1 Wanda Sue's highest-ranked feasible bundle in terms of her budget constraint and her indifference map.

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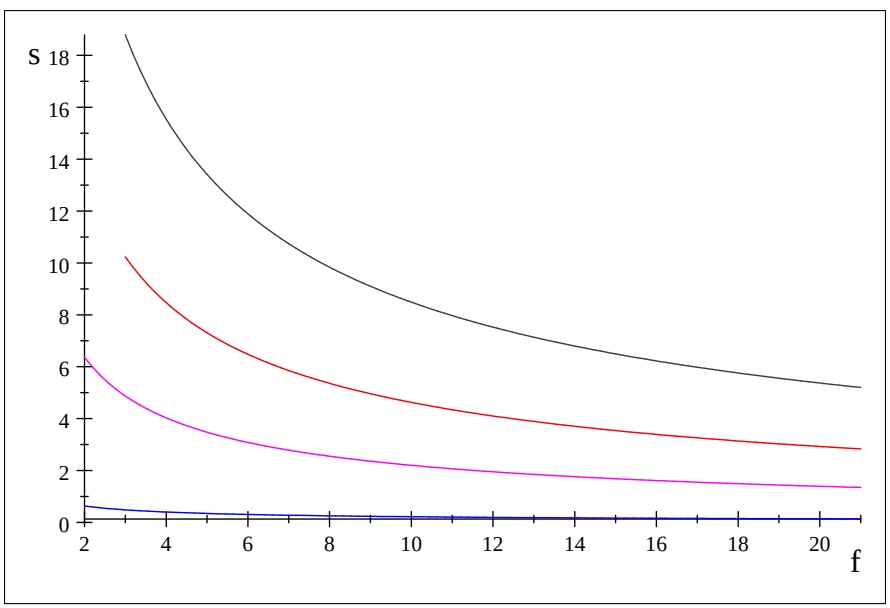
Continue to consume two goods. Let's make it food and sports equipment, f and s, where f if the amount of food purchased and consumed and s is the amount of sports equipment purchased and used.

1.1 Reviewing what we know about indifference maps and budget constraints:

1.1.1 (1) Wanda Sue's indifference map is a complete representation of her preferences.

Since there are only two commodities, her indifference map has only two dimensions.

Imagine that her indifference map looks as follows.



Wanda's indifference map

Wanda wants to get to the highest-possible indifference curve.

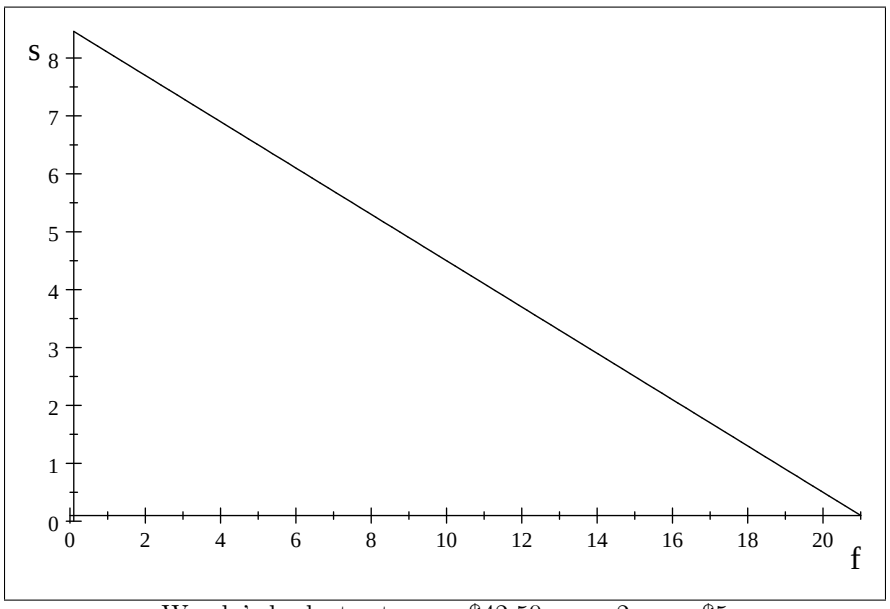
Given her current consumption bundle, the slope of her indifference curve at that point, in absolute terms, is her marginal rate of substitution of food for sports equipment: $\frac{\triangle s}{\triangle f}|_I$ is the slope of the indifference and $-\frac{\triangle s}{\triangle f}|_I$ is the MRS_{fs}.

Her MRS_{fs} is the rate at which she is willing to give up sports equipment to get more food: her *wtp* for food in terms of sports equipment.

1.1.2 (2) Wanda is constrained by her budget constrant; she cannot consume a bundle (combination of f and s) that she cannot afford.

$m = p_f f + p_s s$ implying $s = s_m(m, p_f, p_s) = \frac{m}{p_s} - \frac{p_f}{p_s} f$

To make the example specific
Assme Wanda's income is \$42.50, that $p_s = \$5$ and that $p_f = \$2$
In which case, Wanda's budget line is $s = \frac{42.5}{5} - \frac{2}{5} f = 8.5 - .4f$



Wanda's budget set: $m = \$42.50, p_f = 2, p_s = \$5$

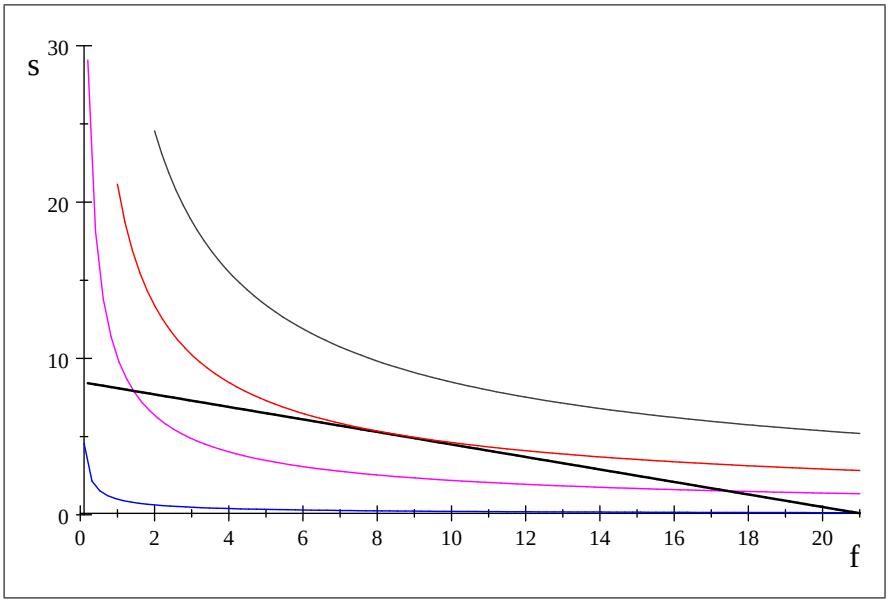
Along the budget line she is exhausting her income, and the slope of the budget line, $-\frac{p_f}{p_s} = -\frac{2}{5} = -.4$ is the rate at which the **market** allows her to substitute food for sports equipment: how much sports equipment she will have to give up to get one more unit of food, $\frac{\triangle s}{\triangle f} |_{\triangle m=0}$

So, the slope of the budget line is the **rate at which the market allows** Wanda to substitute food for sports equipment. And, the slope of her indifferent curve is the rate at which she is **willing,** based on her preferences, to substitute food for sports equipment.

Keep in mind the **difference** between $\frac{\triangle s}{\triangle f} |_{\triangle m=0}$ and $\frac{\triangle s}{\triangle f} |_I$ **They are different things.**

1.2 Representing both preferences and the budget constraint

Putting Wanda's indifference map and constraint set on the same graph, Assuming no other constraints, Wanda's choice problem is fully represented



Wanda's choice problem

What bundle will Wanda choose to consume given her preferences and constraints? She want to get to the highest indifference curve she can afford.

Can she afford any of the bundles on the blue indifference curve? Yes
On the purple indifference curve? Yes

On the black indifference curve? No
The highest one she can get to is the red one.
The bundle where the slope of the budget like is tangent to red indifference curve

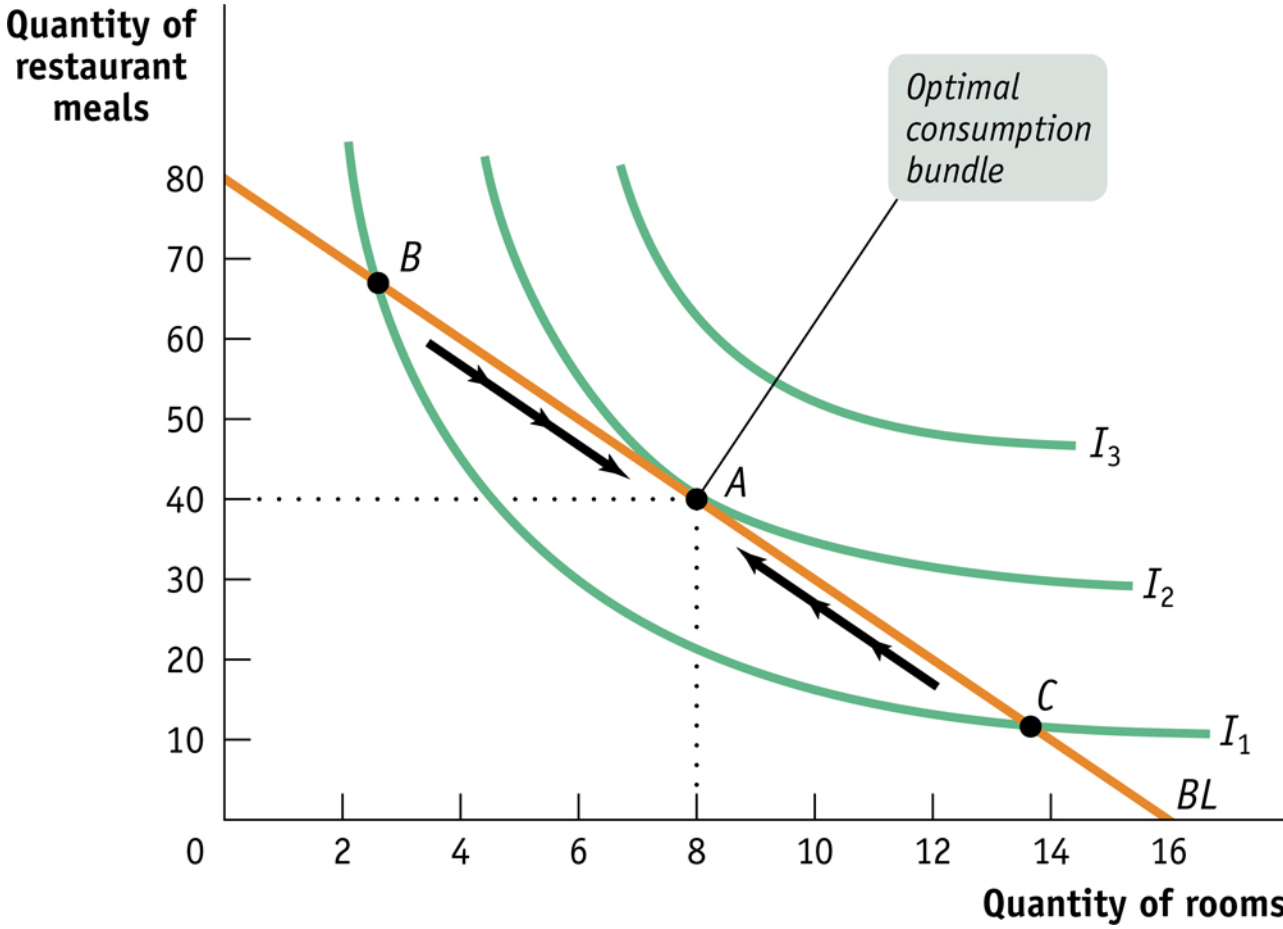
Note that if Wanda is exhausting her budget ($42.50), and she is consuming a bundle where the slope of its indifference curve does not equal the slope of her budget line, Wanda can do better (she is not max her utility subject to her budget constraint).[1]

[1] An exception to this, are situations where the highest ranked afordable bundle includes zero amounts of some good. These are called *corner solutions*.

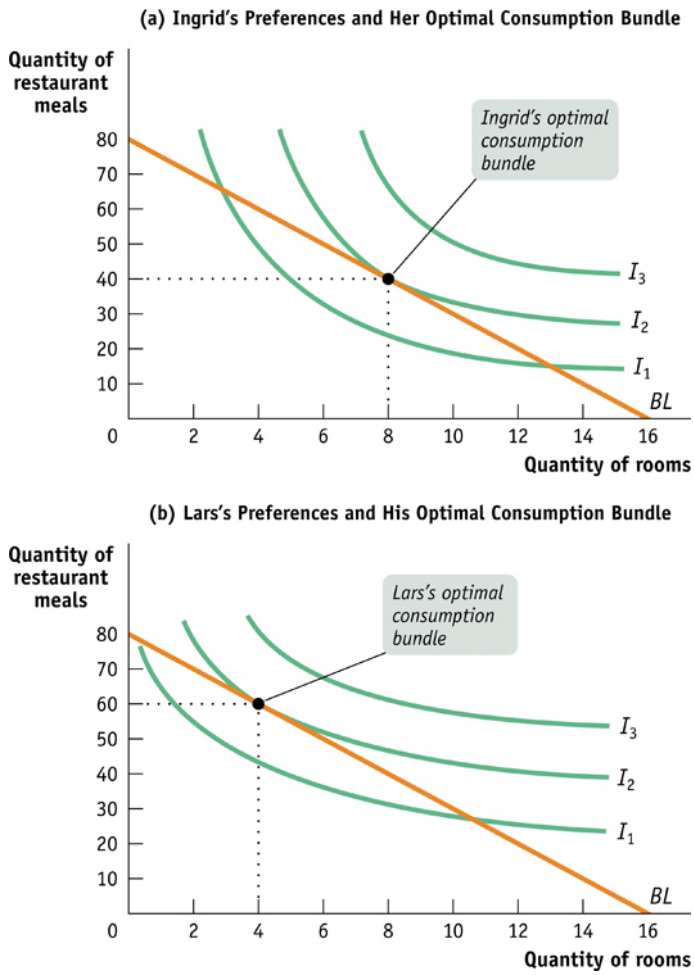
From the indifference map it looks like the bundle has about eight units of food. (in which case it would have about 5.3 units of sports equipment

Note that at this point, the slope of her indifference curve (the rate at which she is willing to substitute food for sports equipment) is equal to the slope of her budget line (the rate at which the market allows her to substitute food for sports equipment).

KW has


Quantity of restaurant meals
80
70
60
50
40
30
20
10
0
2
4
6
8
10
12
14
16
Quantity of rooms
Optimal consumption bundle
B
A
C
I_3
I_2
I_1
BL

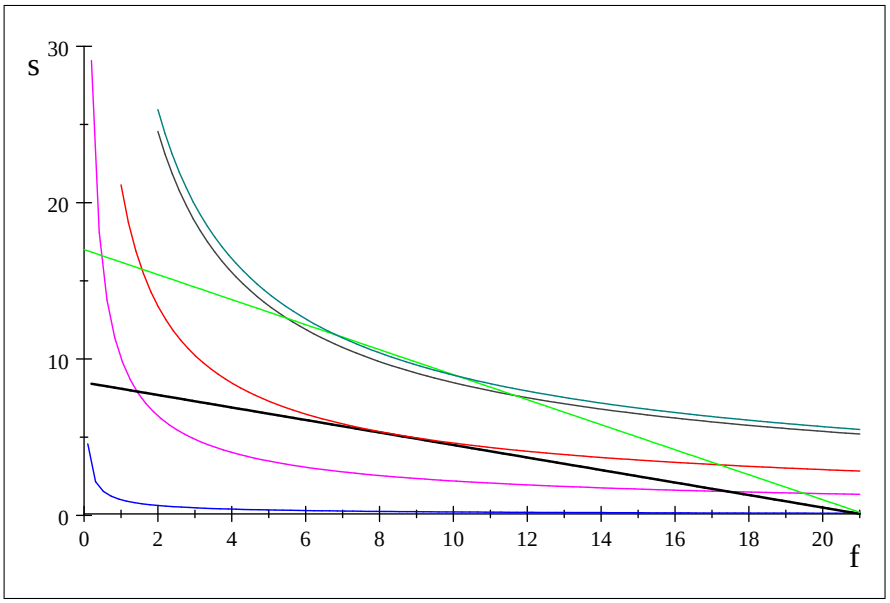
Note how having the same budget contraint, but different preferences leads to a different optimal bundles for Lars and Ingrid



They both have the have the same budget constraint but choose different bundles because they have different preferences.

The next objective is to use our preference and constraint map to see how Wanda's choice changes when her constraints change.

Consider our previous graph

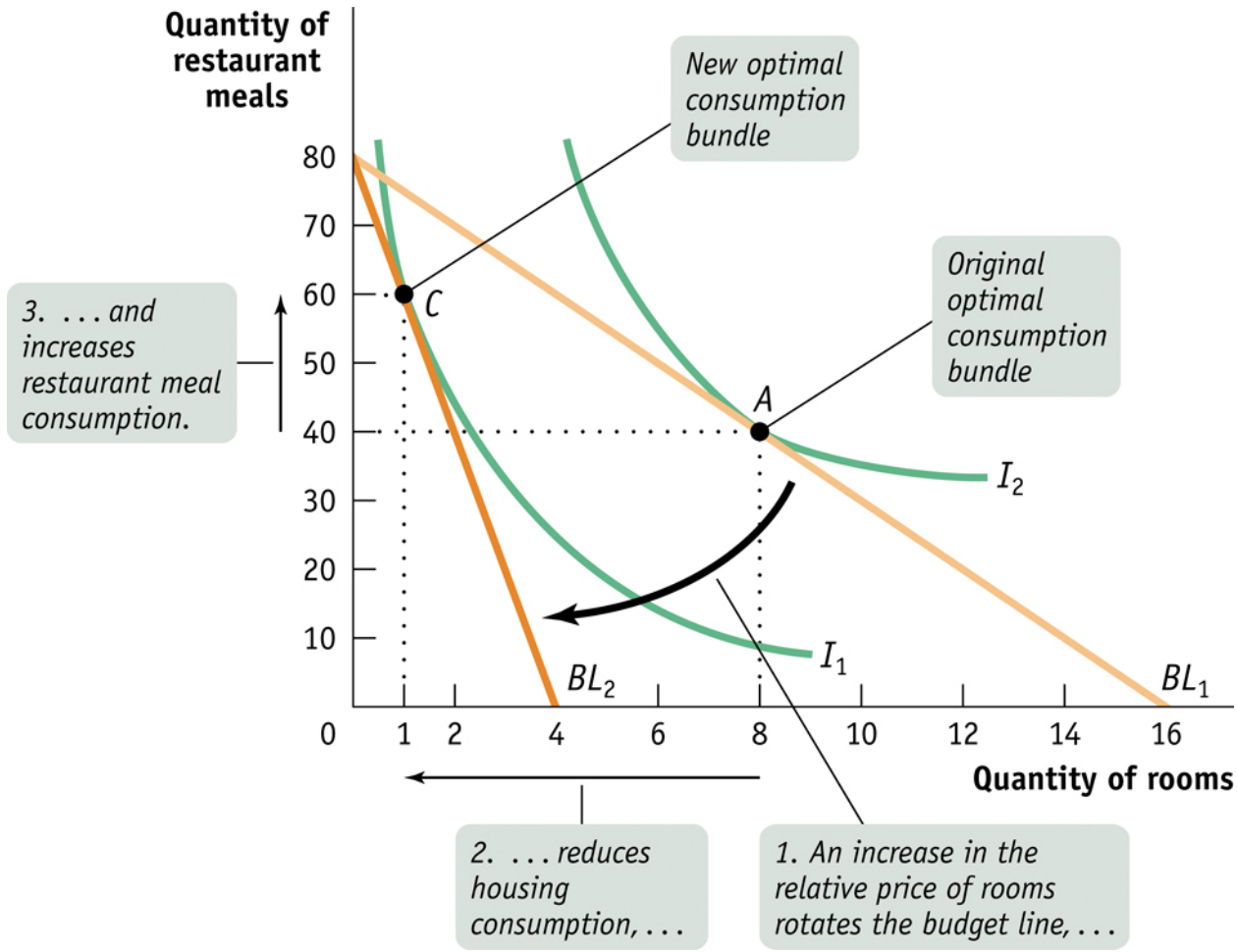


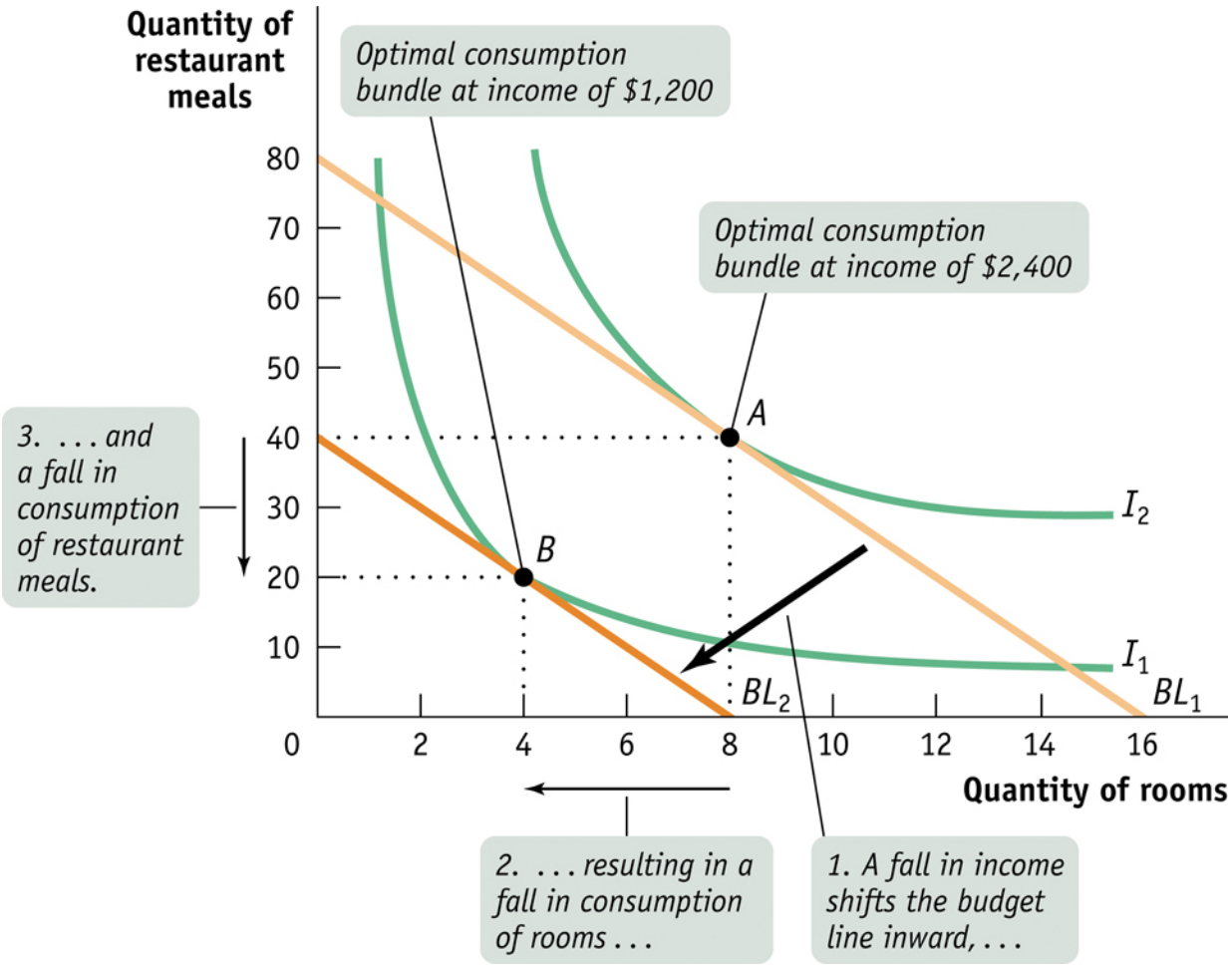
Wanda's choice problem

where the black line is Wanda's orignal budget contraint and the green line is her budget line after the price of sports equipment has fallen from \$5 to \$2.50. Wanda's new budget constraint is $s = \frac{42.5}{2.50} - \frac{2}{2.5}f = 17.0 - 0.8f$, in green

Because of the price decrease, Wanda consumes a lot more sports equiptment and about the same amount of food.

Let's looks of some of the comparable graphs in KW




Quantity of restaurant meals
Optimal consumption bundle at income of $1,200
Optimal consumption bundle at income of $2,400
80
70
60
50
40
30
20
10
0
2
4
6
8
10
12
14
16
A
B
I_2
I_1
BL_2
BL_1
Quantity of rooms
3. . . . and a fall in consumption of restaurant meals.
2. . . . resulting in a fall in consumption of rooms . . .
1. A fall in income shifts the budget line inward, . . .

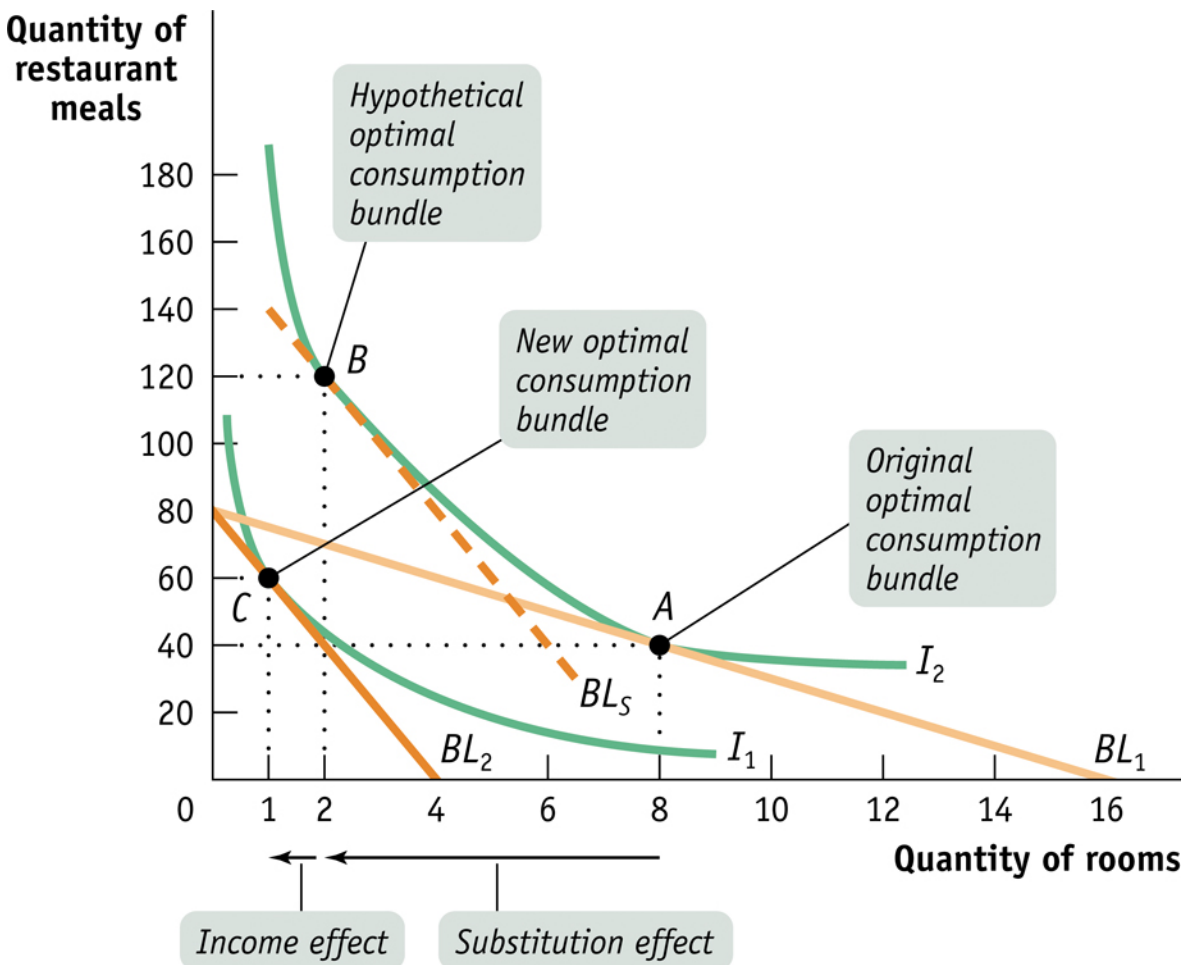
1.3 Income and substitution effects

When we think about how the bundle changes when a price increases (e.g. a move form bundle A to bundle C in the next graph), we might ask why does the chosen bundle change.

It is because relative prices have changed (yes) and is it because **real** income has changed (yes). The change is the sum of two changes.

Can we figure out how much of the change is caused by the change in relative prices and how much of the change is caused by the fact that the price increased forced the individual to a lower indifference curve (a lower-ranked bundle?

Yes



Note the two things that happen when the price of rooms increases: relative prices change (the slope of the budget line changes) and the individual is forced onto a lower indifference curve (his "real" income has dropped).

Try to divide the change from bundle A to bundle C into two effects: the bundle change that would result only if the relative price of rooms rose but one's real income remained the same (one did not have to drop to a lower indifference curve) and the bundle change that would result if one were constrained to move to the lower indifference curve, but one faced the same, new, relative prices

The first effect is called the *substitution effect*, the latter the *income effect*

The change from bundle A to B is the **substitution effect:** the change the individual would make if only relative prices changed, real income remaining constant. The substitution effect, by itself, would cause rooms to drop by 6 (8 to 2), and meals to increase by 80 (40 to 120)

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The change from bundle B to C is the **income effect**: the change cause by the fact that the price increase caused real income to fall, holding relative prices constant. The income effect, by itself, would cause rooms to drop by 1 (2 to 1), and meals to drop by 60 (120 to 60).

Note that if only money income changes there is an income effect but no substitution effects. This is because relative prices do not change if only money income changes.