

Topic 3 Part 3

Applications

Review – Corner Solution

- Generally, people consume **positive amounts of X and Y**.
- In this case, such bundle is said to be an **interior** solution.

- But, some people choose to consume **ONLY one good**.
- In this case, such bundle is said to be a **corner** solution.

Review – Corner Solution

- When the optimality condition “ $MU_x/P_x = MU_y/P_y$ ” holds, we will have an interior solution.
- This is because this condition implies the bundle where the IC and BL are **tangent (their slopes are equal)**.
- This in turn implies that such bundle is **affordable** and gives the **highest utility**.

Review – Corner Solution

- Suppose that $MU_x/P_x > MU_y/P_y$.
- This means spending one dollar on X will give higher MU.
- Hence, we should consume more X.

- Note that when X increase, MU_x falls, equating $MU_x/P_x = MU_y/P_y$, and the optimal bundle is reached.

- **What if there is NO bundle such that $MU_x/P_x = MU_y/P_y$?**

Review – Corner Solution

- Suppose that $MU_x/P_x > MU_y/P_y$ for all affordable bundles.
- This means that, **for every bundle we can buy**, \$1 spent on X will ALWAYS give higher MU than \$1 spent on Y.
- Therefore, we should spend money on X, i.e. we should consume only X.
- This is what a corner solution means.

Applications of the Consumer Theory

- Voucher vs Cash Subsidy
- Demand for Leisure and Supply of Labor
- Consumer Price Index

Choice with Composite Goods

- In previous analysis, a consumer has two choices: good X and good Y.
- We will introduce a **Composite Good**.
- Suppose that **good Y represents a composite good, then good Y includes every other good except good X.**

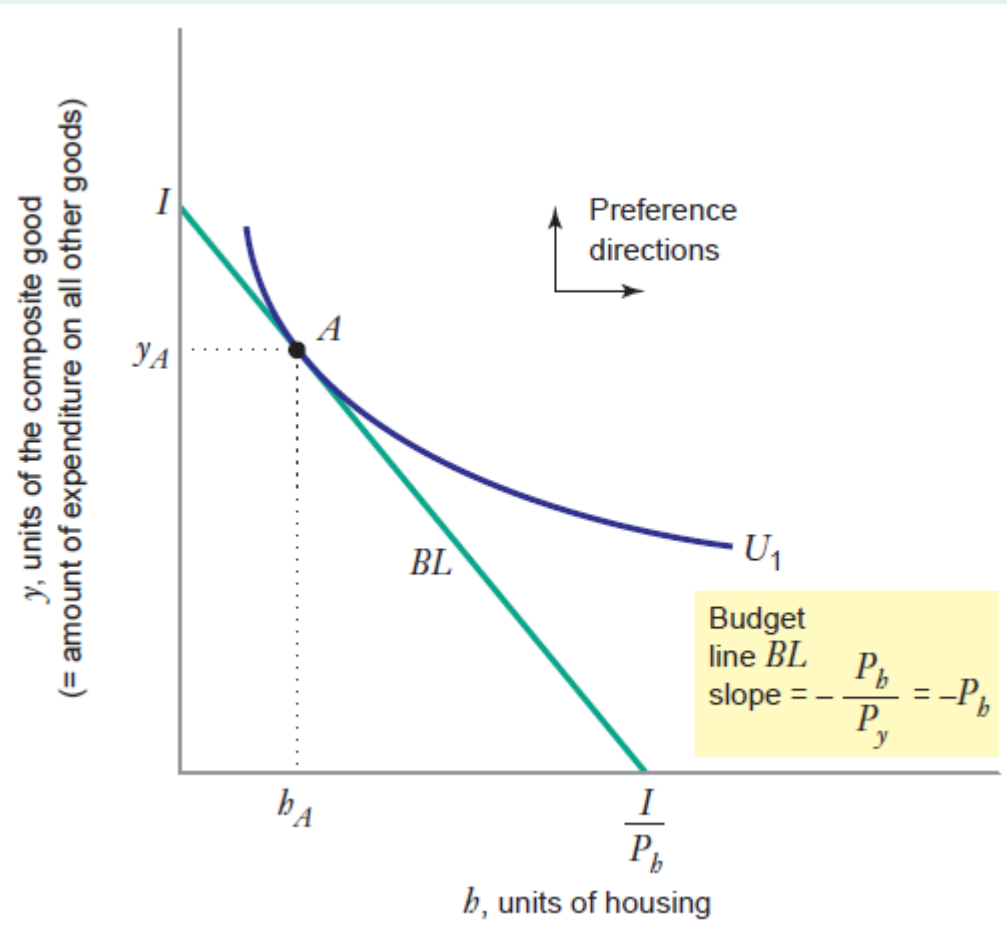
Choice with Composite Goods

- We will plot a composite good in place of good Y, i.e. on the vertical axis.
- We assume that its price is \$1, i.e. $P_y = 1$.
- Hence, the slope of the budget line becomes $-P_x/P_y = -P_x/1 = -P_x$.

Choice with Composite Goods

FIGURE 4.10 Optimal Choice of Housing (with Composite Good)

The horizontal axis measures the number of units of housing h . The price of housing is P_h . If the consumer has an income of I , he could purchase at most I/P_h units of housing (the intercept of the budget line on the horizontal axis). The vertical axis measures the number of units of the composite good y (all other goods). The price of the composite good is $P_y = 1$. If the consumer were to spend all his income on the composite good, he could purchase I units of the composite good. Thus, the intercept of the budget line on the vertical axis is I , the level of income. The budget line BL has a slope equal to $-P_h/P_y = -P_h$. Given the consumer's preferences, the optimal basket is A , where the consumer purchases h_A units of housing and spends y_A dollars on other goods.



App: Coupons and Cash Subsidies

- Governments often have programs (coupons and subsidies) aimed at helping the poor purchase more essential goods, e.g. food, housing, and education.
- **Cash Subsidies is essentially an increase in income of a consumer**, shifting his/her BL to the right.
- **Coupons/Vouchers permit consumers to buy more of a specific good only, partly shifting his/her BL to the right.**

App: Coupons and Cash Subsidies

FIGURE 4.11 Optimal Choice of Housing: Subsidy and Voucher

Consider two types of programs that might be implemented to increase the consumer's purchases of housing.

Income subsidy: If the consumer receives an income subsidy of S dollars from the government, the budget line moves from KJ to EG .

Housing voucher: If the government gives the consumer a voucher of S dollars that can only be spent on housing, the budget line moves from KJ to KFG .

If the consumer has the indifference map shown in the graph, he is indifferent between receiving an income subsidy of S dollars and a housing voucher worth S dollars. In either case, he will select basket B .

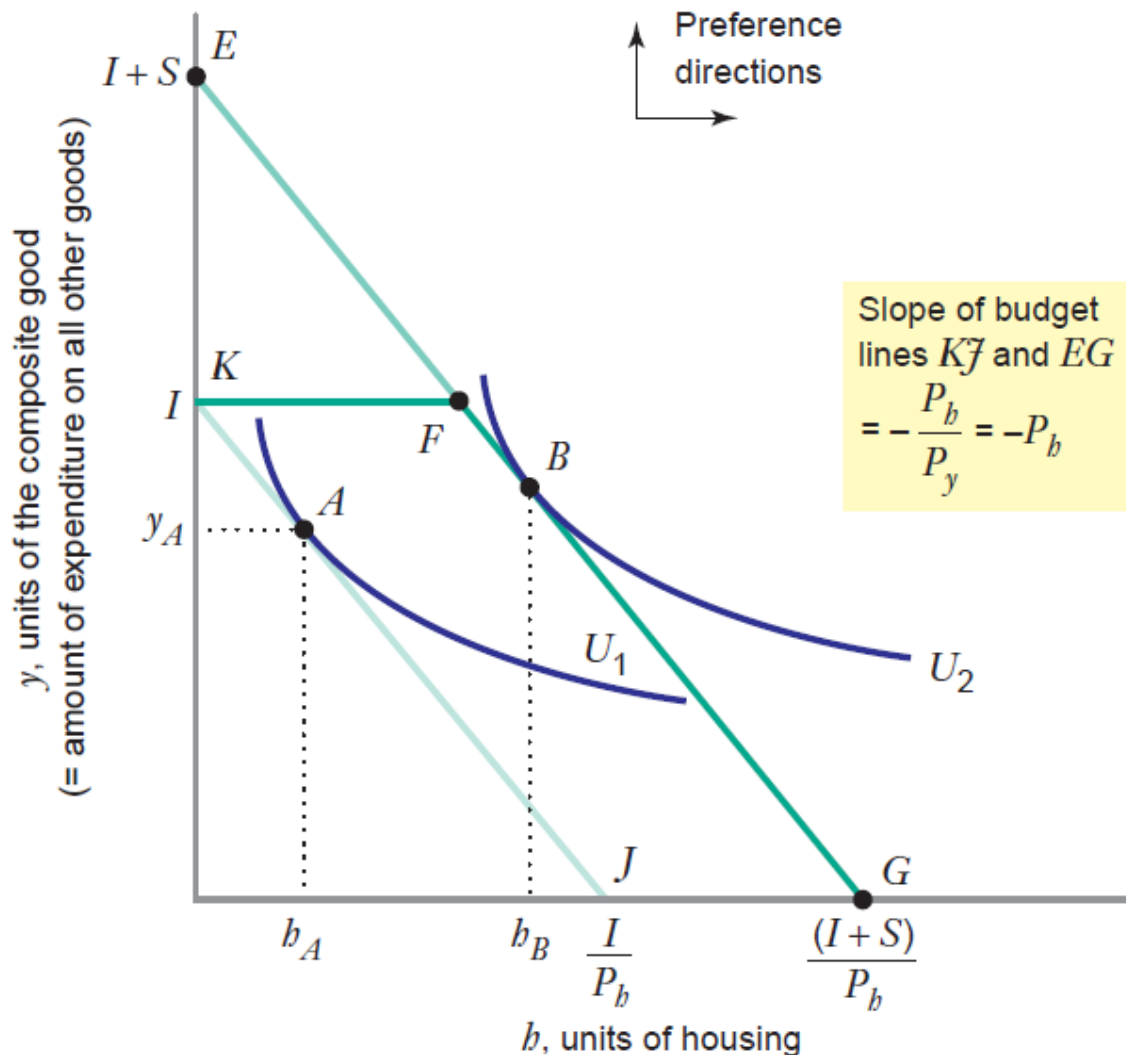
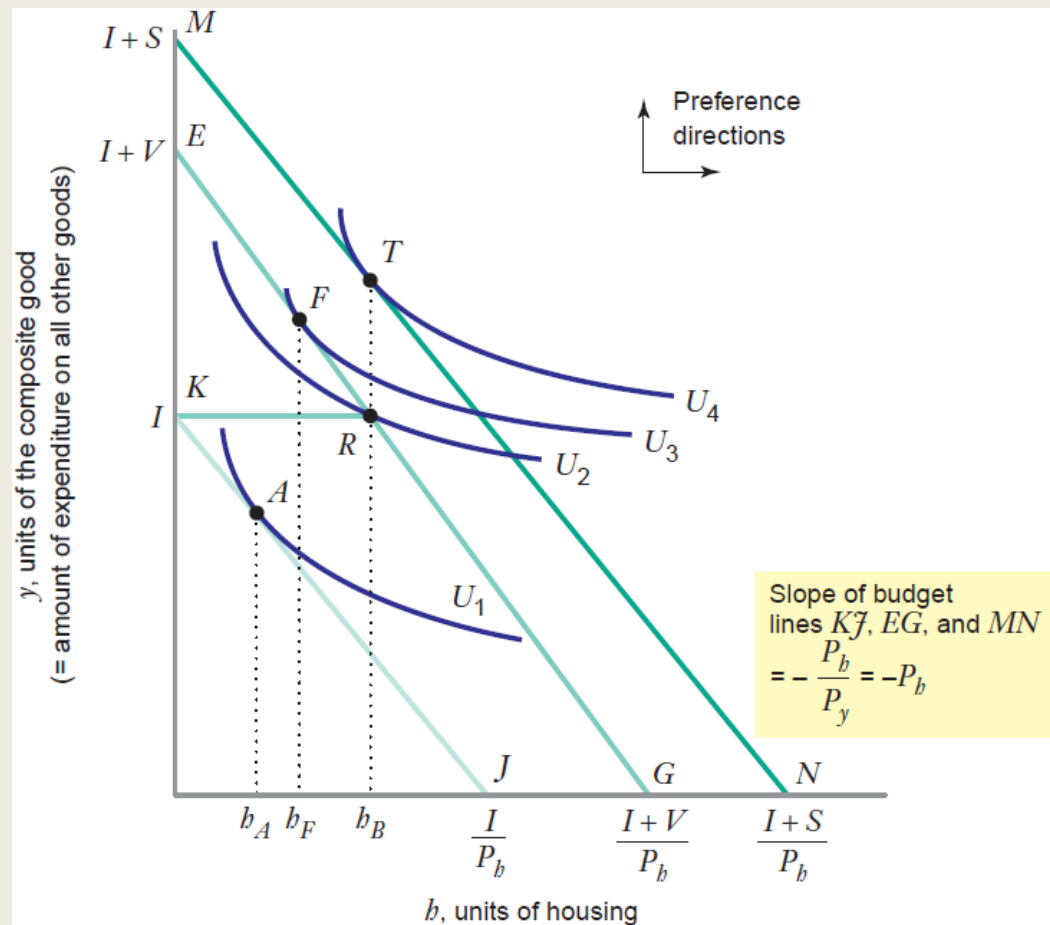


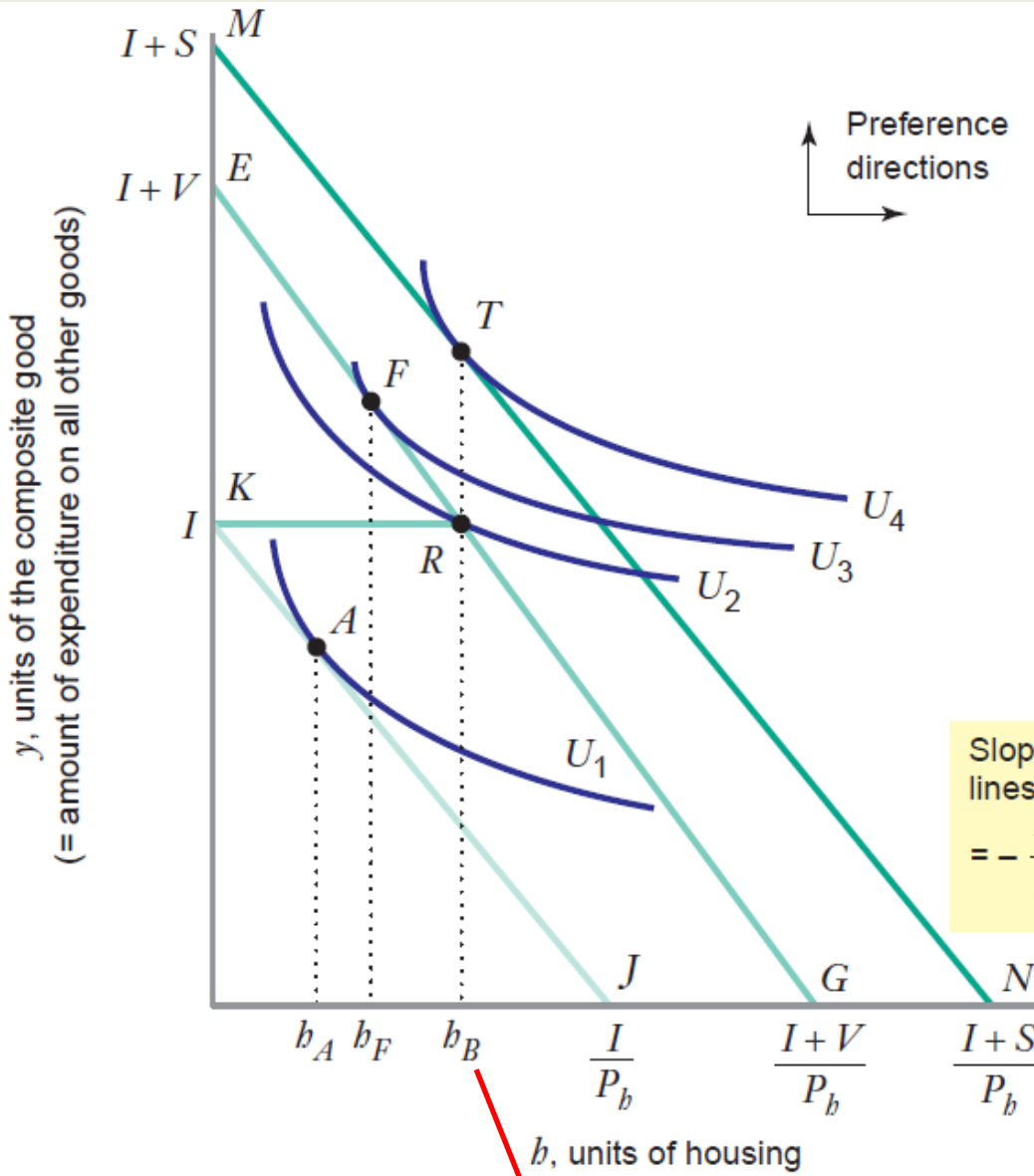
FIGURE 4.12
Optimal Choice of Housing: Subsidy and Voucher

If a consumer has an income I , he will choose h_A units of housing. The government could induce him to choose h_B units of housing with either of the following two programs:



- Give him an income subsidy of S dollars, moving the budget line to MN . The consumer chooses basket T .
- Give him a housing voucher worth V dollars that can be spent only on housing, moving the budget line to KRG . The consumer chooses basket R .

Since basket T lies on a higher indifference curve than basket R , a consumer with the preferences in the graph would prefer an income subsidy of S dollars over a housing voucher worth V dollars. However, the government might choose the voucher program because it would cost less. To induce the consumer to choose h_B units of housing, the government must spend $(S - V)$ dollars more if it chooses the cash subsidy program instead of the voucher program.



A is the original bundle.

T is the bundle when the govt gives a cash subsidy of S.

F is the bundle when the govt gives a cash subsidy of V.

R is a bundle when the govt gives a housing voucher of V.

Slope of budget lines KJ , EG , and MN
 $= -\frac{P_b}{P_y} = -P_b$

F gives higher utility than R. But, at F, the consumer buys less housing.

Suppose the govt wants h_B units of housing to be consumed. It can save money of $S-V$ if it chooses a voucher program instead of a cash subsidy.

App: Coupons and Cash Subsidies

Key Points

- Since a cash subsidy allows a consumer to buy whatever he wants and whatever he needs, this program tends to give higher utility.
- Coupons/Vouchers will save cost for the government, and are effective when the government wants to increase the consumption of a specific good.

App: Labor Supply Curve

- All workers face labor-leisure trade-off.
- They have 24 hours a day, which are allocated between working and resting.
- Workers value both income from working and their leisure time.
- MU for both are positive but diminishing.
- **Leisure is a normal good**: as income rise, people want to consume more leisure.

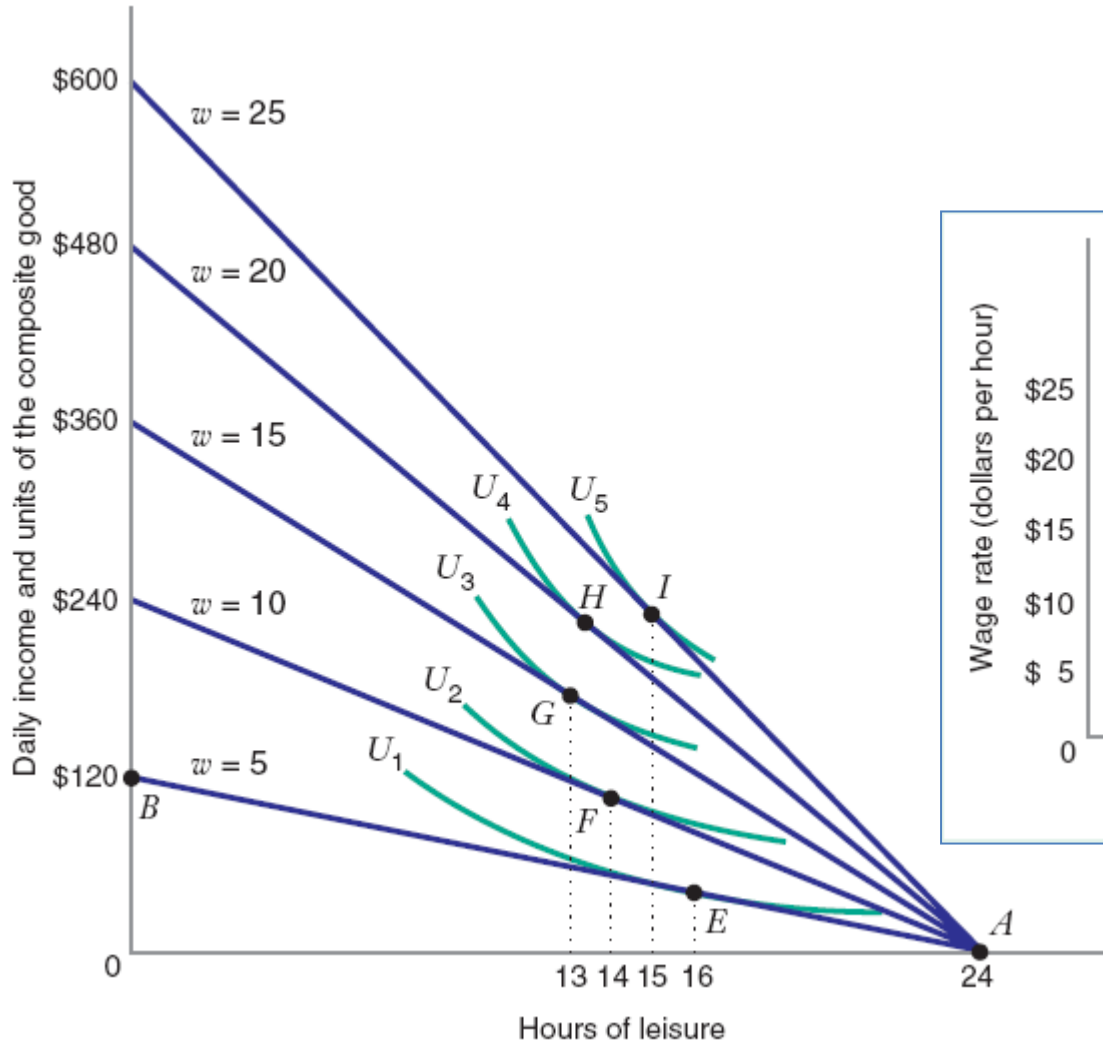
App: Labor Supply Curve

- **One can think of “wage” as “price of leisure”** since when we rest, we forego wage income.
- Now, if wage rises, leisure becomes more expensive.
- SE implies that workers will work more.
- IE implies that, with more money from higher wage, workers can work less and rest more.
- Two effects work in the opposite directions.

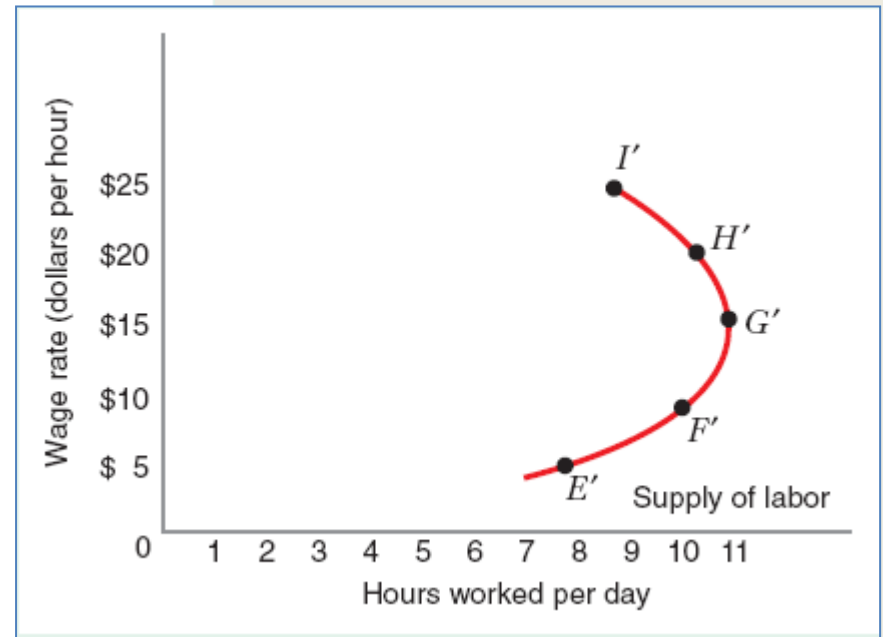
App: Labor Supply Curve

- **The labor supply curve slopes upward over the region where the $SE > IE$.**
- Because leisure is more expensive, workers substitute away from leisure and work more.
- **The labor supply curve bends backward over the region where the $IE > SE$.**
- Given a higher wage, workers now become richer. Since leisure is a normal good, more leisure is consumed, and workers work less.

App: Labor Supply Curve



Backward-Bending Labor Supply



Hrs of Leisure
Hrs of Work

App: Consumer Price Index (CPI)

- CPI is an index (a number) that tells us about the cost of living of typical consumers.
- It measures changes in the price level and can be used to calculate the inflation rate.
- CPI is a fixed-weight index, calculated from a fixed basket of goods.

App: Consumer Price Index (CPI)

- Since CPI is calculated from a fixed basket of goods, it ignores the fact that people would “substitute” expensive goods with cheaper goods.
- **This is called the “substitution bias” and causes CPI to overestimate the cost of living when the price level rises.**

App: Consumer Price Index (CPI)

Example

- Assume a consumer buys two goods: food with $P_{F,1} = \$3$ and clothing with $P_{C,1} = \$8$.
- At these prices, the consumer buy 80 units of food and 30 units of clothing, $(F, C) = (80, 30)$.
- Thus, the cost of living before the price change is \$480.

App: Consumer Price Index (CPI)

Example (cont)

- Suppose the prices of food and clothing rises; the new prices are $P_{F,2} = \$6$ and $P_{C,2} = \$9$.
- CPI assumes that the consumer would still buy the original bundle, $(F, C) = (80, 30)$. With this approach, the cost of living after the price change would be \$750.
- $CPI = 750/480 = 1.56$. Inflation = 56%.

App: Consumer Price Index (CPI)

Example (cont)

- In reality, there exists a bundle that could give the consumer the same happiness as $(F, C) = (80, 30)$.
- From the diagram, such bundle is $(40, 60)$ and costs \$720 after the price change.
- If CPI were to account for the substitution, CPI would be $720/480 = 1.5$. Inflation = 50%.

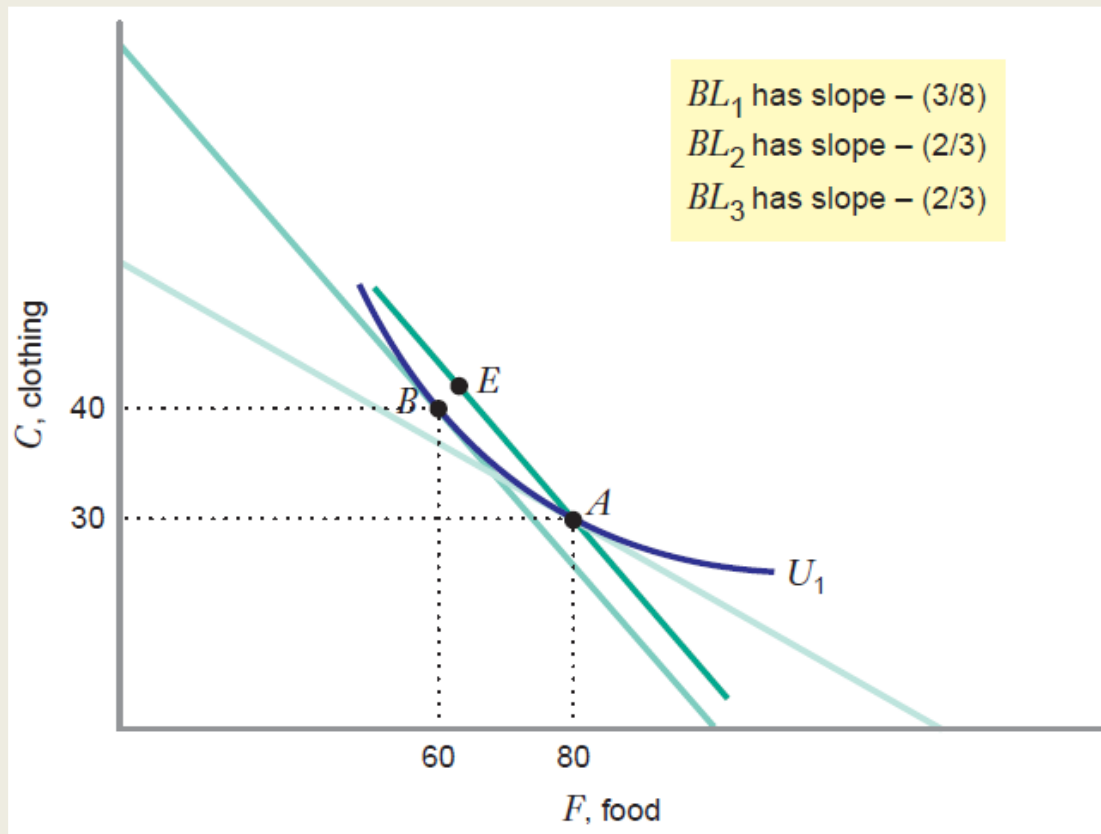


FIGURE 5.27 Substitution Bias in the Consumer Price Index

In year 1 the consumer has an income of \$480, the price of food is \$3, and the price of clothing is \$8. The consumer chooses basket A. In year 2 the price of food rises to \$6, and the price of clothing rises to \$9. The consumer could maintain his initial level of utility U_1 at the new prices by purchasing basket B, costing \$720. An ideal cost of living index would be 1.5 ($=\$720/\480), telling us that the cost of living has increased by 50 percent. However, the actual CPI assumes the consumer does not substitute clothing for food as relative prices change, but continues to buy basket A at the new prices, for which he would need an income of \$750. The CPI ($\$750/\$480 = 1.56$) suggests that the consumer's cost of living has increased by about 56 percent, which overstates the actual increase in the cost of living. In fact, if the consumer's income in year 2 were \$750, he could choose a basket such as E on BL_3 and achieve a higher level of utility than U_1 .