What are economic models and why do we study them?

Economists use models to understand the real world. Unlike a physicist or a chemist economists are unable to have controlled experiments where they can isolate variables and focus on testing a hypothesis (except behavioral economists in labs, but that's another topic). Economists are more like observers of a complicated and intertwined system. This system works without the understanding of the actors who act within it. An economic model is a combination of rules or steps which try to explain why economic actors behave in the way they do. For example a model could strive to explain why some countries are rich and others are poor. When building a model an economist observes a specific phenomenon and interprets what is going on by creating assumptions about what she is observing. Later these assumptions are used to build a model which is supposed to be representative of the phenomenon which she has observed. No economic model is perfectly representative of the real world, because there can be many hidden or unobservable reasons why something happens. However "good" economic models are representative and in general could give insights about human behavior under institutional constraints.

Model: **Indifference Curves**

Indifference curves help economists analyze how a consumer decides between two goods. Imagine Jane who wants to buy fish and wine and has to make a choice of how much fish and wine she should buy because her budget is limited. We assume that fish and wine are **normal goods** for Jane.

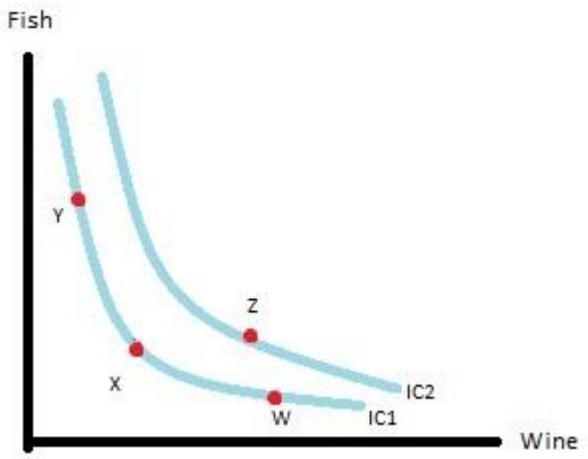
Vocabulary:

Normal good: is a good that as the consumer's budget grows she chooses to buy more of that good

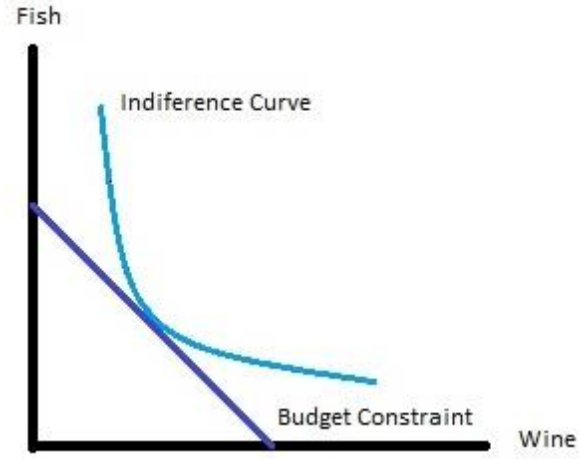
Trade-off – if the consumer wants more of one good she needs to sacrifice the other good

Diminishing Marginal rate of substitution – how much are you willing to give of one good to get the other.

On the graphs below the y axis represents quantity of fish and the x axis represent quantity of wine. The points Y, X and W are trade-offs on the indifference curve IC1. Trade-offs must always be made (diminishing marginal returns are explained in detail in the **Isoquant model**).

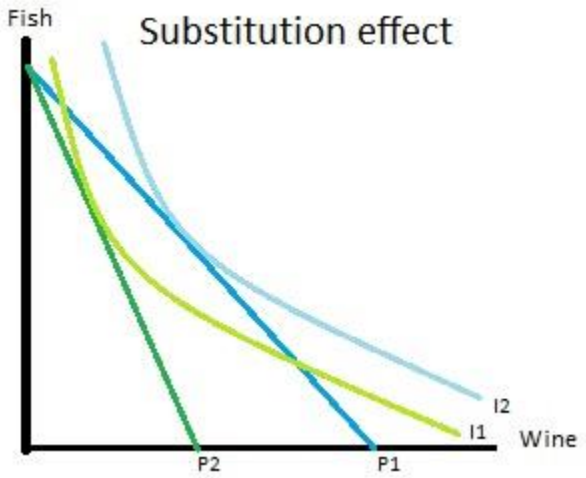


Budget constraint – limit to how much the consumer can buy. The optimal decision is a tangent line although it depends on the consumer's preferences where the tangent line will touch the budget constraint. Below the tangent line is positioned equally between fish and wine.



Income effect – when Jane's income or budget increases she can afford more of both goods. Therefore she moves to a higher indifference curve.

Substitution effect – the price of wine increases so Jane chooses to buy less wine. This is reflected by the shift from P1 to P2, when P1>P2. The price of fish stays the same. Now Jane moves from the higher indifference curve I2 to the lower indifference curve I1. This implies that she is less happy.

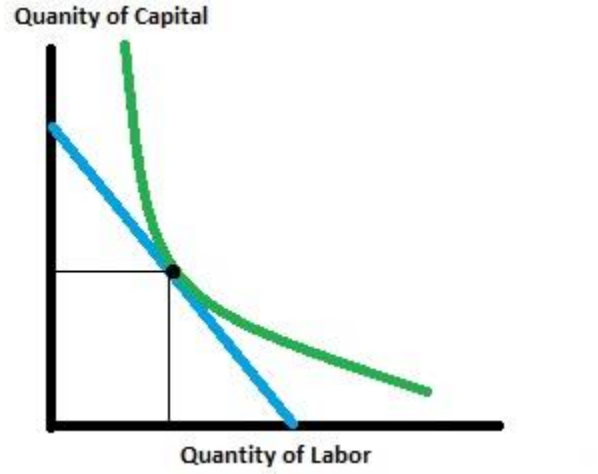


Conclusions: This model drives the point that humans are optimizing actors and that they will adjust their preferences accordingly with the change in prices of goods. The law of demand is an underlying assumption which is a complicated way of saying that when the price of a good increases people will buy less of it.

Model: Isoquant Curves

Isoquants are essentially indifference curves for producers. A producer is a firm which makes a good for the purpose of selling it to consumers. While a consumer chooses between two goods to achieve the highest satisfaction, a producer chooses between two inputs to achieve the lowest cost of production. Remember the basics: incentives matter! A consumer is a buyer of already produced goods by a producer. It is in the interest of the consumer to pay the lowest price he can pay and it is in the interest of the producer to charge the highest price he can charge. Economists model the decision of a producer

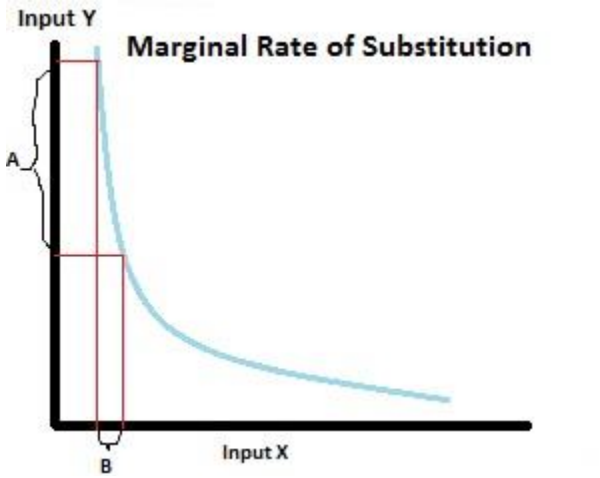
between two inputs: capital and labor. Capital is machines and tools while labor is paying wages to employees. So an isoquant model represents a firm's ability to substitute either between capital and labor in order to achieve the same level of output. Like a consumer, the producer wishes to be on a higher isoquant curve because this yields higher output. A firm may move up or down the isoquant line (contour line) by choosing to have more capital in proportion or vice versa.



Vocabulary:

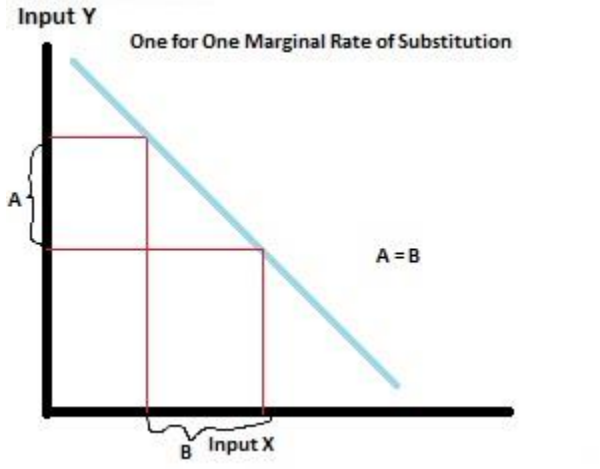
Diminishing marginal rate of substitution: Notice both indifference curves and isoquant curves are bent as opposed to being straight like the budget curve. This is because the marginal rate of substitution varies as you move down on the curve. In non-economic jargon it simply means that the producer is ready to give up one input in exchange for another while maintaining the same level of output. Same goes for our consumer example above when indifference curves were introduced. Indifference curves are also bent because the consumer is ready to give up one good in exchange for another good while maintaining the same level of satisfaction. For example in the graph below, if input Y is decreased by amount A, input X only gains a moderate amount B. This implies a diminishing marginal rate of substitution. It simply means that is the producer wants to move from A to B she needs to give up a lot of input A to have a little of input B.

Graph: 1



If the curve was a straight line we would see a perfect rate of substitution (one for one rate of substitution).

Graph 2

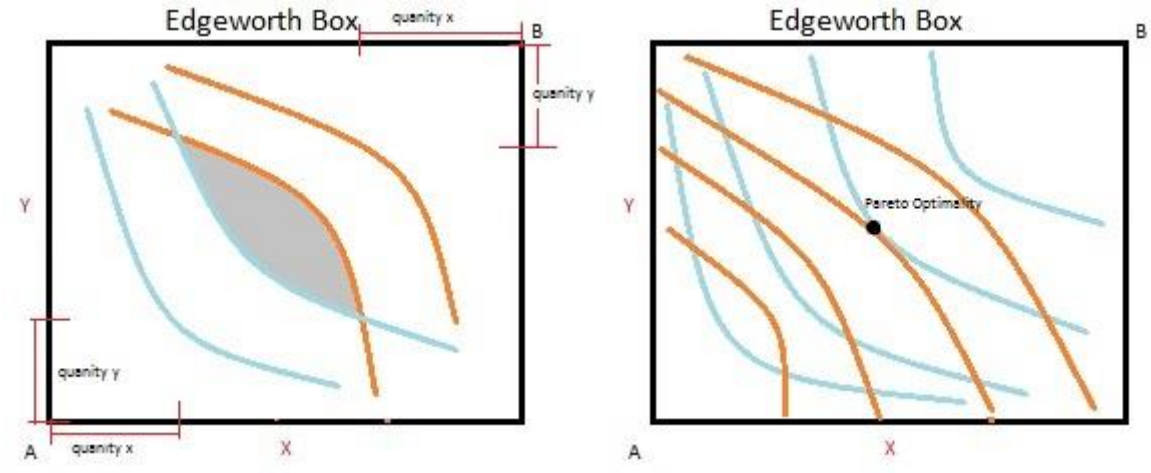


Conclusion of model: As the goods which a consumer owns vary his or her preferences for those goods vary as well. Simply put one may get a lot of satisfaction from the first glass of water, but each subsequent glass of water has diminishing marginal returns to satisfaction. Same applies for the producer isoquant model above. As the producer substitutes from input Y to input X in **Graph 1** she has to give up a lot of input Y to gain little of input X.

Model: Edgeworth Box

The Edgeworth box model represents a trade equilibrium that is reached when two partners exchange two goods. Imagine that the two goods are all there is (aka a fixed economy). Also notice that the x axis and y axis represent quantity of good X and quantity of good Y (see graph below). Person A's point of origin is at the bottom right corner while person B's point of origin is in the top right corner. If person A wants more of good X and good Y they would move up and to the right on the diagram. If person B

wants more of good X and good Y they would move toward the bottom and left. Person A's indifference curves for goods X and Y are in blue while person B's indifference curves for goods X and Y are in orange. Each A and B prefers to be on a higher indifference curve therefore they will eventually meet in the center and form a lens. The gray area in the lens is the opportunity for partner A and B to trade in order to reach higher indifference curves. Without them trading they are unable to gain higher satisfaction by moving on to a higher indifference curve. As you see partner A is only able to attain a quantity of good X up to the gray area, so is partner B able to attain quantity of good X up to the gray area. When both parties engage in trade they are able to expand their indifference curves up to the point where all gains from trade are exhausted. This point is called the Pareto optimal point.



Conclusions: This model drives the idea that trading or interpersonal exchange is a good thing, because it helps each partner have more of each good. When however there are transactions costs to trading such as government taxes, or maybe even each person speaks a different language or they simply don't trust each other, these costs will take away from the trading gain of both partners.

References