that

$$r(S) \in S/c(S)$$
 if $r(S) \neq \Diamond$

Define $\overline{U}(x) = \{y \in X | U(y) \ge U(x) \forall U \in \mathcal{U}\}$. Choice in any given choice set is given by

1. If $r(S) = \Diamond$

$$c(S) = \arg\max_{x \in S} u(x)$$

1. If $r(S) \neq \Diamond$

$$c(S) = \left\{ x \in S | u(x) \ge u(y) \ \forall \ y \in S \cap \bar{U}(r(S)) \right\}$$

2. For any $T \subset S$ such that $r(S) \in T$ and $c(S) \cap T \neq \emptyset$ then $r(T) \neq \emptyset$ and

$$c(T) = \left\{ x \in X | u(x) \ge u(y) \ \forall \ y \in T \cap \bar{U}(r(S)) \right\}$$

Consider observing choices from every subset of some finite set X. Here are some questions concerning this model

- 1. Show that this model will violate WARP
- 2. What observation would allow you to identify an alternative z as acting as a reference point in a set S?
- 3. We will say that z acts as a reference for x if, by being a reference point in some choice set it causes x to be chosen if it would not have been otherwise. Use your above condition to identify a behavioral equivalent - i.e. when is z revealed to be a reference point for x in the data? If z is revealed as a reference of x and x is revealed as a reference for y then must z be revealed as a reference for y?
- 4. Show that the model implies that if $x \in C(\{x, y\})$ and $y \in C(\{y, z\})$ then it must be the case that $x \in C(\{x, z\})$
- 5. Let **T** be a collection of sets such that (i) $\cup T \in \mathbf{T} = S$ and (ii) $T \cap C(S) \neq \emptyset$ for all $T \in \mathbf{T}$. Show that the above model implies the following statement must be true if and only if |T| = 2 for some $T \in \mathbf{T}$:

For some $T' \in \mathbf{T}$ we have $C(T') = C(S) \cap T'$

- 6. Consider the concept of Personal Equilibrium introduced by Koszegi and Rabin. Does this model satisfy that concept? Can it satisfy that concept?
- 7. Consider the following alternative model of reference point formation are reference effects.. For simplicity we will work with choice functions, so C(S) is always a singeton. There exists a 'salience ranking' R on X which is a strict linear order. For every alternative $x \in X$ there is a one to one utility function u_x . The decision maker makes choices in the following way

$$C(S) = \max_{x \in S} u_y(x)$$
 for $y \in S$ s.t. $yRz \ \forall \ z \in S$

Show that this model will satisfy the following property: For every choice set S and T and distinct x and y such that $\{x, y\} \subset S \cap T$, if $x \neq C(S) \neq c(S \setminus x)$ then either C(T) = y or $C(T \setminus y) = C(T)$

8. Discuss the relationship between this model and the one you considered in sections 1-6. Are the two models nested? If not how do their behavioral implications differ?