Chapter 3

Consumer Theory

Flow of study in this chapter

› Consumption and Utility

Getting to know the concept of what consumer get from consumption and how do we define them.

› Cardinal approach

As defined in early development of consumer theory, we first look at how a cardinal approach can lead to consumer's equilibrium. What is the condition(s) that maximizes consumer's utility in different scenarios.

› Ordinal approach

Flawed approach brings in the newer one, now we do not need to define uniqueness of utility to remove most of the cons in the original approach.

› Price effect and demand derivation

When price changes, how consumer shifts his/her consumption bundle to a new one according to price effect. We study one of the theories in this class, from John Hicks.

Further reading can be found in Pindyck and Rubinfeld (2018) Part 2, Chapter 3-4.

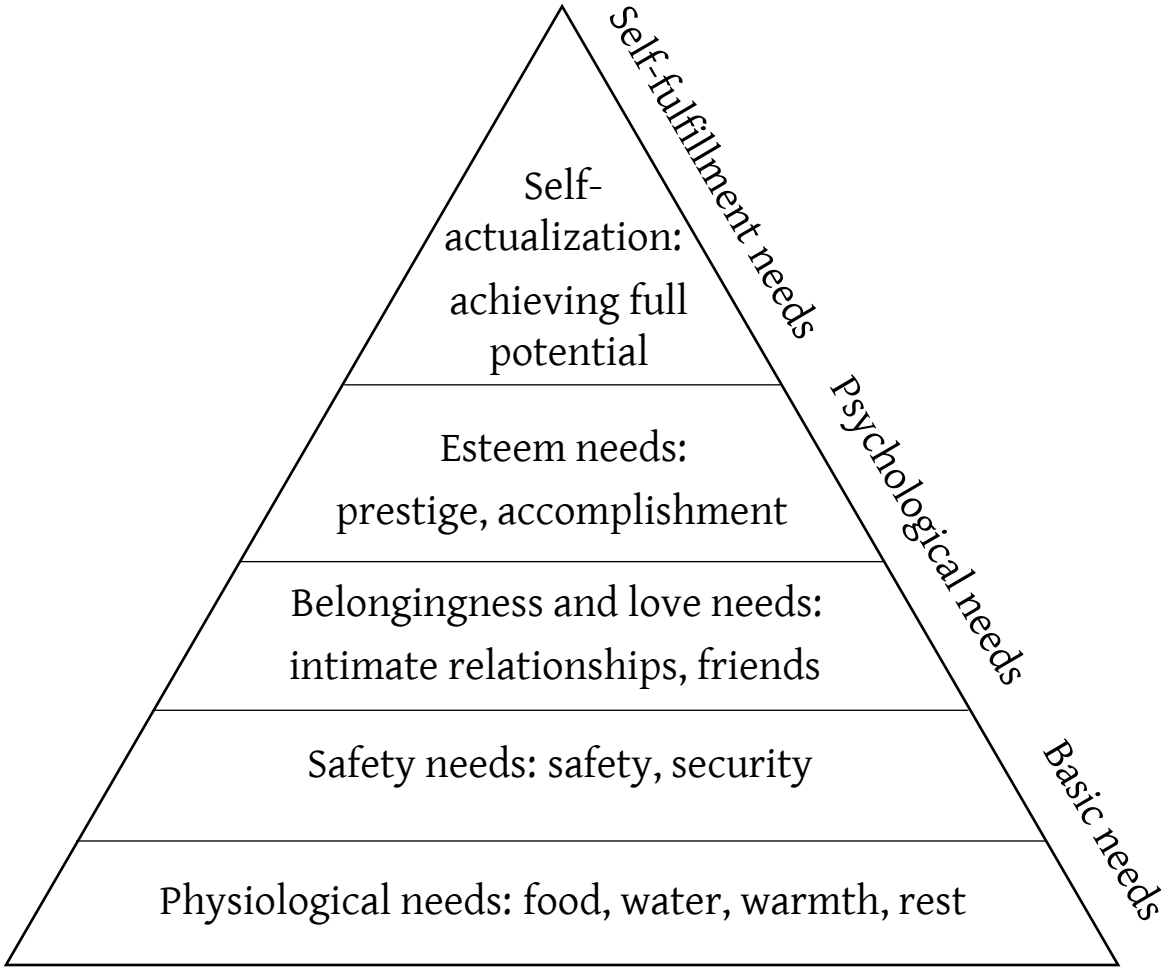
Focus on market

Demand for consumption partly come from fundamental human need to consume products or services in order to survive or gain a kind of well-being condition.

Acquiring various products or services In order to meet consumers' need is according to resource allocation. For welfare states, it is mostly agreed that people should be fulfilled at two levels. Basic human right should be provided by the state, family or community. But people should also be able to seek from markets according to the satisfaction of each person because we prefer different things.

Mainstream economic theories focus on consumption in market system. Therefore, this part is only a study of consumption behavior in market.

(1) Definition



(1) Definition

Consuming goods or services traded in a market system provides satisfaction and treats human needs through resource allocation, employing price mechanisms

Therefore, the first thing that economists need to define is what consumer receive from consumption.

Definition 3.1

Utility *is defined as happiness or satisfaction that a consumer receives from consuming goods or services within a period of time.*

(1) Definition

Quick questions: from the definition, do you think that

› Consuming of the same product or service yields the same amount of utility for each person?

› Is utility the same or different from usefulness?

(2) Assumptions

The study of consumers in economics is mostly divided into two broad approaches, **cardinal** and **ordinal approach**. Before we move on to study the cardinal approach, some assumptions must be posed.

› Consumers are rational with the aim to maximize utility from consumption.

› Utility is measurable, countable, and combinable with unit of 'util'.

› Products or services that consumers choose share the same quality in every unit consumed. (homogenous product)

› Goods or services are assumed to be indefinitely separated into very small unit. (Continuous)

› If there is a budget constraint, consumers are not yet satiated. (Non-satiated)

› Ceteris paribus or 'other things being equal'. Meaning that other than a change we are focus on, other factors are kept constant.

(1) Counting utility

Supposed that we study a consumer who consumes product x, representing units of product x as a domain in a set of continuous positive real number, amount of utility U is resulted from units of product x.

We may define this relationship as a utility function as follows

› $U = f(x) = U(x)$

Once a number of x is assigned into this utility function, it will transform the units of x into a value of utility.

(1) Counting utility

If utility is defined as a measurable unit, consuming goods or services 1 unit obtains an amount of utility. The second unit also provides another amount of utility and so on. Each utility received from each unit is different, which they can be called “marginal utility”.

Definition 3.2

Marginal Utility (MU) *is additional utility that consumer receive from consuming one more unit of a product or service.*

For example, Mr. A has two dishes of meal which utilize 10 and 7 utils respectively. Combining all the marginal utility, we get total utility.

Definition 3.3

Total Utility (TU) *is utility that consumer receive from consumption n unit(s) of a product or service.*

(1) Counting utility

Consider an example from these tables.

x	TU	MU
1	12	
2	20	
3	24	
4	24	
5	20	
6	12	

y	TU	MU
1		6
2		4
3		2
4		0
5		-2
6		-4

(1) Counting utility

We can further define MU and TU as

› $TU_n = \sum_{i=1}^{n} MU_i$

or total utility is the totaled MU for every unit and

› $MU_i = TU_n - TU_{n-1} = \frac{\Delta TU}{\Delta x} = \frac{dTU}{dx}$

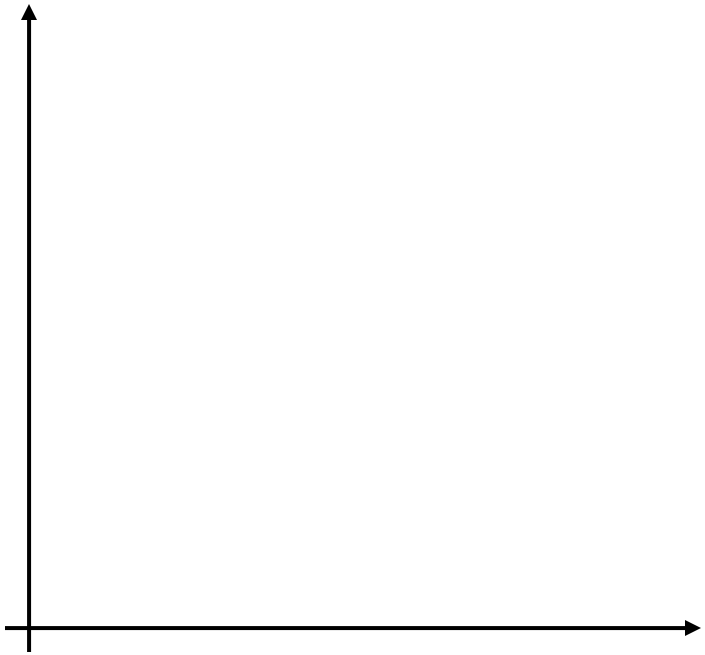
or marginal utility is a difference in total utility. In other words, marginal utility represents slope of total utility.

Now we can see that total utility is actually the utility function

› $U = f(x) = TU_n$

(2) Drawing utility

From the table, if we generalize MU and TU, the graph can be plotted here.



(2) Drawing utility

Definition 3.4

Law of Diminishing Marginal Utility *states that marginal utility from consuming a product or service within a period of time diminishes as the consumer keep consuming it.*

Quick questions: Does this trend of diminishing marginal utility always apply to every consumer products?

(3) Utility maximization

Assumed that consumer is rational, the goal of this study is to **find a condition that would maximize consumer's utility** under different circumstances. We consider 4 different scenarios listed here.

› Consuming a product **without** a budget constraint.

› Consuming a product **with** a budget constraint.

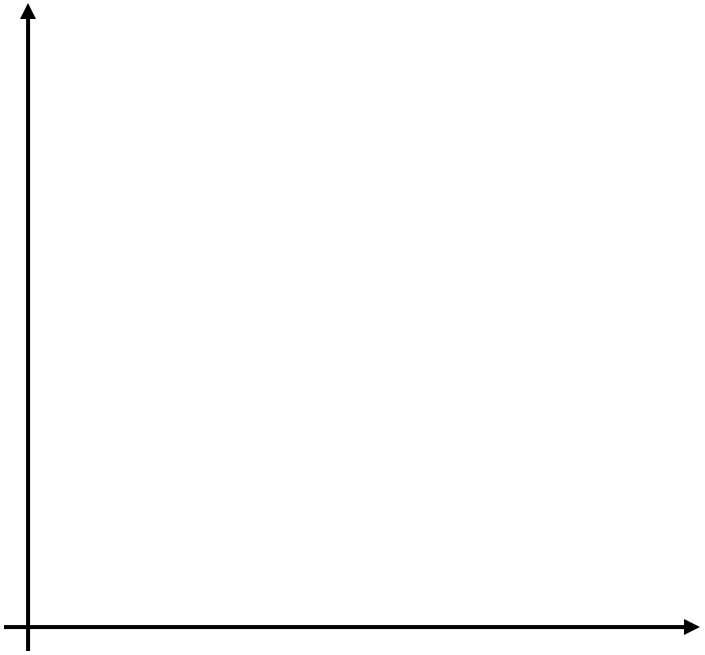
› Consuming two or more products **without** a budget constraint.

› Consuming two or more products **with** a budget constraint.

Note that two products considered are usually substitutes, but more specific cases will be introduced later.

(3) Utility maximization

Case 1: consuming a product **without** a budget constraint.

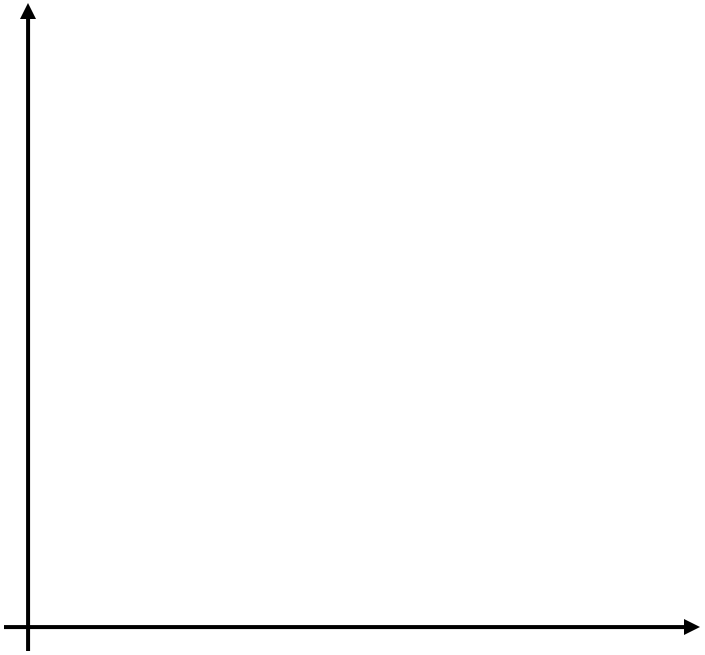


x	TU	MU
1	24	
2	26	
3	42	
4	45	
5	45	
6	42	

› The condition is

(3) Utility maximization

Case 2: consuming a product **with** a budget constraint.

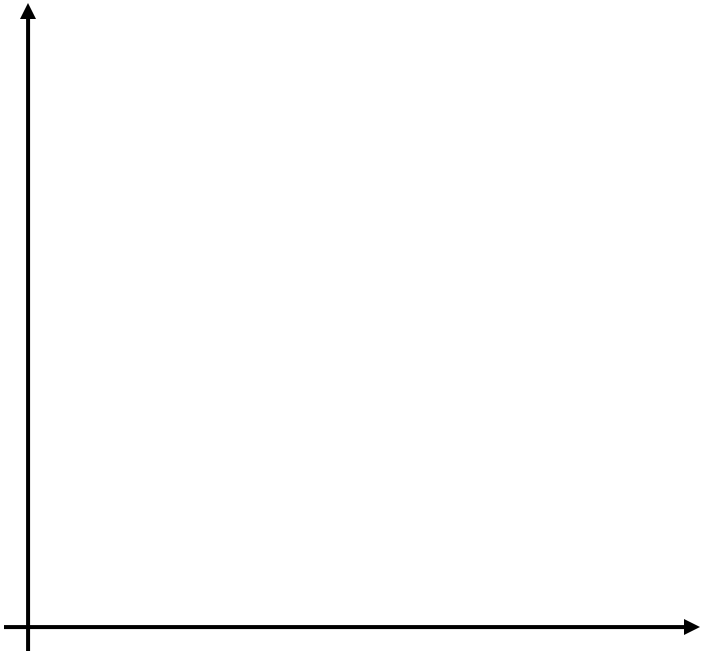


x	TU	MU
1	24	
2	26	
3	42	
4	45	
5	45	
6	42	

› Assumed that $P_x = 8$ and define income as $I = 24$, the condition is

(3) Utility maximization

Case 2: consuming a product **with** a budget constraint.

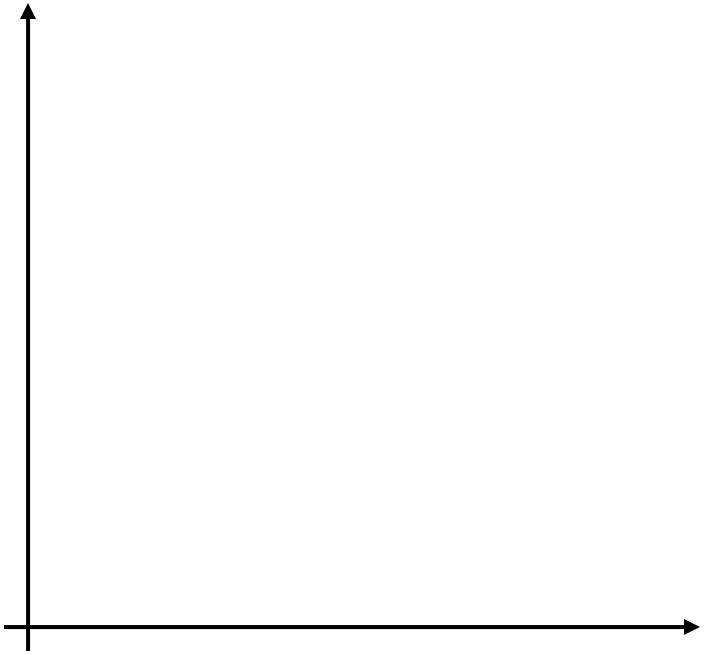


I	x^*	TU
16		
24		
32		

› Now assume that the price remains the same, while income differs, how does this affect consumer's utility maximization?

(3) Utility maximization

Case 2: consuming a product **with** a budget constraint.

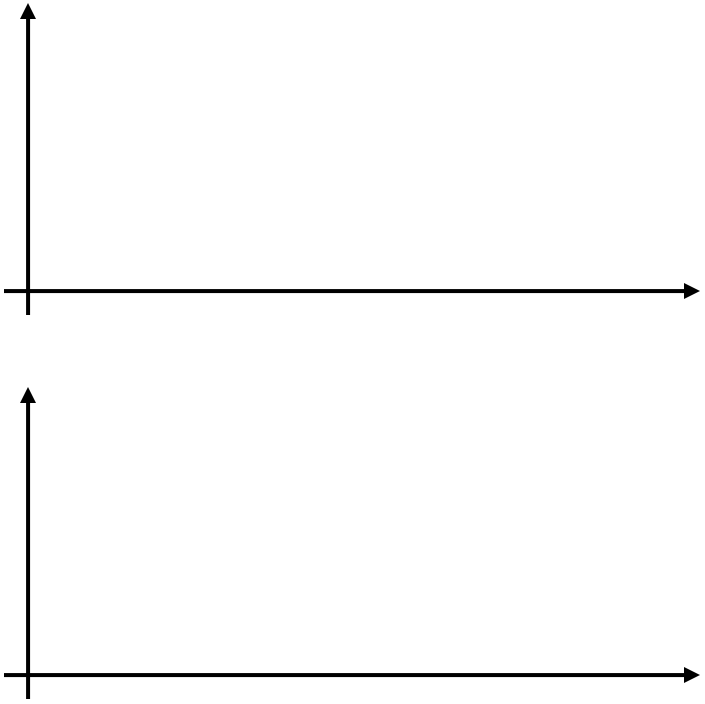


P_x	x^*	TU
6		
8		
12		

› On the other hand, when income remains stable while price goes up and down, how does it affect consumer's utility maximization?

(3) Utility maximization

Case 3: consuming two or more products **without** a budget constraint.



x, y	TU_x	MU_x	TU_y	MU_y
1	5		10	
		---		---
2	8		15	
		---		---
3	9		18	
		---		---
4	9		19	
		---		---
5	8		19	
		---		---
6	6		17	
		---		---

› The condition is

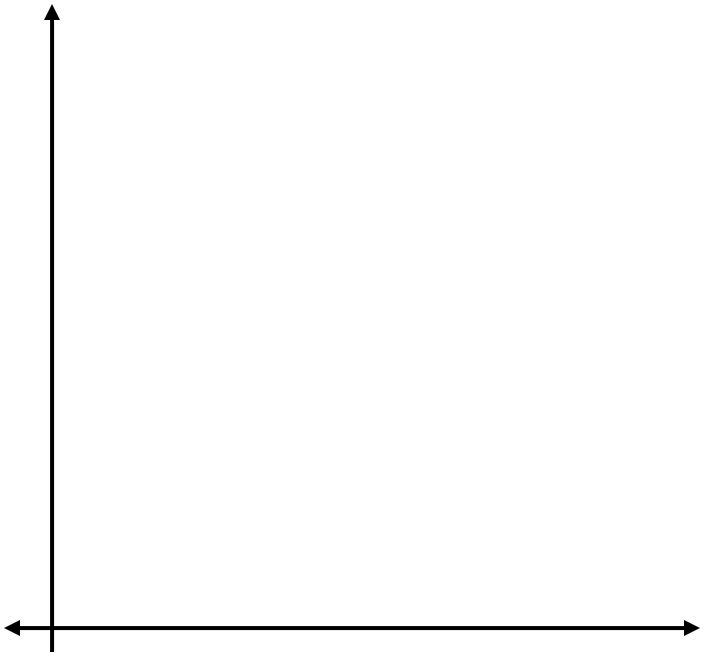
(3) Utility maximization

Case 4: consuming two or more products **with** a budget constraint.

I	x, y	MU_x	MU_y	$\frac{MU_x}{P_x}$	$\frac{MU_x}{P_y}$	choice	remaining budget
22	1	12	10				
	2	8	8				
	3	4	6				
	4	0	4				
	5	-4	2				
	6	-8	0				

› Assumed that $P_x = 4$ and $P_y = 2$, how does this consumer decide?

(3) Utility maximization



To understand why the condition satisfies consumer's maximized utility, consider the graph on the left.

Here it is assumed that every combination of (x,y) the budget is spent totally and prices are constant.

(3) Utility maximization

However, cardinal approach has a lot of drawback such as

› The measurement of utility is problematic due to the unit of utility is not uniquely defined. In other words, if two people are satisfied with the same product or service but the defined level of utility may be different.

For instance, Mr. A can define his satisfaction as 3 when Mr. B can define his satisfaction as 10 but they feel exactly the same.

› Adding up utility, therefore, lacks reliability.

As a result, there is another approach that can solve this problem without determining exact amount of utility as number.

(1) Assumptions

› Consumers are rational with the aim to maximize utility from consumption.

› By being rational, it means that consumer can tell what they prefer to and they can **put them in order of preference**.

› Products or services that consumers choose share the same quality in every unit consumed. (homogenous product)

› Products or services are assumed to be indefinitely separated into very small unit. (Continuous)

› If there is a budget constraint, consumers are not yet satiated (Non-satiated). In other words, the analysis satisfies **Walras' Law**.

› Ceteris paribus or 'other things being equal'. Meaning that other than a change we are focus on, other factors are kept constant.

› The tools used for this ordinal theory are called **Indifferent Curve** (IC) and **Budget Line** (BL).

(2) Indifferent Curve (IC)

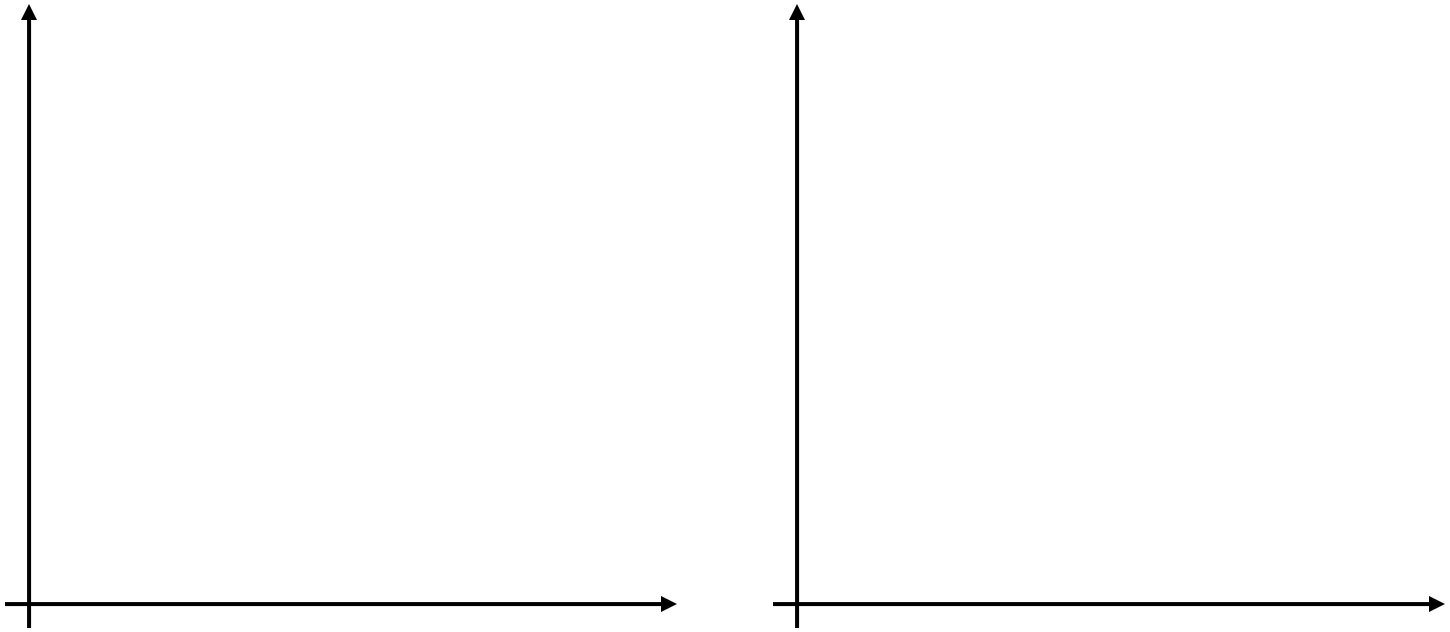
First of all, we need to create a setup for our analysis.

› Most of the time, we analyze a rational consumer, choosing a combination of (x^*, y^*) that would maximize his or her utility subject to a specific level of budget.

› x and y are substitute goods, but not perfectly, although we can analyze perfectly substitutes and complementary products as well.

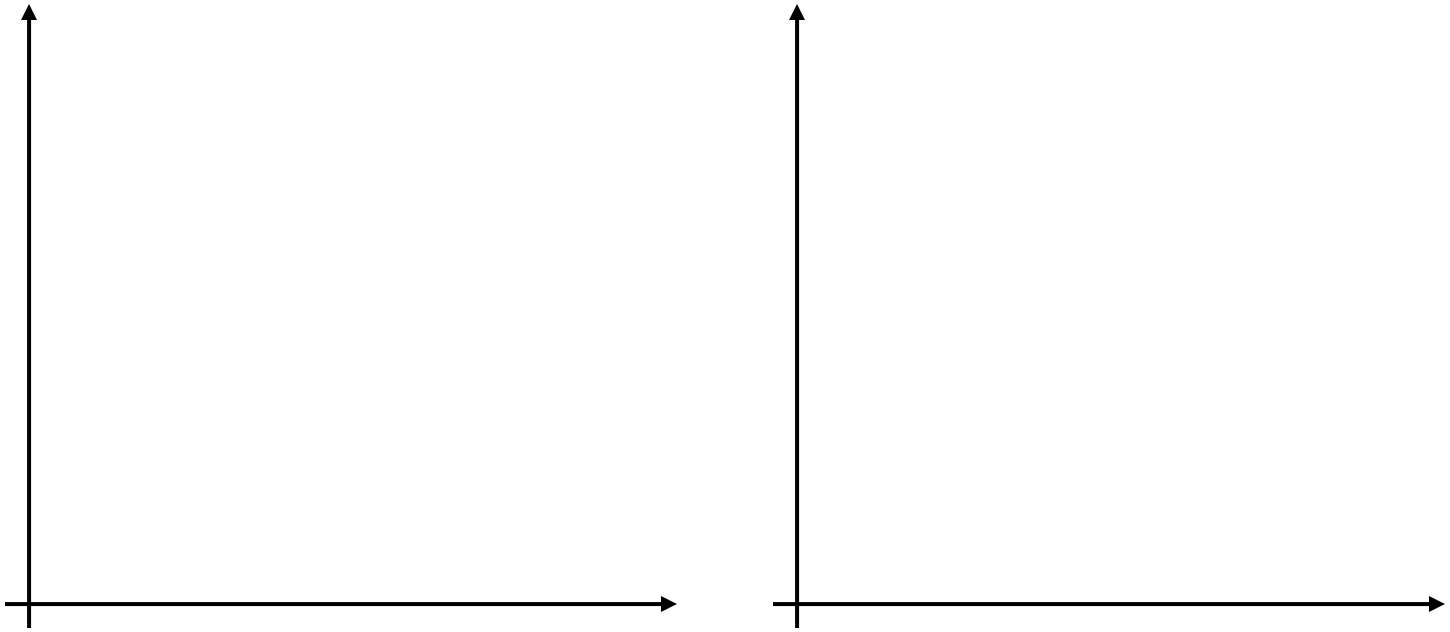
(2) Indifferent Curve (IC)

Comparing consuming one and two substitute products utility function



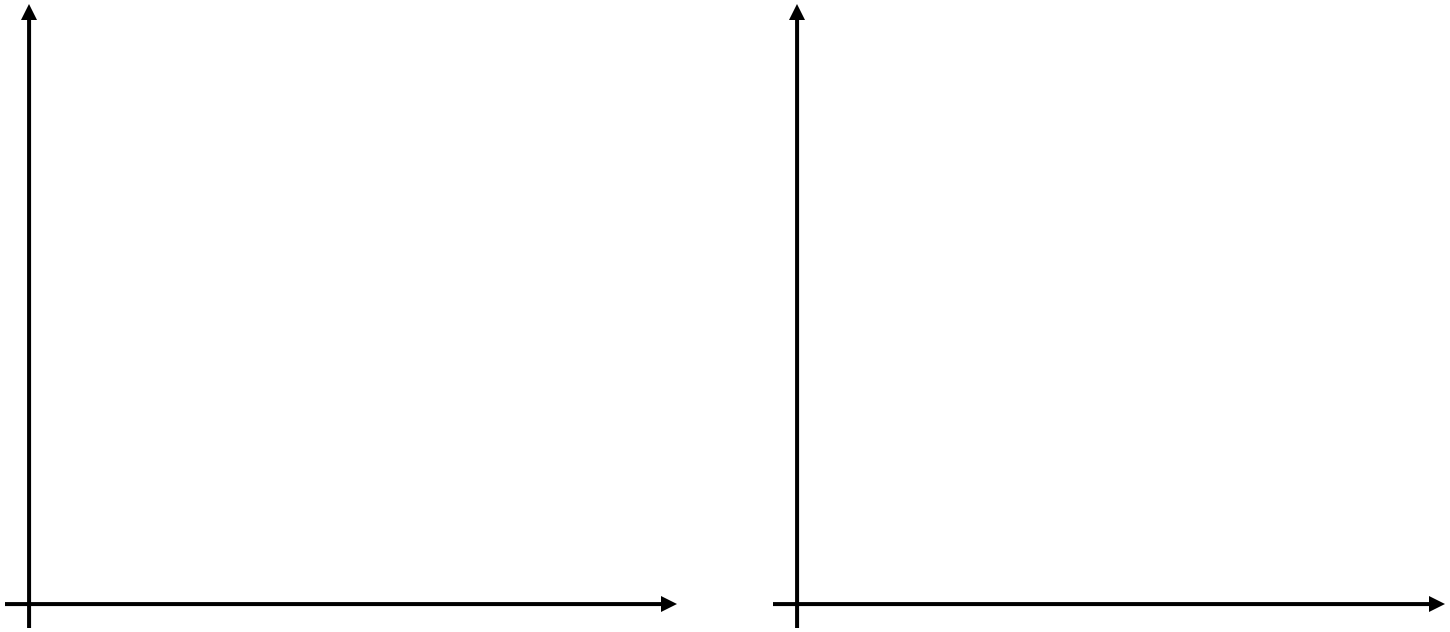
(2) Indifferent Curve (IC)

Turn the function to the side and top view

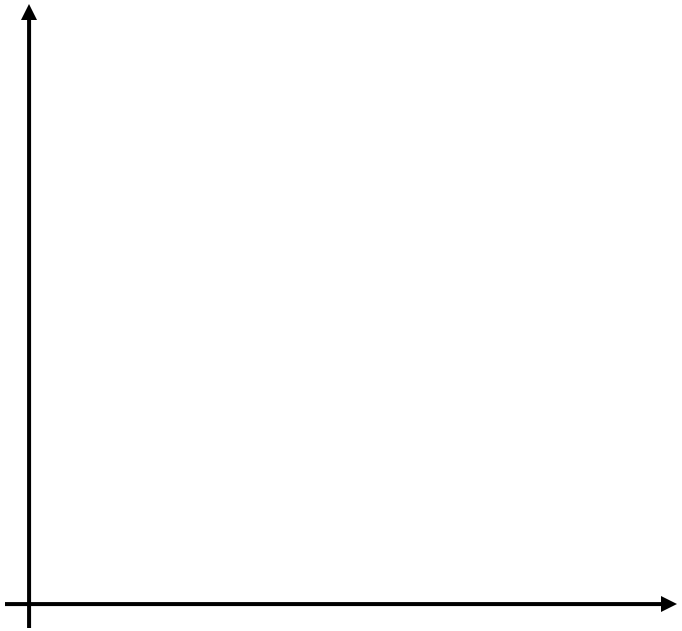


(2) Indifferent Curve (IC)

Some parts are not to be studied



(2) Indifferent Curve (IC)



Characteristics

› Consumption bundles

› Level of utility

› ICs cannot intersect

› ICs have negative slope and convex to the origin

(3) Marginal rate of substitution (MRS)

Definition 3.5

Marginal rate of substitution (MRS) *is a ratio of substitution of two goods at a point on IC curve that yields the same amount of utility.*

› $MRS_{xy} = \frac{\Delta y}{\Delta x}$

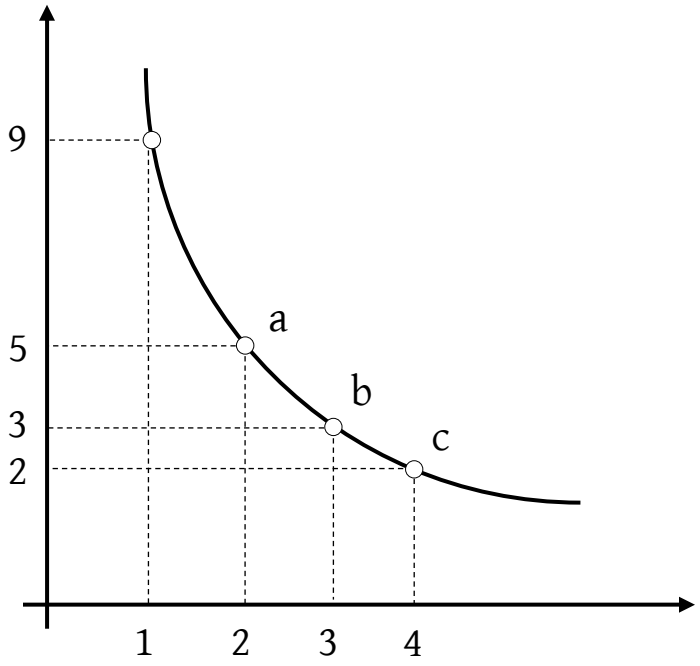


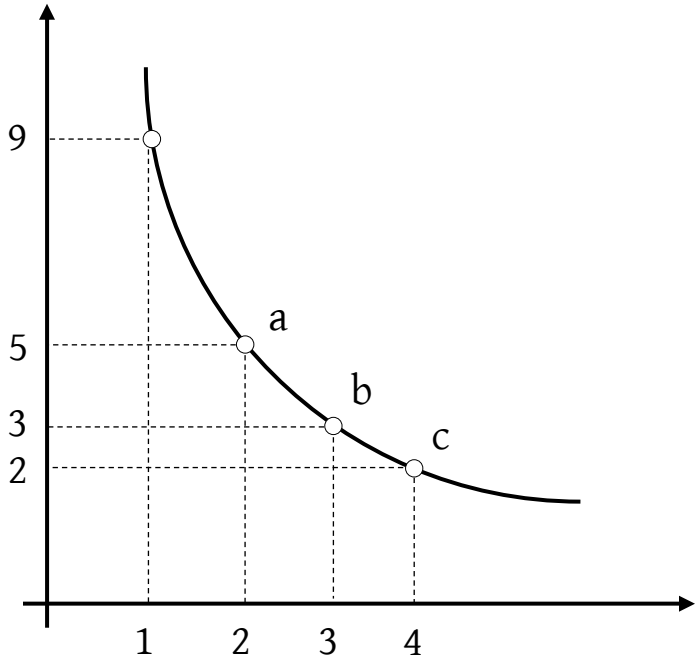
Figure out these MRS_{xy}

› $\text{MRS}_{xy(\text{a})} =$

› $\text{MRS}_{xy(\text{b})} =$

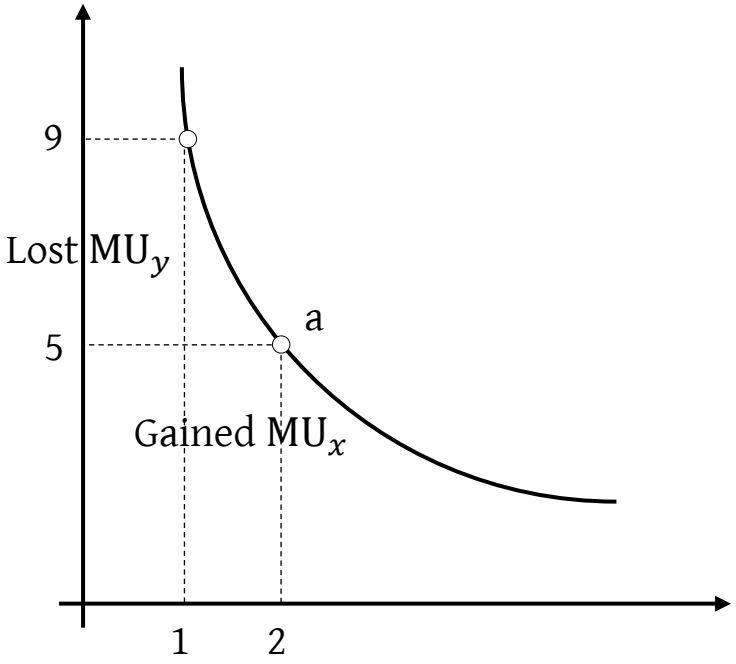
› $\text{MRS}_{xy(\text{c})} =$

(3) Marginal rate of substitution (MRS)



Now take a look at these ratios closely again, why the (absolute) number of these ratios keep decreasing, comparing the upper left to the lower right.

(3) Marginal rate of substitution (MRS)

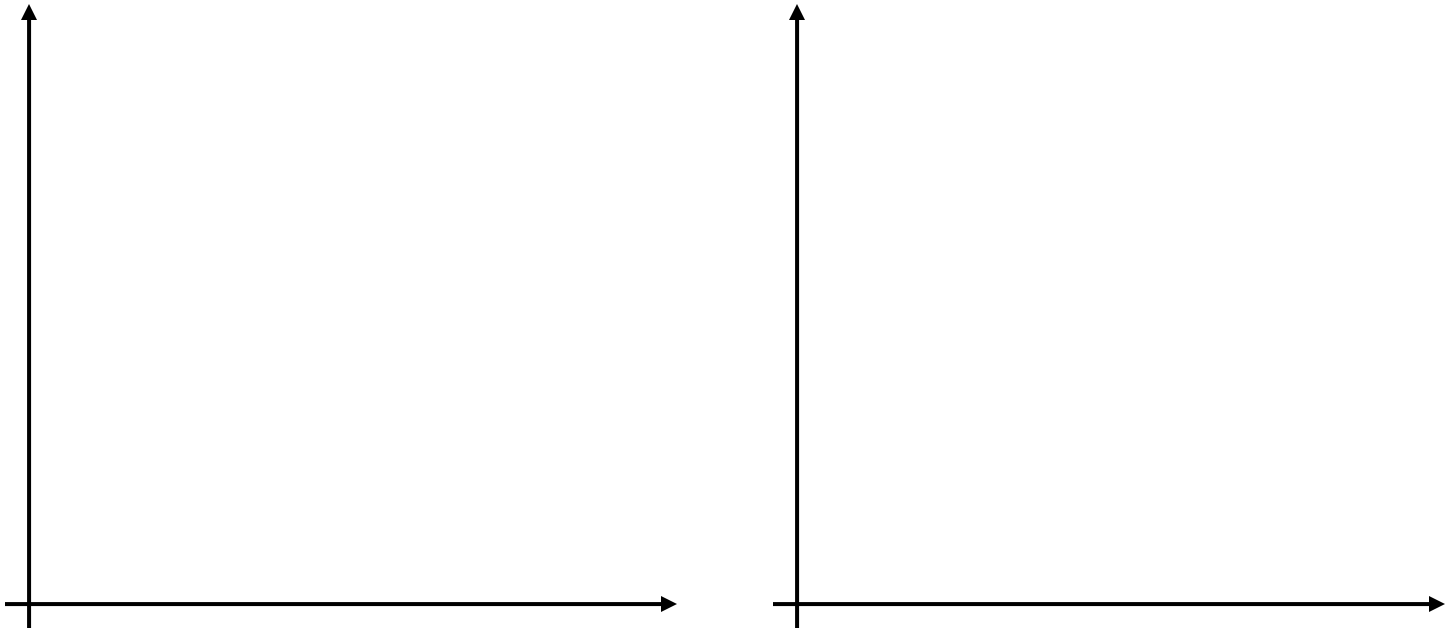


As we learned that, in case of two substitutable goods, MRS is the ratio of substituting two goods in which resulting in the same amount of utility, it also means that.

› $\left|MRS_{xy}\right| = \left|\frac{\Delta y}{\Delta x}\right| = \frac{MU_x}{MU_y}$

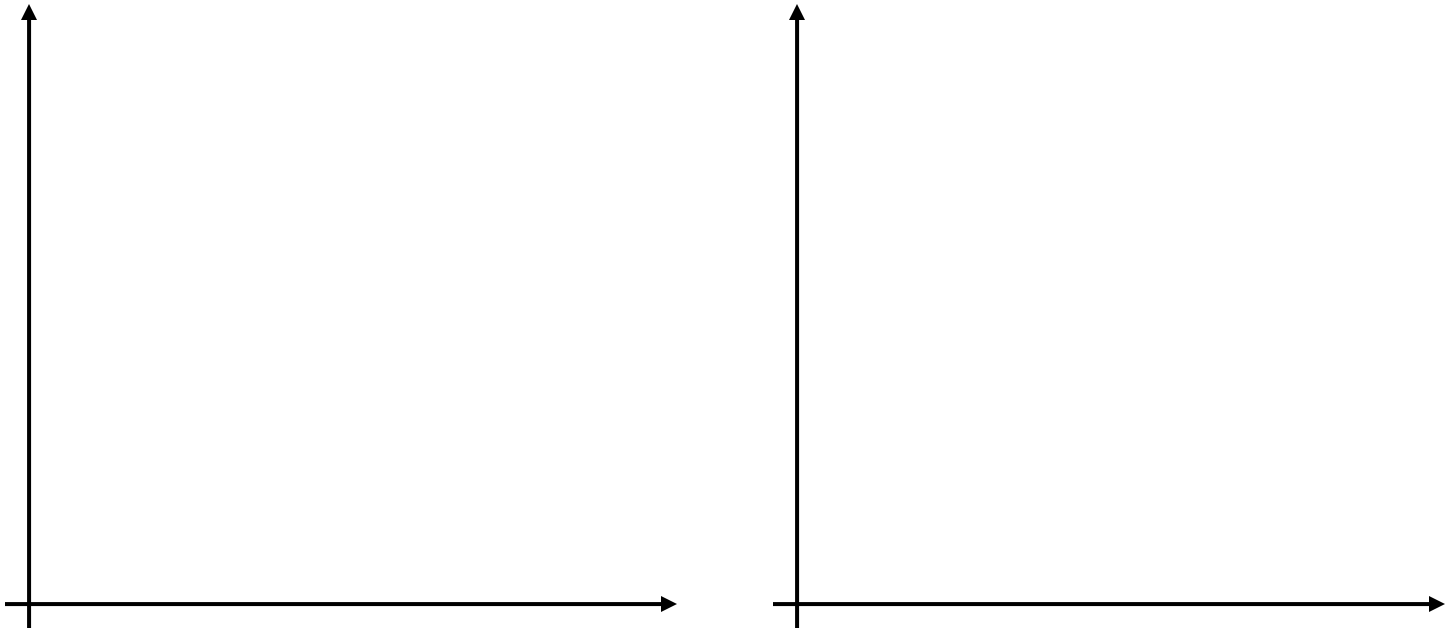
(3) Marginal rate of substitution (MRS)

Given that torque or acceleration power (x) and cargo space (y) are two attributes that represent buyers' decision, how would you draw an Audi TTS owner's IC and a Subaru XV owner's IC?



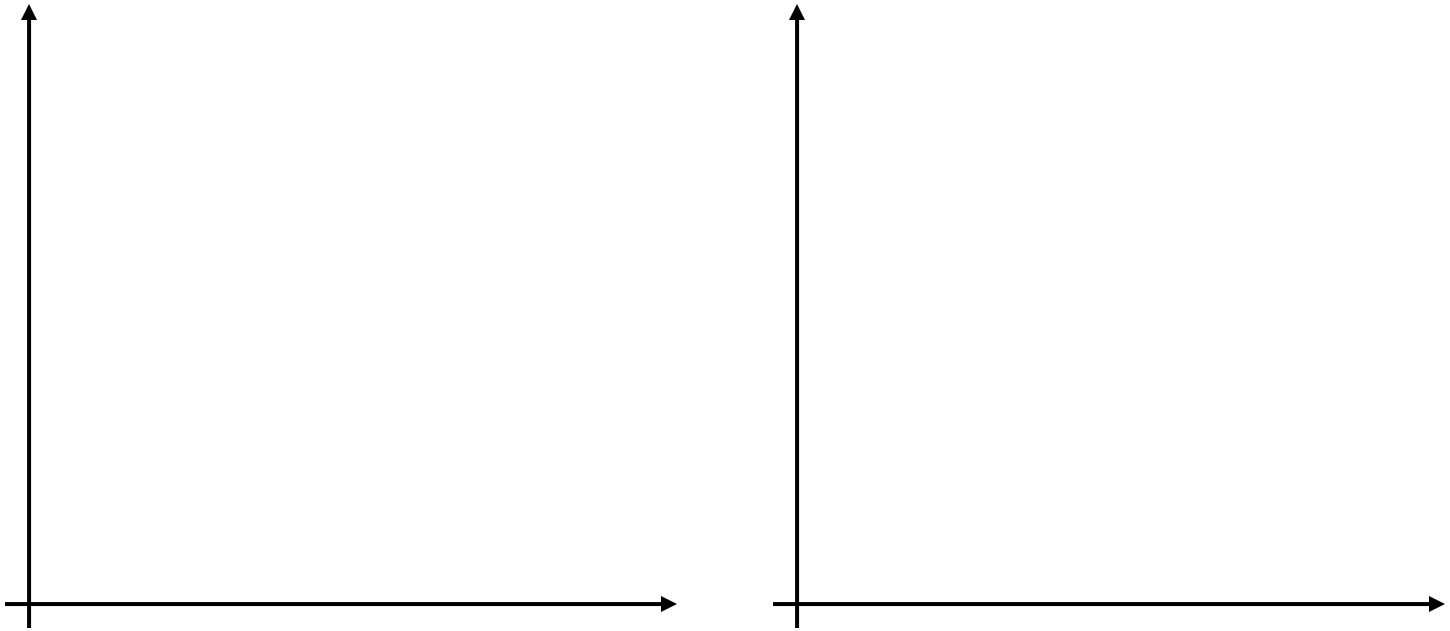
(3) Marginal rate of substitution (MRS)

Given that fish (x) and pork (y) are two types of meet which are substitutable, how would you draw an IC of a person who likes either one of them and an IC of another person who feels more indifferent.



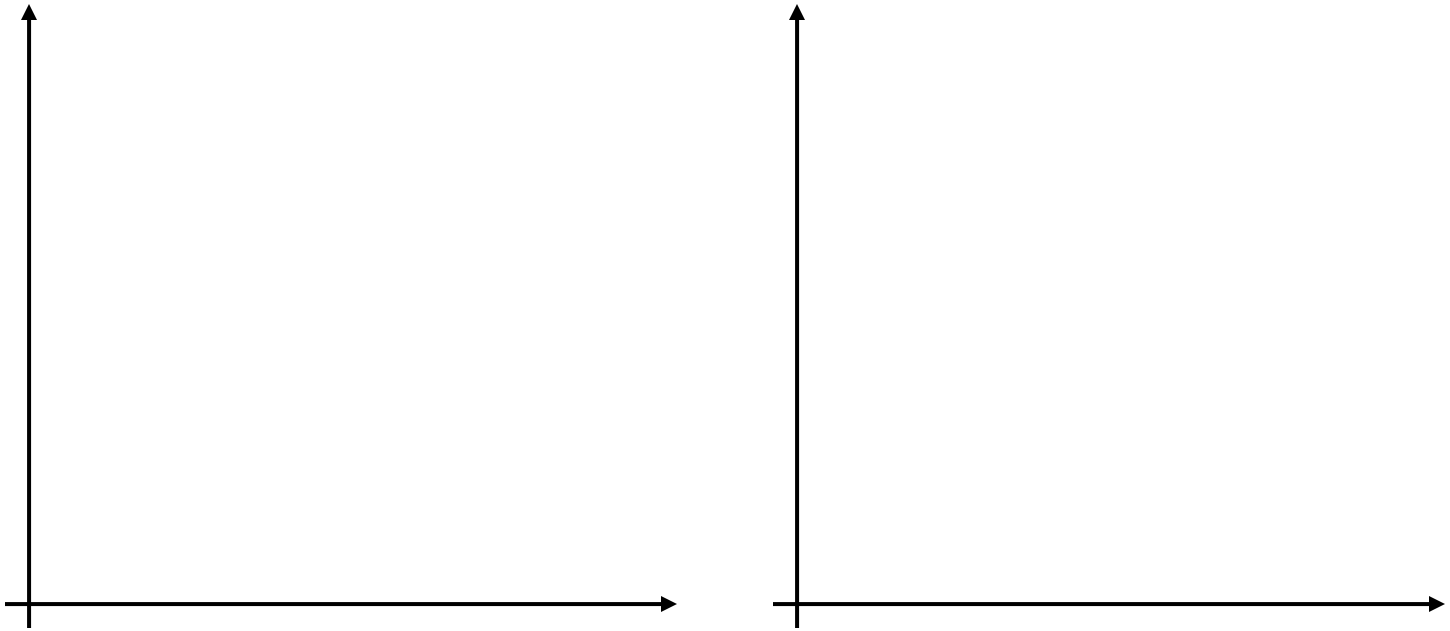
(3) Marginal rate of substitution (MRS)

There are also perfectly complementary and substitutable goods in the market as well.

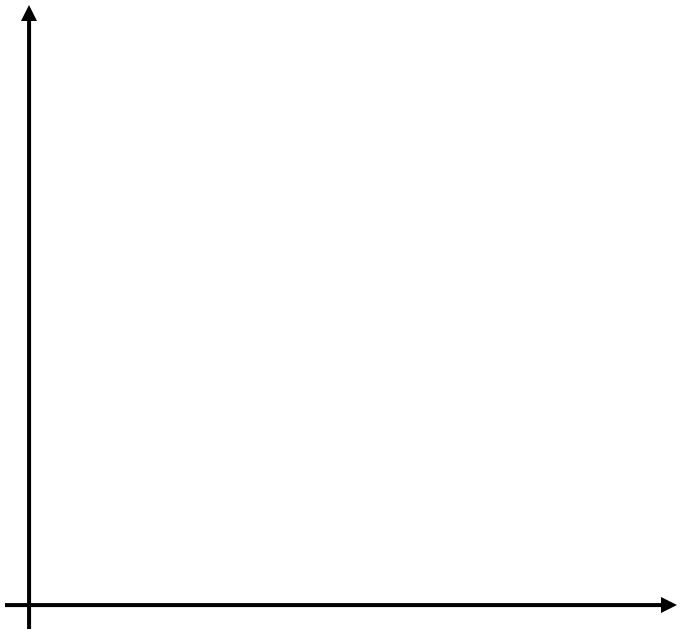


(3) Marginal rate of substitution (MRS)

If any commodity is not wanted in a society, it can also be considered as **bad**.



(4) Budget Line (BL)



Budget line is derived from budget constraint, the boundary of consumption bundles that a consumer can choose under a premise of budget constraint. It can be represented in the form of

› $I = P_x \cdot x + P_y \cdot y$

Consider an example of a consumer who has 500 baht, price of goods x is 50 baht and price of goods y is 20 baht, draw the budget line.

(4) Budget Line (BL)

Budget line has constant slope since price of goods are not according to how much products are purchased and assumed to be fixed (for now). The slope of a budget line represents **relative price** of two products

Definition 3.6

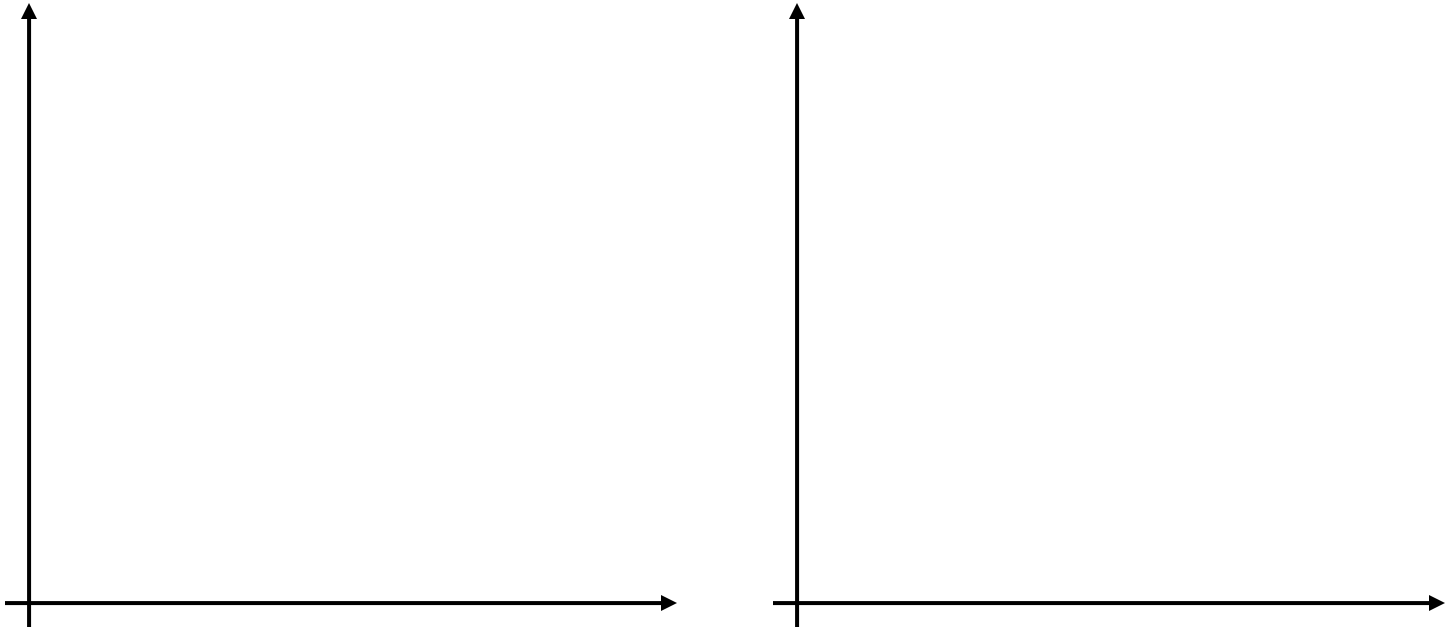
Relative price *is the price ratio of two goods or services, which is actually the slope of budget line. Sometimes it can be referred to as the* ***Marginal Rate of Market Substitution*** *(MRMS).*

› $MRMS_{xy} = \frac{\Delta y}{\Delta x} = \frac{P_x}{P_y}$

This price ratio reflects how pricey two goods comparatively. See how this ratio shifts when a price changes.

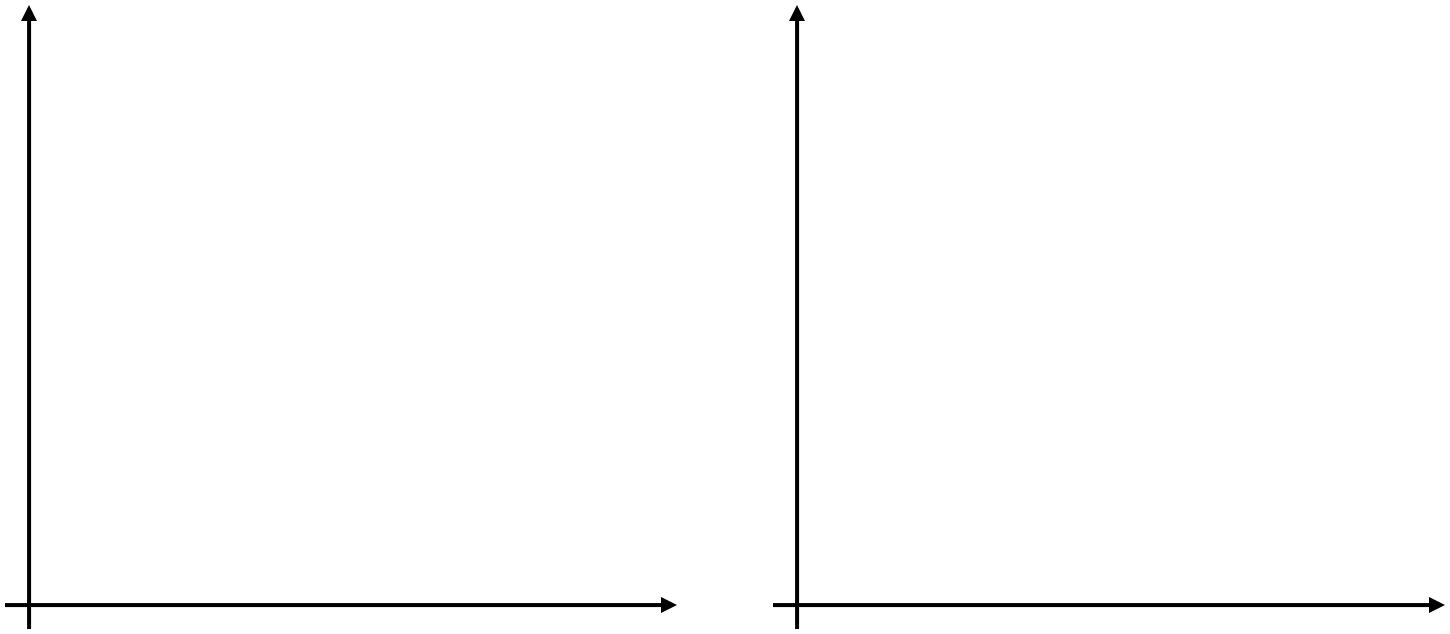
(4) Budget Line (BL)

Draw a consumer budget line who has 400 baht on the left and 600 baht on the right. Price of goods x is 50 baht and price of goods y is 20 baht.

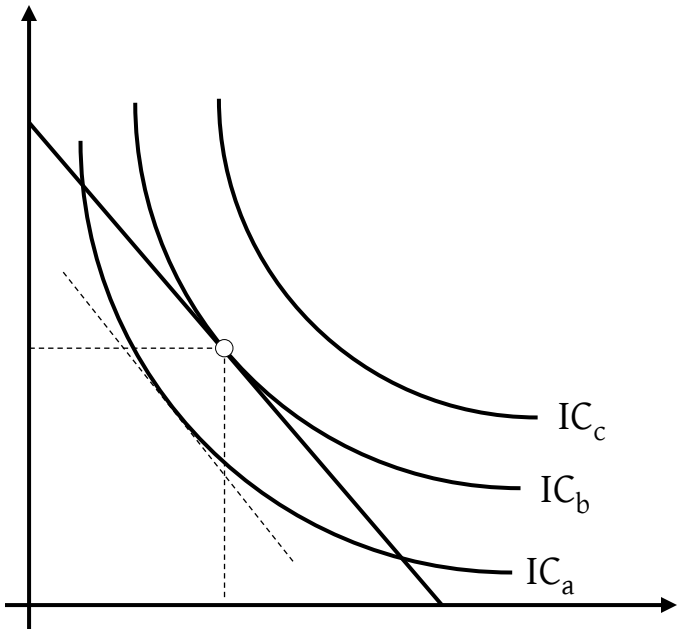


(4) Budget Line (BL)

A consumer has 500 baht. Initially, price of goods x is 50 baht and price of goods y is 20 baht. What would happen if price of x drops to 25 baht and price of y raises to 50 baht. Draw the budget line according to the change on the left and right respectively.



(5) Consumer's equilibrium



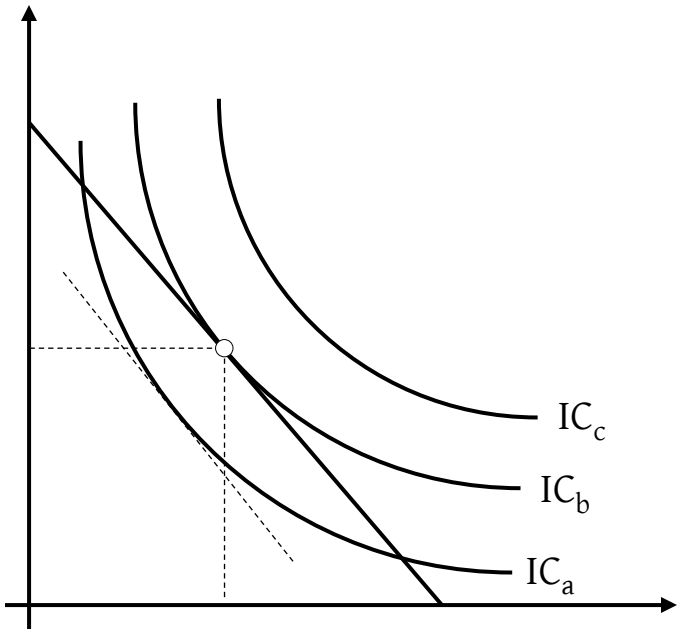
Consumer will maximize utility under budget constraint when consuming two goods or services when an IC is tangent to the budget line or

Quick questions

› Why the equilibrium cannot be on IC_c?

› What underlying assumption that prohibits an equilibrium on the dotted line, which is also tangent to IC_a?

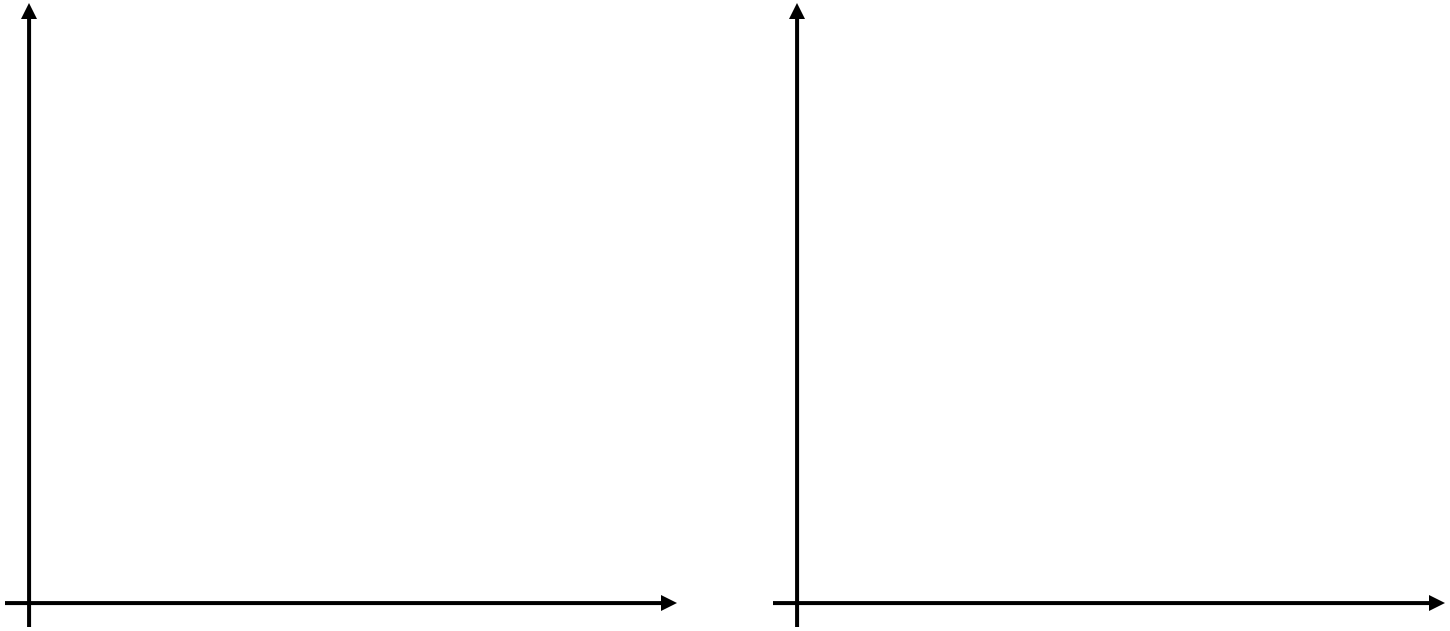
(5) Consumer's equilibrium



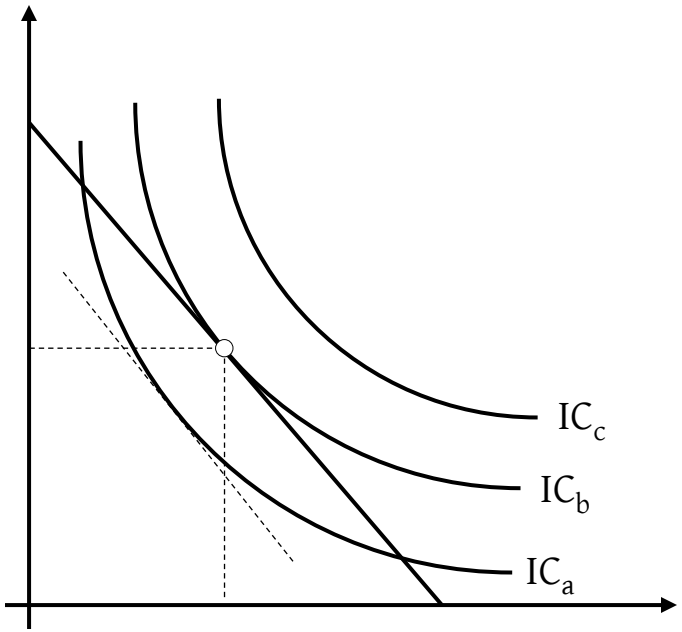
Reconsider the intersections on IC_a, then try to prove with math why they are not the equilibrium.

(5) Consumer's equilibrium

The equilibrium can reveal both how a consumer prefers and how the relative price is. Try illustrate both scenarios in the graphs.



(5) Consumer's equilibrium



Example: The consumption bundle that this consumer chooses makes

$$\left|MRS_{xy}\right| = \frac{1}{5}$$

› If $P_x = 50$ and $P_y = 100$, does this consumer has his/her utility maximized?

› Assumed Walras' Law, where is the current consumption bundle and why?

(6) Hicksian's price effect (PE)

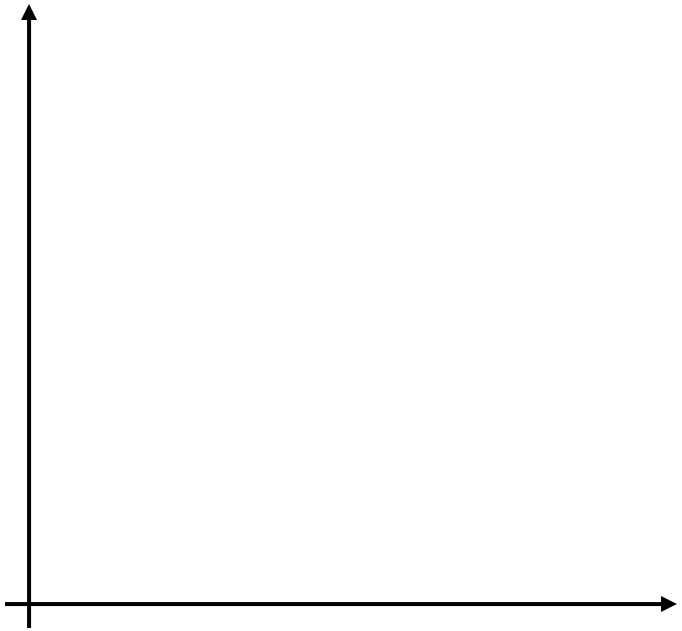
This is a little revision of price effect. When price changes and affects quantity demanded, the result is called **price effect (PE)** which consists of two sub-effects.

› **Substitution effect (SE)** is the effect of relative price of substitutable good. For example, if A and B are substitutable and price of good A increases (decreases), good B will relatively become cheaper (more expensive) comparing to the relative price before price change.

› **Income effect (IE)** is the effect of consumers' real income. For example, if price of good A rises (drops), consumers are considered become poorer (richer) because they lose (gain) purchasing power.

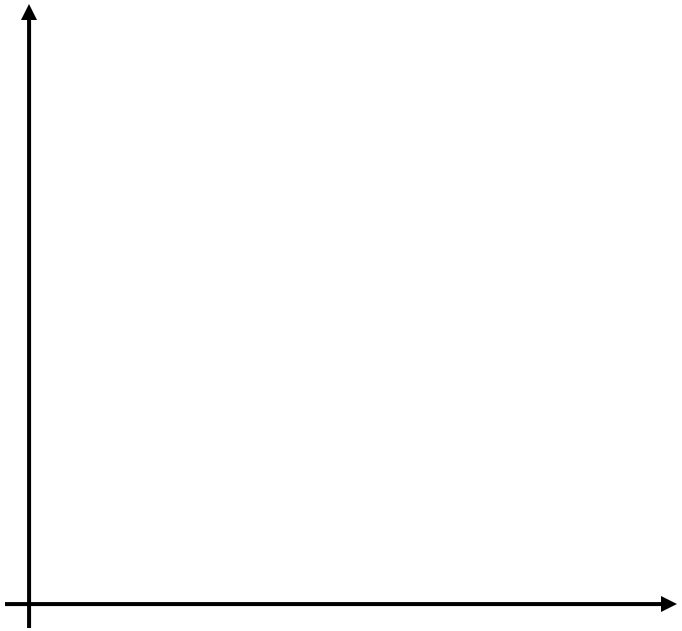
The reasons we study price effect are two folds: to understand how a consumer change his or her consumption bundle when a price changes due to these effects, which leads to deriving a demand function.

(6) Hicksian's price effect (PE)



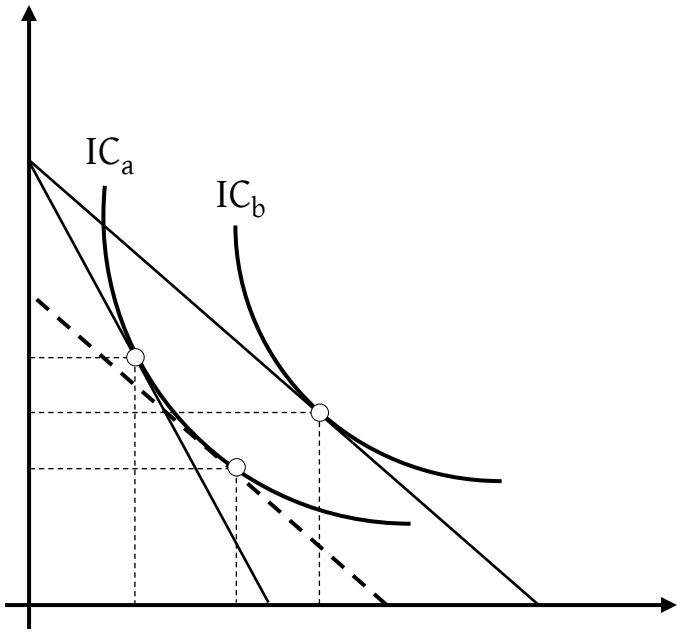
Consider when relative price of both x and y change but this consumer can still choose another bundle on the same IC, this is purely **SE**.

(6) Hicksian's price effect (PE)



Consider when income changes, this is purely **IE.**

(6) Hicksian's price effect (PE)



	x	y
SE	----------	----------
IE	----------	----------
PE	----------	----------

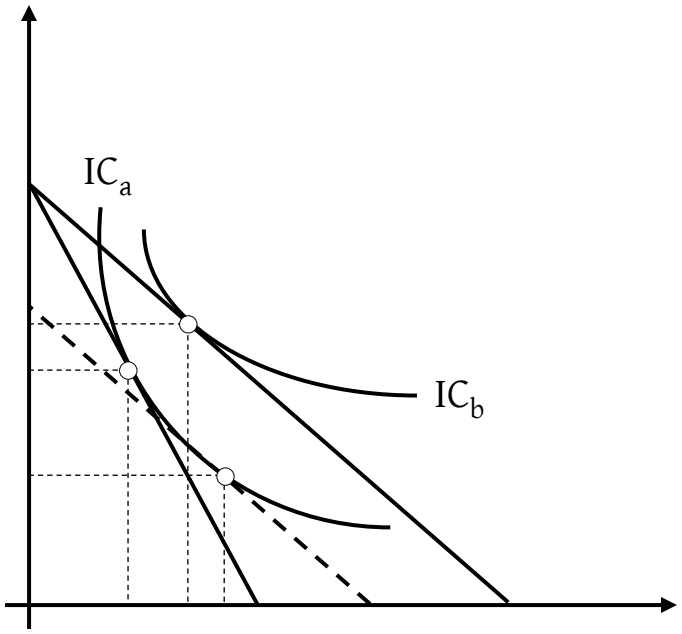
When price of x decreases. Both x and y are **normal goods**,

› Create a hypothetical BL, parallel to the new budget line (new relative price) and tangent to the same IC (keep real income the same) to see **SE.**

› Shift the equilibrium to the new IC to see **IE.**

› From the initial equilibrium to the new one, that is **PE.**

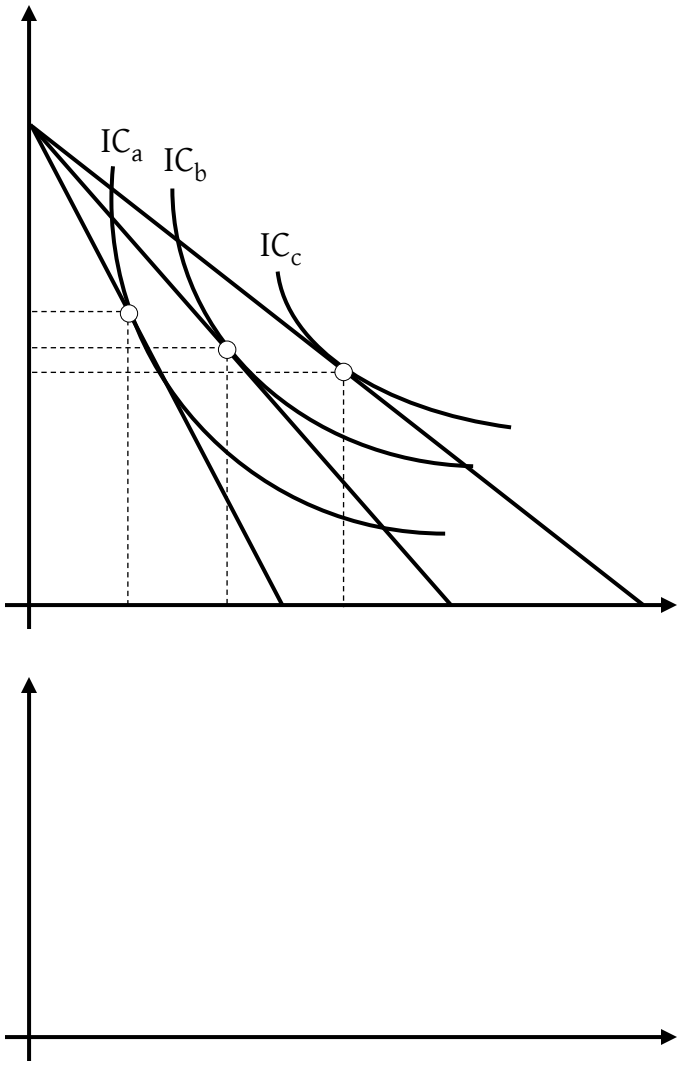
(6) Hicksian's price effect (PE)



When price of x decreases, x is an **inferior good** while y is a normal good. Repeat the same steps.

	x	y
SE	----------	----------
IE	----------	----------
PE	----------	----------

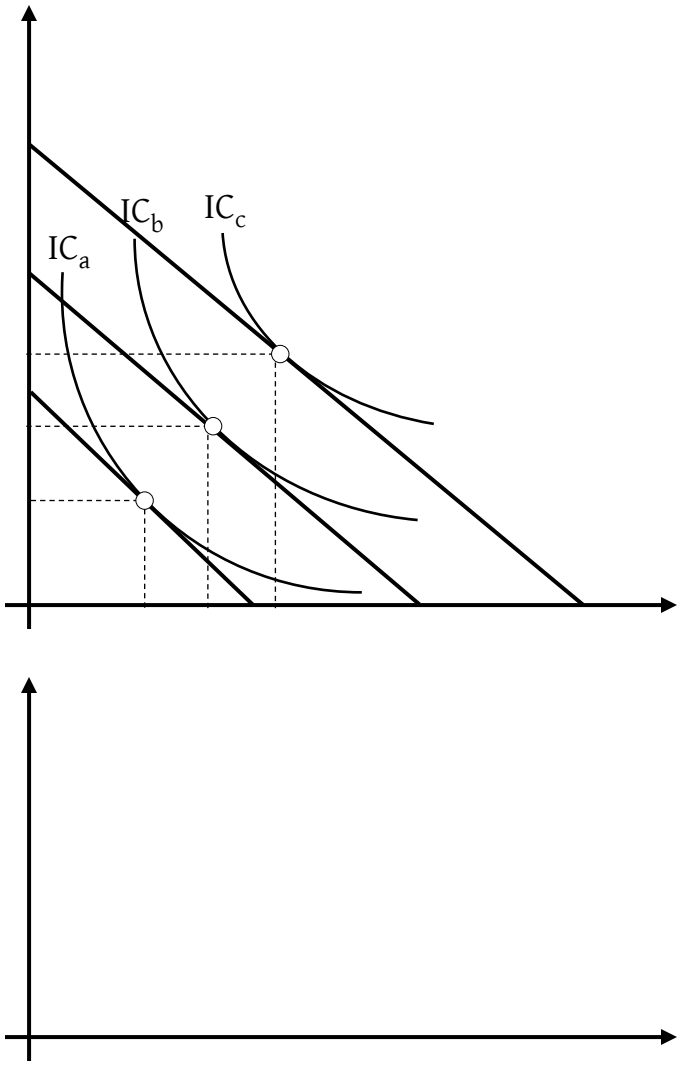
(6) Hicksian's price effect (PE)



Assumed that price of x keeps decreasing, when we draw a curve through consumer equilibria, the curve is called **Price-Consumption Curve (PCC)**.

PCC slope indicate price elasticity of demand for x, which you will study this in other courses.

(6) Hicksian's price effect (PE)



Assumed that consuming income keeps decreasing, when we draw a curve through consumer equilibria, the curve is called **Income-Consumption Curve (ICC)**.

ICC slope indicate types of goods x and y, which again you will study this in other courses.