1 Preferences

1.1 Monotonicity

"More is better."

(Weak) Monotonicity:

$$(x_1, x_2)$$

$$(x'_1, x'_2)$$

If $x_1 \geq x'_1$ and $x_2 \geq x'_2$ then $(x_1, x_2) \succsim (x'_1, x'_2)$

Furthermore if **both** of these inequalities are strict.

If $x_1 > x'_1$ **and** $x_2 > x'_2$ then $(x_1, x_2) \succ (x'_1, x'_2)$

Strict Monotonicity:

If $x_1 \geq x'_1$ and $x_2 \geq x'_2$ then $(x_1, x_2) \succsim (x'_1, x'_2)$

Furthermore if **both** of these inequalities are strict.

If $x_1 > x'_1$ **or** $x_2 > x'_2$ then $(x_1, x_2) \succ (x'_1, x'_2)$

Finn's preferences over ice cream are that he wants more but doesn't care about flavor.

$$(2, 2) \succ (1, 1)$$

$$(2, 1) \succ (1, 1)$$

Remy only likes chocolate ice cream. Otherwise he want's more chocolate. He does not care about the amount of vanilla.

$$(2, 2) \succ (2, 1)$$

$$(2, 1) \sim (1, 1)$$

This is weakly but not strictly monotonic.

Weakly monotonic allows this:

$$(2, 1) \sim (1, 1)$$

Strictly monotonic does not allows this:

$$(2, 1) \sim (1, 1)$$

It insists that

$$(2,1) \succ (1,1)$$

Neither form allows this:

$$(2,2) \sim (1,1)$$

It insists that

$$(2,2) \succ (1,1)$$

Weakly Monotonic preferences imply that the indifferences are "weakly" downward sloping (they can have flat parts.

Strict monotonicity implies indifference curves are strictly downward sloping. Slope downwards everywhere and have no flat parts.

1.2 Examples of Monotonicity

Perfect Substitutes, Cobb Douglass, Quasi-Liner Strictly Monotonic

Perfect Complements- Weakly Monotonic

1.3 Convexity

Mixtures are better than extremes.

Convexity.

"Convex Combinations" of two indifferent bundles have to be at least as good as those two bundles.

$(x_1, x_2)\,(x_1', x_2')$

Convex combination of these bundles is some $t \in [0,1]$ construct a new bundle by taking t proporiton of the first bundle and $1-t$ proportion of the second bundle.

$$t\,(x_1, x_2) + (1-t)\,(x_1', x_2')$$

A convex combination is nothing more than the line between two bundles. The set of possible convex combinations are all of the points on that line.

$(2,0)\,,(0,2)$

Pick $t = \frac{1}{2}$:

$$\frac{1}{2}\,(2,0) + \left(1 - \frac{1}{2}\right)(0,2)$$

$$\frac{1}{2}(2,0)+\left(\frac{1}{2}\right)(0,2)$$

$$\left(\frac{1}{2}2,\frac{1}{2}0\right)+\left(\frac{1}{2}0,\frac{1}{2}2\right)$$

$$(1,0)+(0,1)$$

$$(1,1)$$

Pick $t=1$:

$$1(2,0)+(1-1)(0,2)$$

$$1(2,0)+0(0,2)$$

$$(2,0)$$

Pick $t=0$

$$(0,2)$$

Pick $t=\frac{3}{4}$

$$\left(\frac{3}{2},\frac{1}{2}\right)$$

(Weak) Convexity

For any pair (x_1,x_2) and (x_1',x_2') such that $(x_1,x_2)\sim(x_1',x_2')$ and for all $t\in[0,1]$.

$$t(x_1,x_2)+(1-t)(x_1',x_2')\succsim(x_1,x_2)$$

$$t(x_1,x_2)+(1-t)(x_1',x_2')\succsim(x_1',x_2')$$

The points on a line between two indifference bundles have to be at least as good as those bundles.

Strict Convexity.

For any pair (x_1, x_2) and (x_1', x_2') such that $(x_1, x_2) \sim (x_1', x_2')$ and for all $t \in (0, 1)$. (Not allowed to pick the endpoints).

$$t\,(x_1, x_2) + (1-t)\,(x_1', x_2') \succ (x_1, x_2)$$

$$t\,(x_1, x_2) + (1-t)\,(x_1', x_2') \succ (x_1', x_2')$$

For every pair of indifference bundles every mixture (excluding the bundles themselves) is strictly better than those bundles.

1.4 Examples of Convexity

Convexity implies that the line between any two points on the same indifference curve lies weakly above the indifference curve.

Convexity implies that the line between any two points on the same indifference curve lies strictly above the indifference curve.

Weakly convex preference can have some flat parts.

Strictly Convex- Cobb Douglass, Quasi-Linear

Weakly Convex- Perfect Substitutes, Perfect Complements

1.5 Marginal Rate of Substitution and Slope of the Indifference Curve

MRS, the marginal rate of substitution measures a consumer's willingess to trade-off between goods at some bundle. It is measures by the slope of the indifference at a point. We interpret is as "how much x_2 am I willing to give up to get one more unit of x_1"?

$MRS = -2$ the consumer is willing to give up 2 units of x_2 to get one of x_1.

2 Utility

The utility function is a way of representing preferences that allows to do math on the.

Utility function turns $\succsim$ into numbers that we can work with using tools from mathematics.

A utility function is "mapping" from every bundle to a number. It has to be that if one bundle is better than another it gets a higher number. If it is strictly better, it gets a strictly higher number.

$$U : X \to \mathbb{R}$$

If $x \succsim y$ then $U(x) \geq U(y)$ and if $x \succ y$ then $U(x) > U(y)$. Better bundles get higher utility.

We write it like this: $U(x)$. The is the utility of the bundle x.

Finn's preferences over ice cream.

Finn only cares about **number of scoops**.

$$U(x_1, x_2) = (x_1 + x_2)$$

$$U(1,1) = 2$$

$$U(2,1) = 3$$

$$U(1,2) = 3$$

$$U(0,0) = 0$$

Ten times the number of scoops:

$$U(x_1, x_2) = 10(x_1 + x_2)$$

$$U(1,1) = 20$$

$$U(2,1) = 30$$

$$U(1,2) = 30$$

$$U(0,0) = 0$$

Log of the number of scoops plus one.

$$U(x_1, x_2) = ln(x_1 + x_2 + 1)$$

All of these utility functions represent Finn's preferences.

2.1 Definition

A utility function $U(x)$ represents preferences $\succsim$ when, for every pair of bundles x and y, $U(x) \geq U(y)$ if

2.2 MRS from Utility Function

2.3 Examples of Utility Functions

2.3.1 Perfect Substitutes

Perfect Substitutes: $u(x_1, x_2) = ax_1 + bx_2$

2.3.2 Quasi-Linear

Quasi-Linear: $u(x_1, x_2) = x_1 + f(x_2)$

2.3.3 Cobb-Douglas

Cobb-Douglas: $u(x_1, x_2) = x_1^{\alpha} x_2^{\beta}$

2.3.4 Perfect Complements

Perfect Complements: $u(x_1, x_2) = min\{ax_1, bx_2\}$

3 Choice

3.1 Three Possibilities