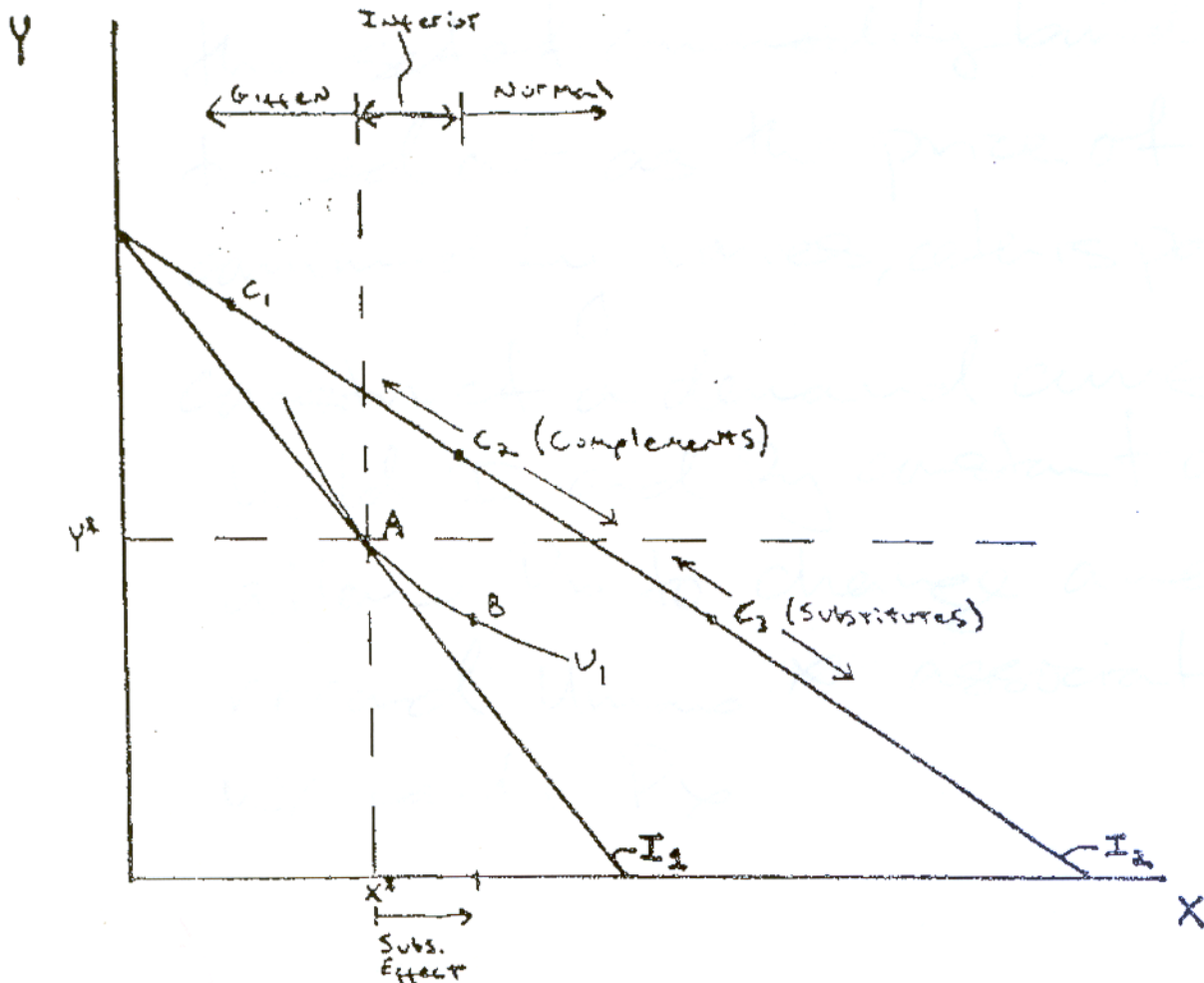


Handout 1: Graphs of Complements and Substitutes



When the price of one good changes, its relationship as a complement or substitute to another good will determine where the new equilibrium ends up on the new budget constraint. For example, in the graph above, the original equilibrium (eq.) is at point A where the indifference curve U_1 is tangent to the budget constraint I_1 . Draw a vertical and a horizontal line through point A to help us visualize how much X and Y are being consumed at the original eq. If the price of good X falls ($P_X \downarrow$), causing the budget constraint to rotate out to I_2 , we can decompose the movement from the equilibrium at point A to the new eq. at some point C into a substitution and an income effect. The substitution effect moves the consumer from point A to some point B on the indifference curve U_1 . Utility is unchanged, but the consumer has chosen to consume more X and less Y due to the change in price. The effect of income, however, depends on whether the good is normal or inferior. Let's examine the possibilities.

Where will the new eq. (point C) be located on the new budget constraint I_2 ?

Observation 1 (Giffen, inferior, normal): Point C will almost certainly fall to the right of the vertical line that goes through point A, otherwise good X is a Giffen good ($P_X \downarrow \Rightarrow Q_X \downarrow$). So a new eq. at a point like C_1 is extremely unlikely. Also note that if the new eq. is to the right of the vertical line through point A but to the left of point B, X is inferior. If the new eq. is to the right of point B, X is normal.

Observation 2 (complements): If X and Y are complements, then $P_X \downarrow \Rightarrow Q_X \uparrow \Rightarrow D_Y \uparrow$, so the new eq. has to end up somewhere on I_2 that is above the horizontal line through point A. Point C_2 provides an example. Due to the fall in P_X the demand for Y has increased. In fact, the new eq. for complements has to end up on I_2 somewhere to the right of the vertical line and above the horizontal line.

Observation 3 (substitutes): If X and Y are substitutes, then $P_X \downarrow \Rightarrow Q_X \uparrow \Rightarrow D_Y \downarrow$, so the new eq. has to end up somewhere on I_2 that is below the horizontal line through point A. Point C_3 provides an example. Due to the fall in P_X the demand for Y has decreased.