

Complementary notes on Income and Substitution effects and on Labor Supply.

As it has already been explained, income effect depicts the change in the quantity of the good consumer purchases which is just due to the change in income. For example, if the consumer's consumption basket includes apples and the price of apples falls, I will get more of them for the simple reason that my real income increased. (provided apples are normal good). This is the **Income effect**.

At the same time, apples are now relatively cheaper than other goods. So if a good becomes cheaper than the other one, you will simply be getting more of it. In other words, assuming that your real income has not changed, you purchase more of it because the price ratio has changed in favor of apples. **This is the substitution effect**.

Adding the two effects gives the total effect from a price change. Given that the Substitution effect *ALWAYS* acts in the opposite direction (increase in price => fall in quantity, decrease in price => increase in quantity), the total effect will depend on the income effect. If the good is normal, then the income effect adds to the substitution effect. Assume a price fall; the substitution effect increases the quantity you purchase. The income effect also increases the amount you purchase since the real income increased and the good is normal.

If the good was **inferior**, for a price fall, the substitution effect would have increased the quantity the consumer purchases, exactly as before. But now the income effect is negative (for an inferior good when the income goes up the quantity you purchase falls). However, the total effect is still positive since the S.E. > I.E.

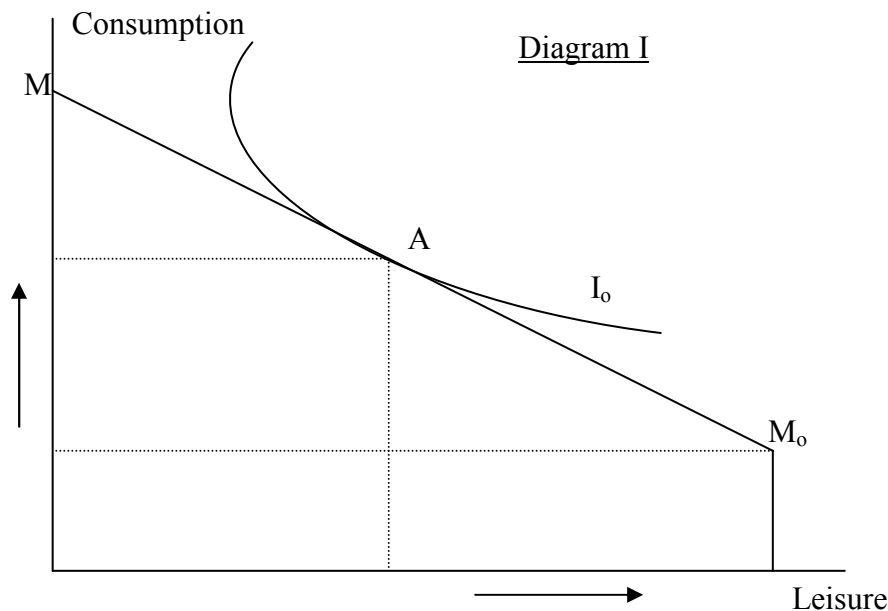
Finally, for a **giffen** good, the S.E would be positive, the I.E. negative BUT the I.E. > S.E. Thus, the total effect would be negative.

LABOR SUPPLY

Let's see now if we can apply the above philosophy in the analysis of the labor that a consumer-worker supplies. By the term labor supply we mean the hours that someone is willing to work, normally per week. So, in this case the trade off is not between the two goods X and Y we had before but between Consumption and Leisure. Again the relationship is negative. In the analysis of goods X and Y, if you had wanted to have more of Y you should have had less of X (for being on the same indifference curve). The same logic applies here: If you want to have more leisure you have to work less, meaning less hours of work and thus less income and consumption. The indifference curve I_0 on diagram I represents all the combinations between Leisure and Consumption that give the same utility to the consumer. This curve reveals consumers preferences.

The budget line on the other hand (line MM_0) illustrates what the consumer can actually purchase for a given level of leisure¹. A single point on the budget line shows the maximum consumption you can achieve for a given level of leisure. The rate at which consumption is exchanged for leisure (the slope of the budget line) is simply the wage! If you can consume 100 by working for 10 hours (assume no saving) and 90 when you work for 9 hours, this 10 difference in your consumption is simply the wage you loose by not working for this hour.

At point A, consumer achieves his optimum. It is the point where the budget line is tangent to an indifference curve. As you can see, the budget line does cross the vertical axis at M but not the horizontal. At M, the consumer-worker devotes all of his time to work and can achieve a maximum consumption of M. However, at M_0 , he/she doesn't work at all but can still consume. So M_0 represents the non-wage income (Benefits, property income, lottery (!!)) etc). Obviously, if non wage income increases this does not affect the slope of the budget line. It rather stimulates a parallel upwards shift.



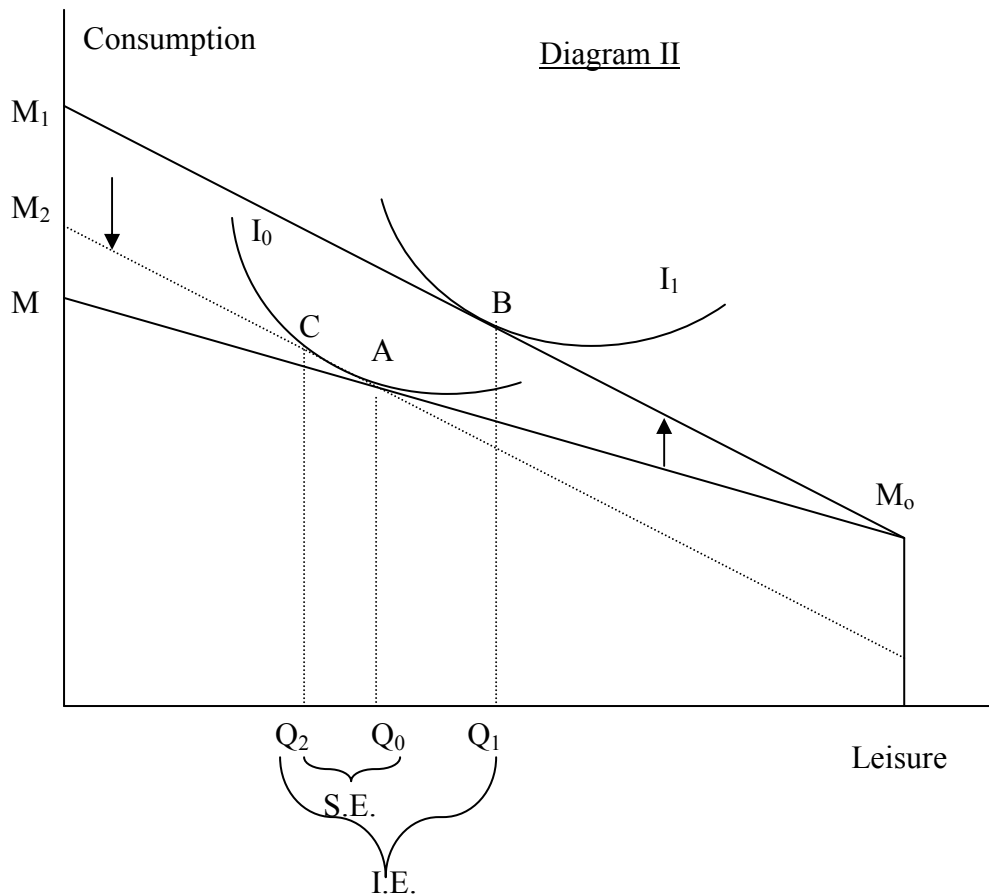
Suppose now that the wage someone receives goes up, (Diagram II). Obviously, this also increases the cost of leisure since the opportunity cost for not working is the wage you don't get. So, since leisure has become more expensive, the worker increases his working time. This is the (negative) substitution effect. At the same time, there is also an income effect coming from the fact that since your wage increased, your whole wage income increased.² Thus, the income effect will tempt the worker to increase his/her leisure. Be careful here: Leisure became more expensive but the income effect is positive. Remember that when we were talking about a

¹ Or for a given level of work. Since your time endowment is fixed, say 1, hours of work = 1 - Leisure

² The increased wage is not only for the extra hour you will or will not work but also for the hours you were already providing.

normal good X , an increase in price would have caused both effects to be negative. I'll explain this contradiction later.

An increase in the wage will cause the budget line to pivot upwards to the new position MoM_1 . The consumer now is on the new indifference curve I_1 . As you can see, he has both increased his leisure and his consumption! Let's decompose this effect. The substitution effect will make the worker work more, Q_0 to Q_2 . However, the income effect will push in the opposite direction, Q_2 to Q_1 . Since the I.E. over weights the S.E., the consumer will increase his leisure.



This worker's reaction was actually determined by the IE, since the SE would always motivate the worker to work more. For a different worker, the IE could have acted in the same direction as the S.E. Clearly, this depends on where the indifference curves lie on the diagram, their shape (preferences) and the level of non wage income.

Suppose a worker possesses a very significant source of non wage income. Obviously, he would react more smoothly in a wage increase than someone who relies solely on his wage income.

For a particular level of wage, a worker would be indifferent between working and not working at all. This wage is called reservation wage and depends on the level of the non wage income, keeping preferences constant.

Finally, few comments on the contradiction I mentioned before:

Suppose we have good X which is normal and its price increases. There is a decrease in the consumption of the good since the good became more expensive in relation to other goods. (Substitution effect). There is also a decrease in the consumption of the good because of the income effect, since the real income decreased and the good is normal. Consequently the one effect adds to the other and the total effect is negative.

Now in X's position we have Leisure, assuming that leisure is a normal good. If its price increases (increase in wage) then leisure becomes more expensive so the worker would want to consume less of it (work more). On the other hand the income effect motivates the worker to increase his/her leisure instead of reducing it (as it was the case with good X). Who is wrong here?

Apparently none! In the conventional model of goods X and Y we are concerned with people who consume the goods and do not sell those goods. In contrast, an individual not only consumes leisure but also "sells" it to an employer (in which case it is called work time). Thus when the price of leisure increases, it may become more expensive to consume but at the same time the consumer benefits from selling it at a higher price! Thus, the income effect can be either positive or negative depending on consumer's preferences and particularly on how much leisure he sells in relation to how much he consumes.