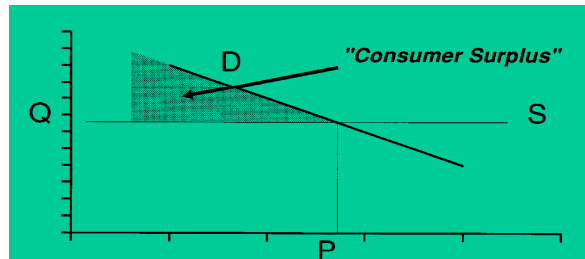


Value Functions

- **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”

Illustration of Difference in Value

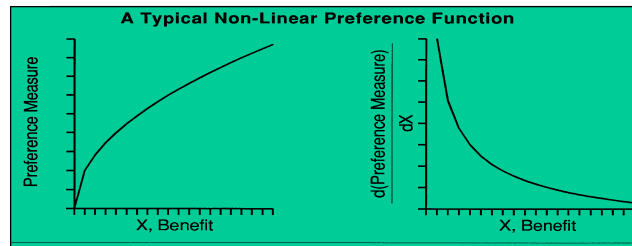
- **Value in Exchange IS NOT Value in Use**
 - Value-In-Use - Like a “shadow price” in optimization
- **“Fair Market Value”**
 - Market Prices Rarely Reflect Value
 - Consumer Surplus



Value Function - $V(X)$

- **Definition:**

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

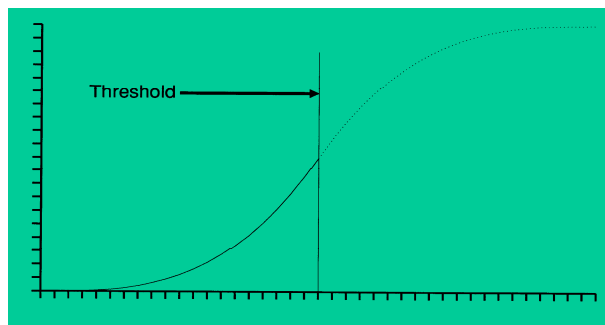


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Preference Function

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



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Basic Axioms (1)

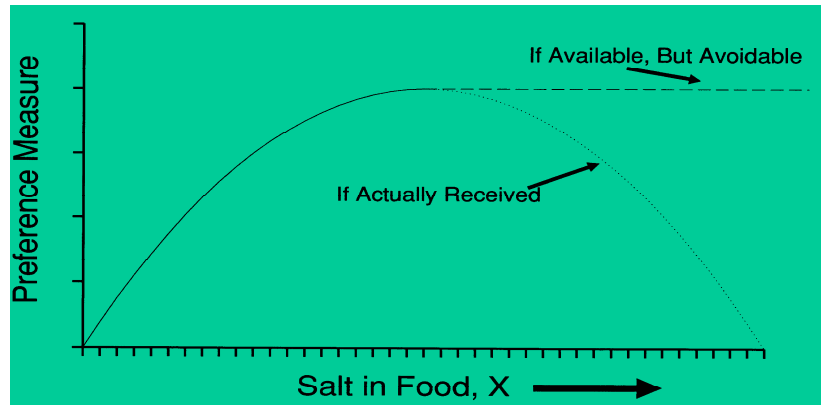
- **Completeness or Complete Preorder**
 - People have preferences over all \underline{X}_i
- **Transitivity**
 - If X_1 is preferred to X_2 ; and X_2 is preferred to X_3 ; Then X_1 is preferred to X_3
 - **Caution: Assumed True for Individuals; NOT Groups**

Basic Axioms (2)

- **Monotonicity or Archimedean Principle**
 - For any \underline{X}_i ($\underline{X}^* \geq \underline{X}_i \square \underline{X}_*$)
there is a w ($0 < w < 1$) such that
 $V(\underline{X}_i) = w V(\underline{X}^*) + (1 - w) V(\underline{X}_*)$
 - That is, More is Better (or Worse)

Another Preference Function

- Represents a Benefit Which Ultimately Becomes Undesirable



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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 $V(\underline{X})$

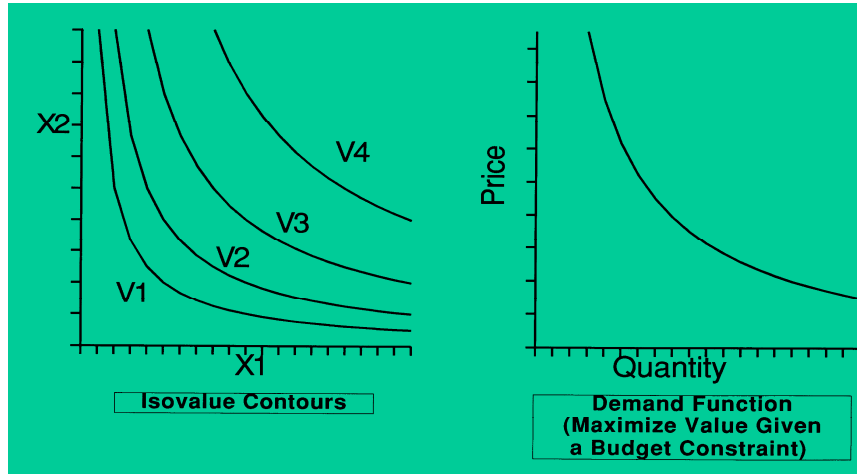
For example:

$$V(X_1, X_2) = X_1^2 X_2 = 2 \log(X_1) + \log(X_2)$$

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