

Solution 2

(Tutorial 1) Question 4

- (a) Cost of 1850 and 1890 bundles at various year's prices:

| Cost | 1850 bundle | 1890 bundle |
|---------------------|-------------|-------------|
| Cost at 1830 Prices | 44.1 | 61.6 |
| Cost at 1850 Prices | <u>49.0</u> | <u>68.3</u> |
| Cost at 1890 Prices | <u>63.1</u> | <u>91.1</u> |
| Cost at 1913 Prices | 78.5 | 113.7 |

- (b) At 1890 prices, 1850 bundle was affordable while 1890 bundle was chosen, so the 1890 bundle is revealed preferred to the 1850 bundle.

- (c) Laspeyres quantity index:

$$L_q = \frac{(0.14)(220) + (0.34)(42) + (0.08)(180) + (0.044)(200)}{(0.14)(165) + (0.34)(22) + (0.08)(120) + (0.044)(200)} = 1.39$$

- (d) Paasche quantity index:

$$P_q = \frac{(0.16)(220) + (0.66)(42) + (0.10)(180) + (0.051)(200)}{(0.16)(165) + (0.66)(22) + (0.10)(120) + (0.051)(200)} = 1.44$$

- (e) Laspeyres price index:

$$L_p = \frac{(0.16)(165) + (0.66)(22) + (0.10)(120) + (0.051)(200)}{(0.14)(165) + (0.34)(22) + (0.08)(120) + (0.044)(200)} = 1.29$$

- (f) This is consistent with the Laspeyres quantity index, so to afford the 1890 bundle, he would have to spend 1.39 times as much as a typical 1850 bundle, at the 1850 prices.

- (g) This is consistent with the inverse of the Paasche quantity index, so the fraction of the amount is 1/1.44 = 0.69.

Question 1

- (a) Demand function: $q = (0.02)(7500) - (2)(30) = 90$ bottles

- (b) With a price increase of 10 pounds per bottle, the extra cost of claret is 900 pounds. Neville's income would need to increase from 7,500 to 8,400 pounds.

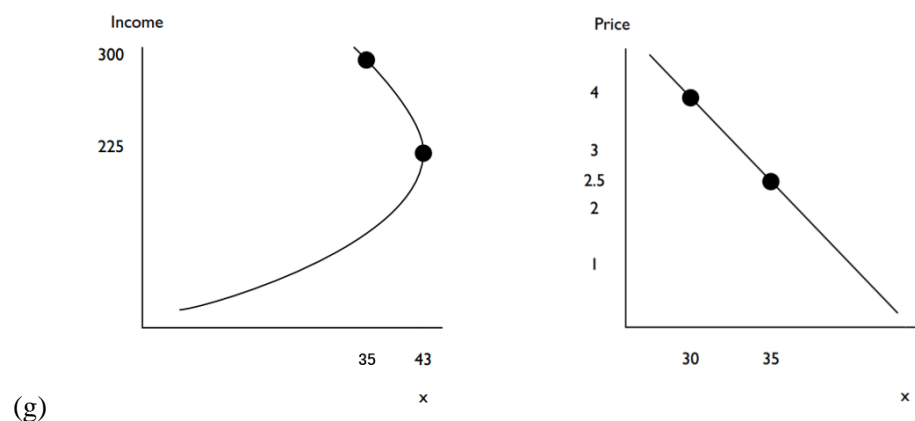
At this income, he would buy $q = (0.02)(8400) - (2)(40) = 88$ bottles.

- (c) Neville would demand $q = (0.02)(7500) - (2)(40) = 70$ bottles.
- (d) The number of bottles that Neville demanded decreased by 20. This total change in demand due to higher claret price is the sum of substitution and income effects.

The substitution effect is the change in demand when Neville's income is adjusted so that, at the new prices, he can only just buy the original bundle. This is exactly the case in part (b). Thus the substitution effect reduces his demand by 2 bottles. The remainings can be attributed to the income effect, which reduces his demand by 18 bottles.

Question 2

- (a) With an income of \$300 and prices of (\$4, \$10), the budget line $4X + 10Y = 300$ is the line that point E goes through. At this bundle point, $X = 30$.
- (b) The new budget line is $2.5X + 10Y = 300$, the line that point C goes through. At this bundle point, $X = 35$.
- (c) Point F, on the same indifference curve as the initial point E, is the bundle that we need to make Zog just able to afford at the new prices (\$2.5, \$10). The corresponding budget line is the line that point F goes through. Given the intercepts 90 and 22.5, the income for this budget line is $\$2.5 * 90 = \$10 * 22.5 = \$225$.
Thus \$75 has to be taken away from Zog.
- (d) The total effect of the price change is to change consumption from point E to point C.
- (e) The income effect corresponds to the movement from point F to point C while the substitution effect corresponds to the movement from point E to point F.
- (f) When Zog's income becomes higher, his chosen bundle moves from point F to point C, i.e., decreasing demand of X, so X is an inferior good.

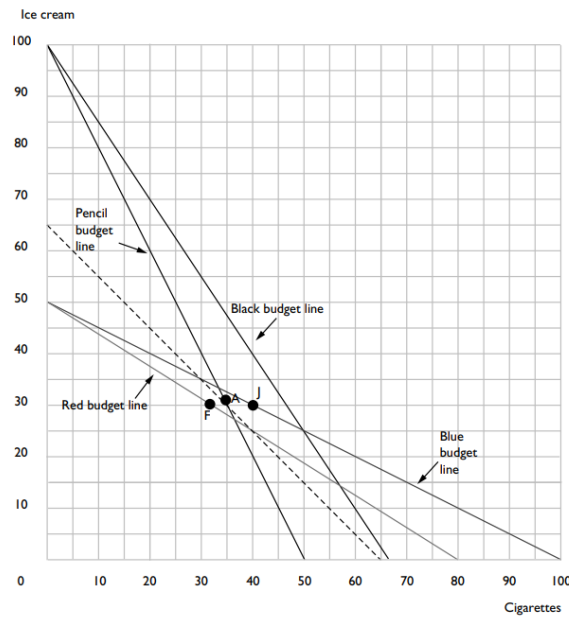


Note that the type of a good can be inferior or normal at different levels of income. For the income level which we observe, it is an inferior good, for other parts it can be any shape-- there is not enough information to determine the shape at other points.

Question 3

- (a) At the budget of \$100 and current prices of (\$1, \$2), the budget line is $x + 2y = 100$, drawn as the blue budget line in the graph.

The chosen bundle is (40, 30), labeled with letter J.



(Blue budget line: $x + 2y = 100$, the budget line for January;

Red budget line: $5x + 8y = 400$, for February;

Black budget line: $3x + 2y = 200$, for March;

Pencil budget line: $2x + y = 100$, for April;

Dashed budget line: $x + y = 65$, for May)

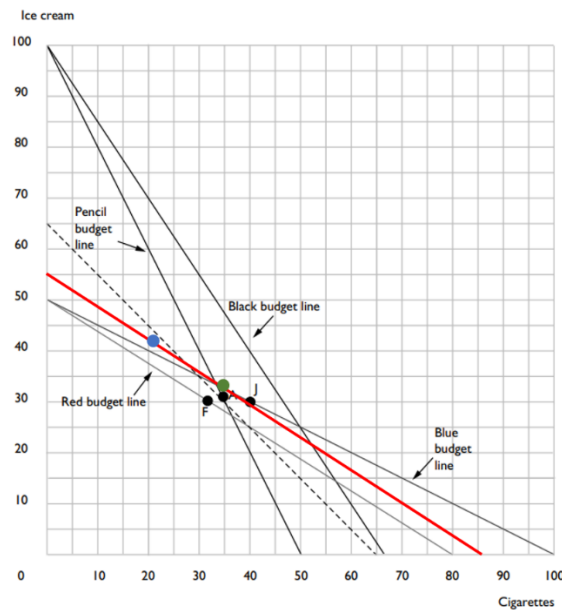
- (b) At the budget of \$100 and current prices of (\$1.25, \$2), the new budget line is $1.25x + 2y = 100$ or $5x + 8y = 400$, drawn as the red budget line.

The chosen bundle is (32, 30), labeled with letter F.

The substitution effect (which is always negative) would make Mr.C buy fewer cigarettes and more ice cream. Since this is true and the total change in his ice cream consumption was zero, it must be that the income effect of this price change on his consumption of ice cream makes him buy less ice cream. The income effect of this price increase is like a decrease in income, so ice cream is a normal good.

Note that there is an ambiguity in the direction of the income effect on cigarette consumption. Cigarette consumption dropped, but it is not clear whether cigarettes are a

normal or inferior good: both could be consistent with a negative total effect. We can't determine whether the income effect is positive or negative. See the different cases given by the blue and green points below:



- (c) At the budget of \$100 and current prices of (\$1.5, \$1), his budget line is $1.5x + y = 100$ or $3x + 2y = 200$, drawn as the black budget line.

The chosen bundle point J in January is below this budget line. By monotonicity, we know that there is at least one bundle on the black budget line that is better than J. Hence the best bundle in the black budget line will also be better than J.

If the prices change to (\$2, \$1), the budget line becomes $2x + y = 100$, drawn as the pencil budget line. Now we cannot tell whether he is better off or not, because no parts of this budget line are to the Northeast of J. We can draw different sets of indifference curves which show either better off or worse off.

- (d) At the prices of (\$2, \$1), the chosen bundle is (34, 32). This bundle must just exhaust Mr.C's budget: $(\$2)(34) + (\$1)(32) = 100$. Thus the budget line is given by $2x + y = 100$, drawn as the pencil budget line in the graph, and the chosen bundle (34, 32) is labeled with letter A.

From the graph, point A is below the blue budget line for January, so it belongs to those worse bundles that Mr.C would not purchase then. He is worse off in April than in January.

Similarly, point F is below the budget line for April, so he is better off in April than in February.

- (e) At the budget of \$130 and current prices of (\$2, \$2), the budget line in May is given by

$x + y = 65$, drawn as the dashed line in the graph.

From the graph, bundle point F is below this budget line, so it is for sure that Mr.C is better off in May than in February.

- (f) If the chosen bundle is (40, 25), it would also go through the budget line for February. Knowing that point F is below the budget line for May, we can say the chosen bundle (40, 25) in May is directly revealed preferred to bundle F. However, in February when both bundles are affordable, point F is chosen. The two situations are inconsistent with each other, so WARP is not satisfied.

Question 4

- (a) According to the substitution effect, the relatively lower price of potatoes would cause a substitution from other goods to potatoes. This effect would increase the consumption of potatoes.

If potatoes were a normal good, both the fall in potato price and the rise in income would increase the demand for potatoes, so its consumption would unambiguously rise between 1850 and 1890. But potato consumption did not increase. So potatoes must be an inferior good.

- (b) If potatoes were a Giffen good, the demand for potatoes would decrease when they became cheaper. Meanwhile, as an inferior good, the rise in income would also decrease the demand. Overall, we should expect a falling consumption of potatoes between 1850 and 1890. But the demand stayed constant. So potatoes were probably not a Giffen good.