

Dynamic Strategic Planning

Value Functions

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Value Functions
Slide 1 of 10

Value Functions

- **In General:**
 - Preference Measure
 - $PM = f(\underline{X})$
 - where \underline{X} = vector of attributes
- **Semantic Caution: Value**
 - Value in Exchange
 - Value in Use
 - “Fair Market Value”

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Slide 2 of 10

Illustration of Difference in Value

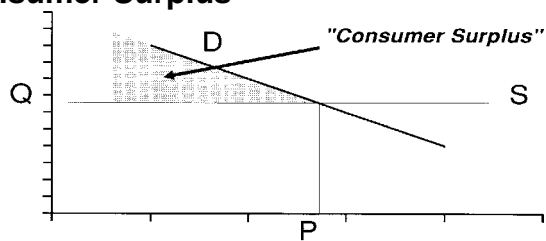
- Value in Exchange IS NOT Value in Use

Value-In-Use - Like a “shadow price” in optimization

- “Fair Market Value”

Market Prices Rarely Reflect Value

Consumer Surplus



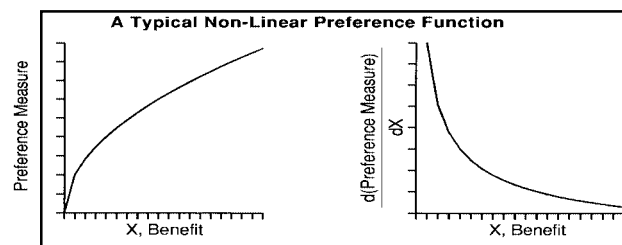
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Value Functions
Slide 3 of 10

Value Function - $V(X)$

- Definition:

$V(X)$ is a means of ranking the relative preference of an individual for a bundle on consequences, X

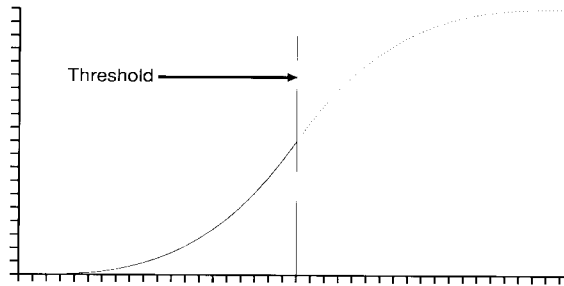


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Value Functions
Slide 4 of 10

Preference Function

- Risk Preference Also Observed
(There is no “Law of Diminishing Marginal Utility”)
- However, May Instead Reflect “Threshold Effect”
(Asymmetric Behavior About A Threshold Value)



Basic Axioms of Value Functions - $V(X)$

- Completeness or Complete Preorder
People have preferences over all X_i
- Transitivity
If X_1 is preferred to X_2 ; and X_2 is preferred to X_3 ; Then X_1 is preferred to X_3
**Caution: Assumed True for Individuals;
NOT Groups**

Basic Axioms of Value Functions - $V(X)$ (cont'd)

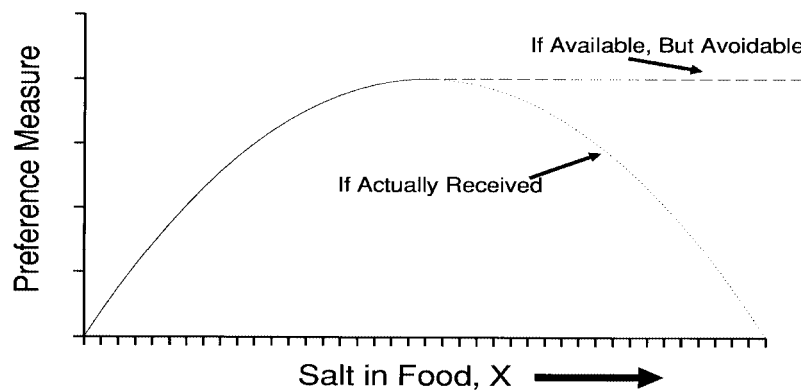
- Monotonicity or Archimedean Principle

For any \underline{X}_i ($\underline{X}^* \geq \underline{X}_i \geq \underline{X}_s$)
there is a w ($0 < w < 1$) such that
 $V(\underline{X}_i) = w V(\underline{X}^*) + (1 - w) V(\underline{X}_s)$

That is, More is Better (or Worse)

Another Preference Function

- Represents a Benefit Which Ultimately Becomes Undesirable



Consequence of V(X) Axioms

- Existence of $V(\underline{X})$
- Ranking Only

Strategic Equivalence of Many Forms of $V(\underline{X})$

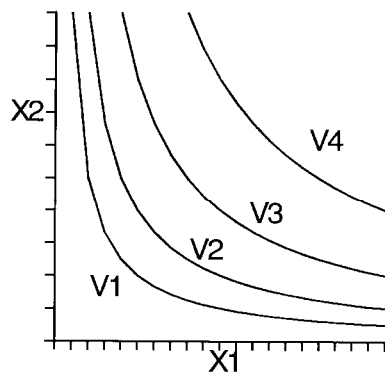
Any Monotonic Transform of a $V(\underline{X})$ is Still an Equivalent $V(\underline{X})$

$$\begin{aligned} \text{e.g., } V(X_1, X_2) &= X_1^2 X_2 \\ &= 2 \log(X_1) + \log(X_2) \end{aligned}$$

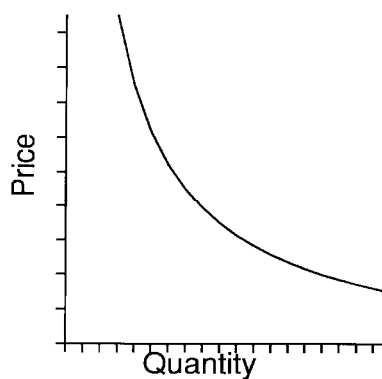
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Slide 9 of 10

Value Functions



Isovalue Contours



Demand Function
(Maximize Value Given
a Budget Constraint)

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Value Functions
Slide 10 of 10