

Budget constraint shift

Oliver has a unique way of balancing his weekly activities. As a hobby, he spends time reading mystery novels (M), cooking gourmet dishes (C), and attending fitness classes (F). However, Oliver has turned his hobbies into small side hustles:

- Oliver writes reviews of mystery novels for a local blog, earning \$2 per hour spent reading.
 - He teaches a weekly cooking workshop, earning \$3 per hour spent preparing and teaching gourmet dishes.
 - To stay active, he attends fitness classes, which cost \$10 per session.
- (a) Write down a budget equation that includes all three activities M , C , and F showing the combinations that Oliver can afford each week.
- (b) Suppose Oliver decides to attend exactly 5 fitness classes per week. Represent the combinations of time spent reading mystery novels and cooking gourmet dishes that he can afford under this constraint. Draw a two-dimensional graph illustrating these possibilities.
- (c) If the cost of fitness classes increases to \$15 per session, how does this affect Oliver's budget equation? Write the new equation and describe the shift in his consumption possibilities.
- (d) If Oliver receives an additional \$40 per week from a sponsor for his fitness goals, how would this impact his budget equation and his consumption choices?

Solution

- (a) Let us formulate Oliver's budget equation. His income comes from reading mystery novels ($2M$) and cooking gourmet dishes ($3C$), and his expenses are based on fitness classes ($10F$). Including his stipend of \$60, the budget equation is:

$$-2M - 3C + 10F = 60$$

Here, M and C appear as negative terms because they represent income (money earned), while F is a positive term because it represents an expense (money spent).

- (b) If Oliver decides to attend exactly 7 fitness classes per week ($F = 7$), substitute F into the budget equation:

$$-2M - 3C + 10(7) = 60$$

$$-2M - 3C + 70 = 60$$

$$-2M - 3C = -10$$

Divide through by -1 to simplify:

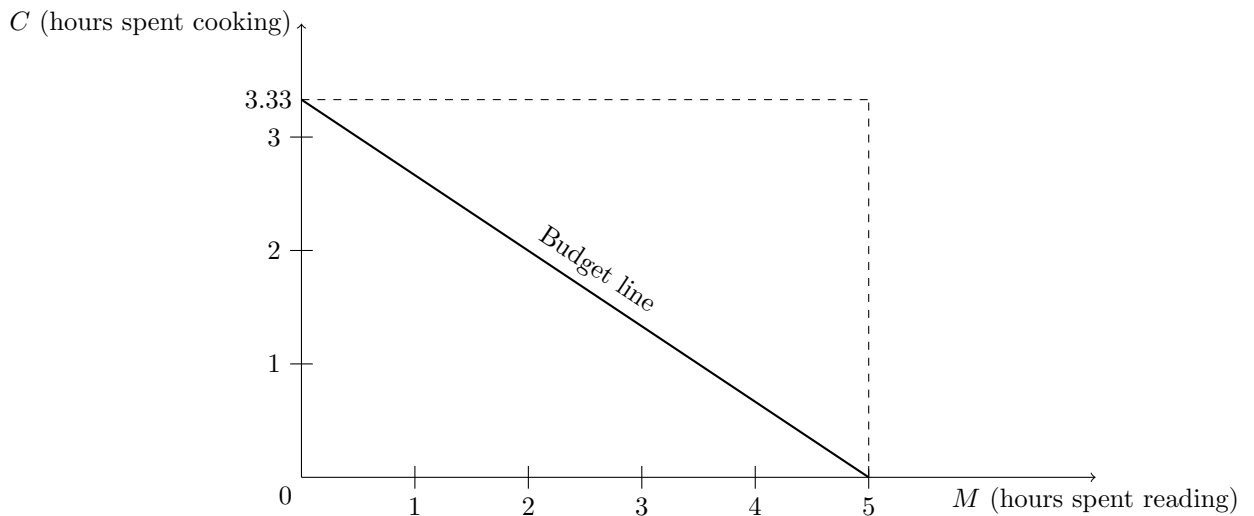
$$2M + 3C = 10$$

This equation represents the combinations of hours spent reading mystery novels (M) and cooking gourmet dishes (C) that Oliver needs to meet the costs of 7 fitness classes. The intercepts of this equation are:

$$M \text{ (if } C = 0\text{): } \frac{10}{2} = 5$$

$$C \text{ (if } M = 0\text{): } \frac{10}{3} \approx 3.33$$

Graph: Combinations of Reading and Cooking Hours



This line shows all possible combinations of time spent reading and cooking that Oliver needs to cover the cost of 7 fitness classes.

- (c) If the cost of fitness classes increases to \$15 per session, the new budget equation becomes:

$$-2M - 3C + 15F = 60$$

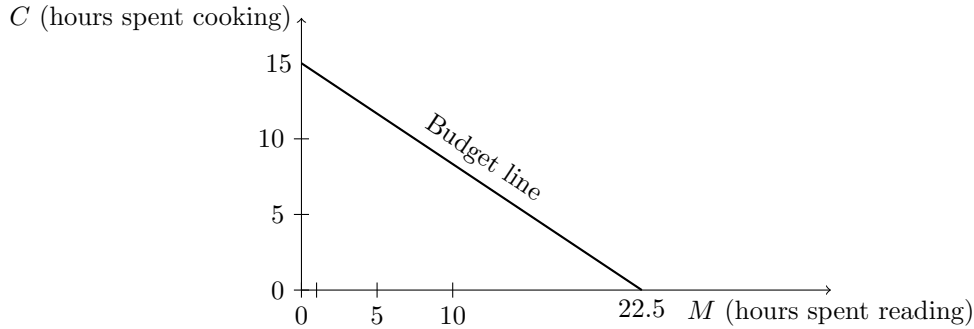
Substitute $F = 7$ to analyze the change:

$$-2M - 3C + 105 = 60$$

$$-2M - 3C = -45$$

$$2M + 3C = 45$$

This drastically limits Oliver's ability to spend time on reading or cooking if fitness classes become more expensive.



The new budget constraint, represented by the expanded line, reflects the increased cost of fitness classes. To cover the higher expenses, Oliver needs to dedicate more time to reading mystery novels and cooking gourmet dishes. This expansion in the budget line indicates that Oliver's working hours (either reading or cooking) have to increase to meet the additional financial demand imposed by the higher gym fees.

- (d) If Oliver receives an additional \$40 per week for his fitness goals, his total weekly budget increases to \$100. The budget equation becomes:

$$-2M - 3C + 10F = 100$$

This shift allows him to afford more combinations of M , C , and F . For example, the maximum number of fitness classes he could now attend if $M = C = 0$ is:

$$F = \frac{100}{10} = 10$$