

Review Session Handout #5

Chapter 6: Consumer Choice, Demand, and Welfare

Introduction to Microeconomics: Markets, Strategy, and Real-World Cases

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Exercise R5.1. A student has \$120 to spend on notebooks, at \$8 each, and pens, at \$4 each.

- (a) Is the bundle of 10 notebooks and 12 pens affordable? Is the bundle of 9 notebooks and 12 pens affordable, and does it lie on her budget line?
- (b) How many notebooks can she buy if she buys no pens? How many pens if she buys no notebooks? What is the opportunity cost of a notebook, in pens?
- (c) If the student's income rises to \$160, with prices unchanged, how does the budget line change?
- (d) If instead the price of notebooks falls to \$6, with income at \$120 and pens at \$4, how does the budget line change? Draw the original and the new budget line.

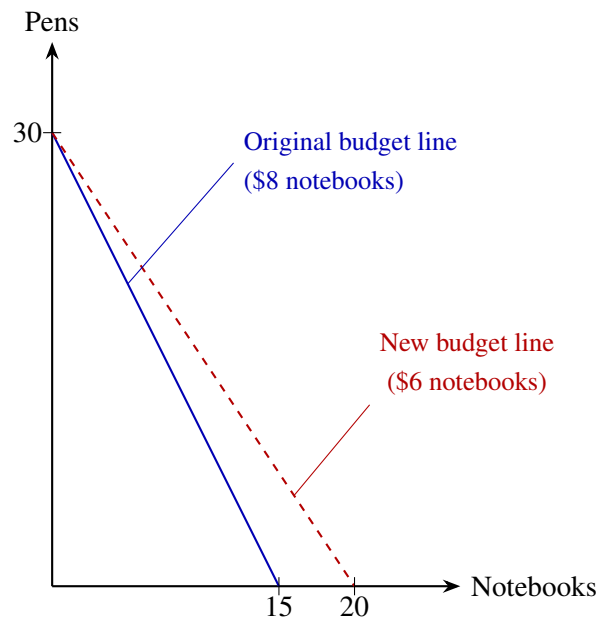
Solution.

Part (a). Ten notebooks and 12 pens cost $10 \times \$8 + 12 \times \$4 = \$80 + \$48 = \$128$, more than her \$120, so this bundle is out of reach. Nine notebooks and 12 pens cost $9 \times \$8 + 12 \times \$4 = \$72 + \$48 = \$120$, exactly her income, so this bundle is affordable and lies on her budget line.

Part (b). If she spends all \$120 on notebooks, she can buy $\frac{\$120}{\$8} = 15$ notebooks; if she spends it all on pens, she can buy $\frac{\$120}{\$4} = 30$ pens. Every bundle that exactly uses her \$120 lies on the straight line between these two points. Since a notebook costs \$8 and a pen \$4, buying one more notebook means giving up 2 pens: the opportunity cost of a notebook is 2 pens, the ratio of the prices, which is also the slope of the budget line.

Part (c). With \$160, she can buy $\frac{\$160}{\$8} = 20$ notebooks or $\frac{\$160}{\$4} = 40$ pens. Both intercepts move out, while a notebook still costs 2 pens, so the budget line shifts out parallel to the original one.

Part (d). At \$6 per notebook, spending all \$120 on notebooks buys $\frac{\$120}{\$6} = 20$ notebooks, while spending it all on pens still buys 30 pens. The budget line pivots outward along the notebook axis, while its pen intercept stays at 30. A notebook now costs $\frac{\$6}{\$4} = 1.5$ pens, so the line becomes flatter.



Remark. A change in income shifts the budget line in or out without changing its slope. A change in the price of one good pivots the line around the intercept of the other good.

Exercise R5.2. A consumer has \$60 to spend on apples, at \$3 each, and bananas, at \$1.50 each. Her best affordable bundle, A, is 10 apples and 20 bananas, where her budget line just touches her highest reachable indifference curve, so her marginal rate of substitution equals the price ratio of 2. The price of apples then falls to \$1.50, while her income and the price of bananas do not change. With just enough money to buy her old bundle at the new prices, she would choose bundle B, with 15 apples and 15 bananas. With her full \$60 at the new prices, she chooses bundle C, with 20 apples and 20 bananas.

(a) Check the three bundles against the budget lines. Specifically:

- Compute the cost of her old bundle A at the new prices. How much of her \$60 would she have left over if she kept buying it?
- Check that bundle B costs exactly the amount you just found, so that B lies on the budget line on which her old bundle is just affordable at the new prices.
- Check that bundle C uses her full \$60 at the new prices.

(b) Identify the substitution effect and the income effect of the price cut on her apple purchases.

(c) Are apples a normal good or an inferior good for this consumer?

Solution.

Part (a).

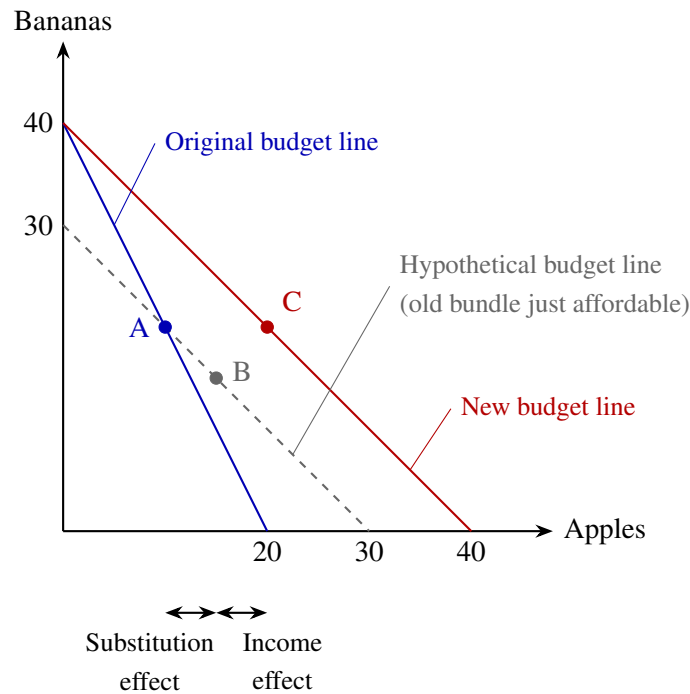
- At the new prices, bundle A costs $10 \times \$1.50 + 20 \times \$1.50 = \$15 + \$30 = \$45$. If she kept buying her old bundle, she would have $\$60 - \$45 = \$15$ left over: the lower apple price stretches her income.

- Bundle B costs $15 \times \$1.50 + 15 \times \$1.50 = \$22.50 + \$22.50 = \$45$, the same amount, so it lies on the hypothetical budget line with \$45 at the new prices, on which her old bundle A is just affordable.
- Bundle C costs $20 \times \$1.50 + 20 \times \$1.50 = \$30 + \$30 = \$60$, her full income.

Part (b).

- Substitution effect: from A to B, apples rise from 10 to 15, an increase of 5 apples. Along the hypothetical budget line, apples are now less expensive relative to bananas, and the consumer substitutes toward them.
- Income effect: from B to C, apples rise from 15 to 20, another 5 apples. The lower price stretches her income, as the \$15 left over in part (a) shows, and she spends part of it on apples.
- Total effect: from A to C, apples rise from 10 to 20, an increase of 10 apples, the sum of the two effects.

Part (c). The income effect on apples is positive: when the price cut stretches her income, she buys more apples. Apples are therefore a normal good for this consumer, and the income effect reinforces the substitution effect.



Remark. For bananas, the two effects cancel: the substitution effect lowers her banana purchases from 20 to 15, and the income effect raises them back from 15 to 20. For apples, whose price fell, both effects push in the same direction, as they always do for a normal good whose price falls.

Exercise R5.3. Four fans value a concert ticket at \$200, \$150, \$100, and \$60, respectively. The ticket price is \$80.

- (a) Which fans buy a ticket?
- (b) Compute each buyer's consumer surplus.
- (c) Compute total consumer surplus.
- (d) If the price rises to \$120, which fans drop out, and what is the new total consumer surplus?
- (e) Compute the loss in consumer surplus from the price increase.

Solution.

Part (a). A fan buys if the most she is willing to pay is at least the \$80 price. The fans who value the ticket at \$200, \$150, and \$100 buy; the fan who values it at \$60 does not.

Part (b). Each buyer's consumer surplus is the most she would pay minus the price: $\$200 - \$80 = \$120$ for the first fan, $\$150 - \$80 = \$70$ for the second, and $\$100 - \$80 = \$20$ for the third.

Part (c). Total consumer surplus is $(\$200 - \$80) + (\$150 - \$80) + (\$100 - \$80) = \$120 + \$70 + \$20 = \$210$.

Part (d). At \$120, the fan who values the ticket at \$100 drops out, and the fan who values it at \$60 still does not buy. The new total consumer surplus is $(\$200 - \$120) + (\$150 - \$120) = \$80 + \$30 = \$110$.

Part (e). Consumer surplus falls by $\$210 - \$110 = \$100$.

Remark. The \$100 loss has two sources. The two fans who keep buying pay \$40 more each, a loss of \$80, and the fan who drops out loses the \$20 of surplus she earned at the \$80 price.