ECON 3012

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Part 1. Budget (2.1-2.7)

1. Bundles

Bundle: $x = (x_1, x_2)$

Example. Ice Cream Bowls. x_1 is the amount of vanilla. x_2 is the amount of chocolate.

$(1, 1)$ one scoop of each flavor.

$(2, 2)$ two scoops of each flavor.

$(0.28, 100)$ a lot of chocolate and a little vanilla.

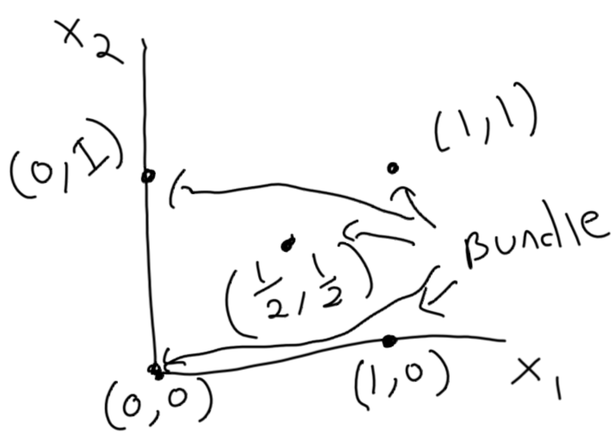

Figure 1.1. Bundles on Cartesian Plane.

2. Feasible Set

The Feasible Set: X is the "feasible" set of bundles.

The feasible set is the universe of bundles that might be relevant in a model. The feasible set defines the scope of a model.

3. Budget Set

Budget Set: B

The budget set is the set of bundles *available* to a particular consumer.

The budget set must be a subset of the feasible set.

In set notation: $B \subseteq X$

3.1. Budget Sets from Prices and Income.

Prices: p_1, p_2: Price of good 1 and price of good 2.

Cost of a bundle: $p_1x_1 + p_2x_2$.

Income: m.

Budget set: $B = \{x | x \in X \,\&\, x_1p_1 + x_2p_2 \leq m\}$.

In non-math language, this says the budget set is the set of bundles such that the price of the bundle is less than income.

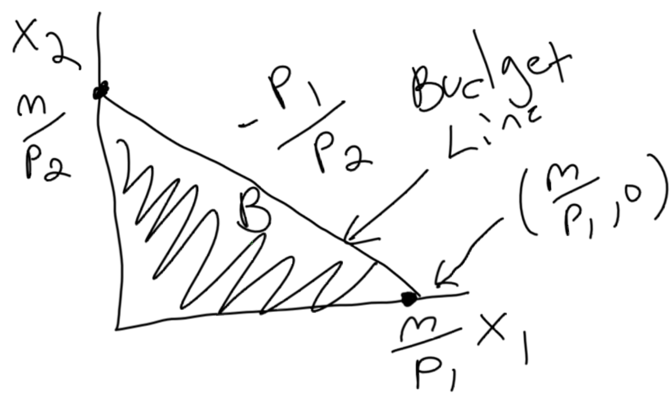

FIGURE 3.1. Graphical Representation of the Budget Set

3.2. Changing Prices and Income.

Suppose income increases. m **changes.**

Both endpoints change. $\frac{m}{p_1}$ (the amount I can buy of good 1 changes) and the same for $\frac{m}{p_2}$. The slope does not change.

Suppose one of the prices changes.

p_1. If p_1 goes up, the slope decreases (more negative). If p_1 goes down, the slope increases. The x_2 intercept stays the same.

p_2. If p_2 goes up, the slope increases. In p_2 goes down the slope decreases (more negative). The x_1 intercept stays the same.

3.3. Taxes.

Quantity tax on good 1:

$$p_1x_1 + tx_1 + p_2x_2 = m$$

$$(p_1 + t)\, x_1 + p_2x_2 = m$$

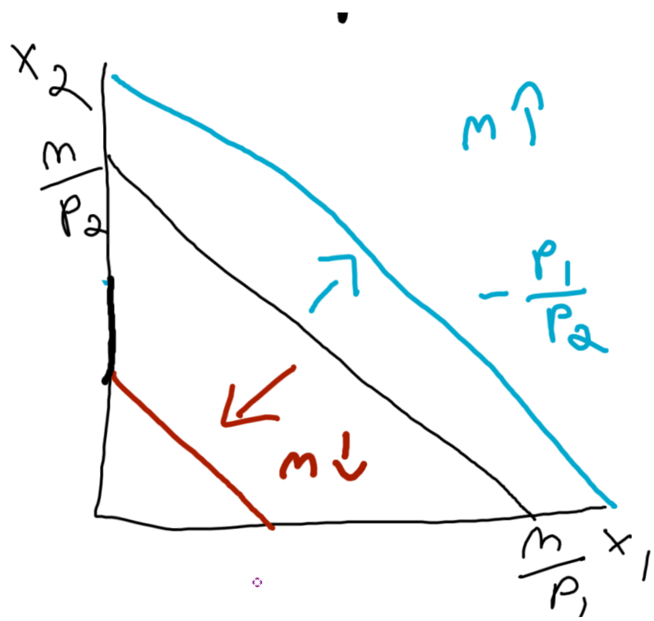

FIGURE 3.2. How Budget Changes with Income

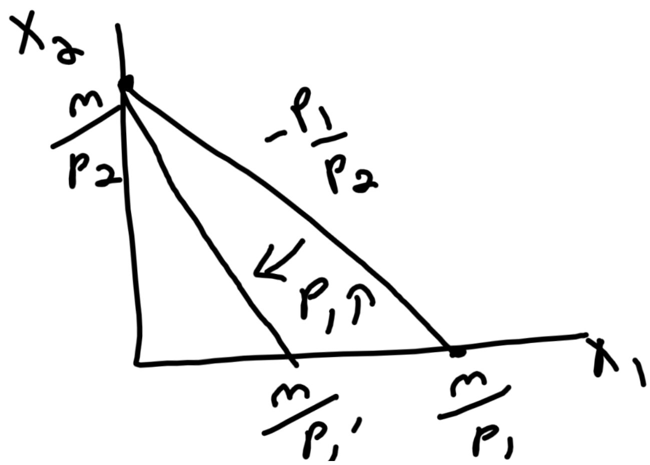

FIGURE 3.3. How Budget Changes with and increase in p_1.

Ad Valorem Tax on good 1:

$$(p_1 x_1) + \tau (p_1 x_1) + p_2 x_2 = m$$

$$(1 + \tau)(p_1 x_1) + p_2 x_2 = m$$

We will focus on quantity taxes.

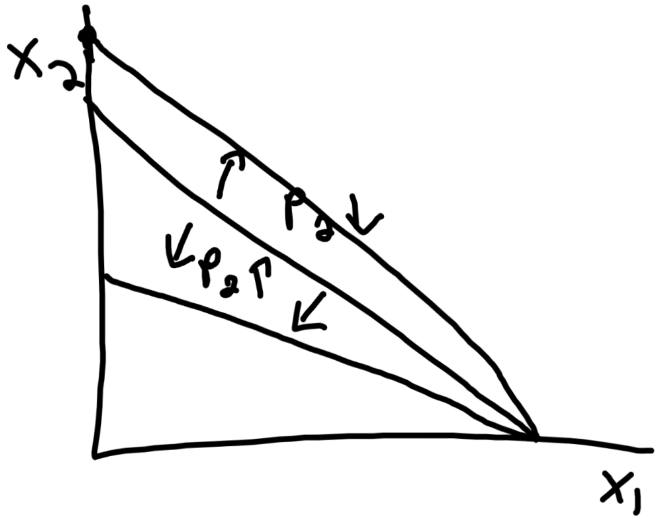

FIGURE 3.4. How Budget Changes with Changes to p_2

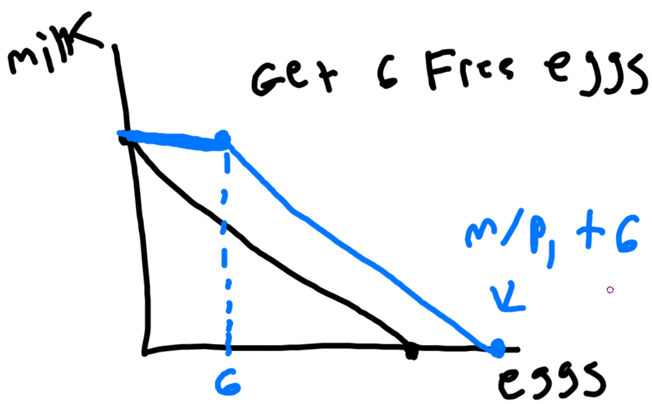

FIGURE 3.5. Six Free Eggs

3.4. **More Complex Scenarios.**

3.5. **Price Depends on Quantity.**

Part 2. **Preferences (3.1-3.8)**

4. The Preference Relation

4.1. **Definitions.** The preference relation is a set of statements about **pairs** of bundles. The statement x is preferred to bundle x' is shorted to:

$$x \succsim x'$$

Ice Cream Example:

Suppose a consumer eats bowls of ice cream. The bundles (bowls) are written with the vanilla scoops first and chocolate second. For example: $(2,0)$ is two scoops of vanilla and zero of chocolate.

A consumer who likes vanilla ice cream might have these preferences:

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

$$(1,0) \succsim (0,1)$$

A consumer who like more ice cream to less might have these preferences:

$$(2,0) \succsim (1,0)$$

$$(2,2) \succsim (1,1)$$

For someone who gets sick of ice cream: (who wants to eat 100 scoops of ice cream?)

$$(1,0) \succsim (100,0)$$

For someone who does not care about flavor:

$$(1,0) \succsim (0,1) \,\&\, (0,1) \succsim (1,0)$$

Indifference Relation: $\sim$

When the following is true: $x \succsim y$ and $y \succsim x$ we say "x is indifferent to y" and write $x \sim y$.

Strict Preference Relation: $\succ$

When the following is true: $x \succsim y$ and **not** $y\backslash succsimx$ we say "x is strictly preferred to y" and write $x \succ y$.

4.2. **Assumptions on $\succsim$.** ***Axiom 1. Reflexive.*** *For all bundles. The bundle is at least as good as itself.*

In set notation:

$$\forall x \in X : x \succsim x$$

Axiom 2. Complete. *For every pair of distinct bundles. Either one is at least as good as the other or the consumer is indifferent.*

In set notation:

$$\forall x, y \in X \& x \neq y : x \succsim y \, or \, y \succsim x \, or \, both$$

A consumer can say "I'm indifferent." but not "I don't know".

Axiom 3. Transitivity.

$$x \succsim y, y \succsim z \,\textbf{implies}\, x \succsim z$$

Transitivity (along with the other assumptions) implies we can always put a set of objects into a ranking.

4.3. **Example of Violating Transitivity.** 1. Rich, Moderately Intelligent, Ugly

2. Poor, Genius, Decent Looking

3. Moderately Well Off, Dumb,Best Looking

$$1 \succ 3 \succ 2 \succ 1$$

4.4. **From Preference to Choice.** Choice Function:

$$C : B \to B$$

$$C\left(B\right) \subseteq B$$

The choice function takes a budget set as input and returns the things the consumer would like to have from that set.

$C\left(B\right)$ is all the objects in B such that those objects are at least as good as everything else in the set.

$$C\left(B\right) = \{x | x \in B : \forall x' \in B, x \succsim x'\}$$

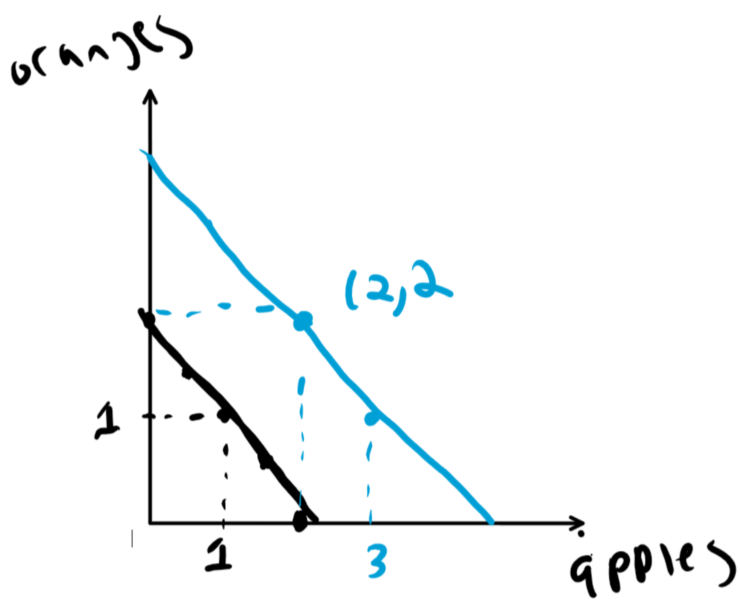

FIGURE 4.1. Indifference curves through the points $(1, 1)$ and $(2, 2)$ for a consumer who will always give up one orange to get one apple.

4.5. **Indifference Curves and the Weakly Preferred Set.** An indifference curve is a set bundles such that the consumer is indifferent between all of the bundles on the curve. **There are many indifference curves.**

4.6. **Indifference Curves Cannot Cross.**

4.7. **Examples of Preferences.**

4.7.1. *Perfect Substitutes.*

4.7.2. *Perfect Complements.*

4.7.3. *Bads.*

4.8. **Further Assumptions: "Well Behaved Preferences".**

4.8.1. *Monotonicity.* $(x_1, x_2), (y_1, y_2)$. $x_1 \geq y_1$ and $x_2 \geq y_2$ and at least one is strict:

$$x \succ y$$

4.8.2. *Convexity and Strict Convexity.*

4.9. **Marginal Rates of Substitution and Slope of the Indifference Curve.**