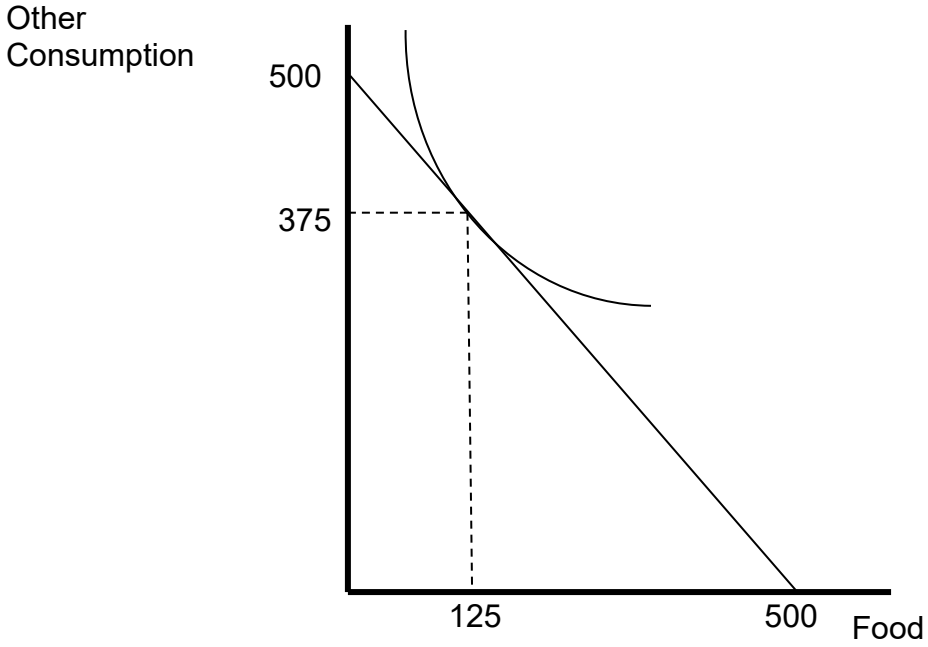
Lecture # 10 -- Applications of Utility Maximization

I. Subsidies

- In our next example, we compare in-kind transfers to subsidies
- Concerned about access to food, government officials are considering two alternative plans to help improve nutrition.
    - *Food Vouchers (e.g. a non-matching grant)*: Give each family a $100 voucher for usable for food only
    - *Food subsidy (e.g. a matching grant)*: subsidize food to reduce the price to consumers
        - A $1 "basket" of food now costs $0.50
- Evaluate these plans for typical low-income family:
    - $500 income per month
    - Spends $125/month on food

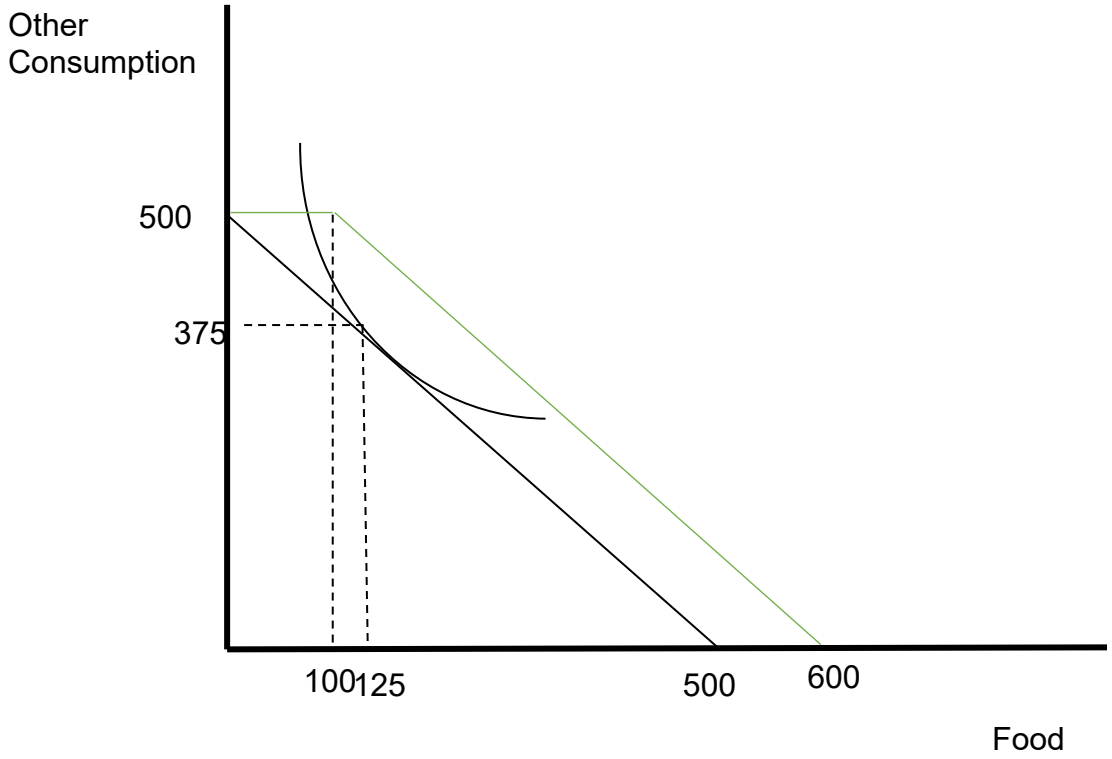
1) Draw the initial budget constraint

- Draw the budget constraint
    - A family can spend up to $500 on other consumption and up to $500 on food.
    - Note that these endpoints are what is important for the budget constraint – we want to show *what is possible*, not just what the consumers actually do.
- Draw the indifference curve
    - The typical low-income family chooses to purchase $125 worth of food.
    - This choice leaves them with $375 to spend on other goods.
    - This is shown by drawing an indifference curve tangent to the budget constraint at 100 units of food.



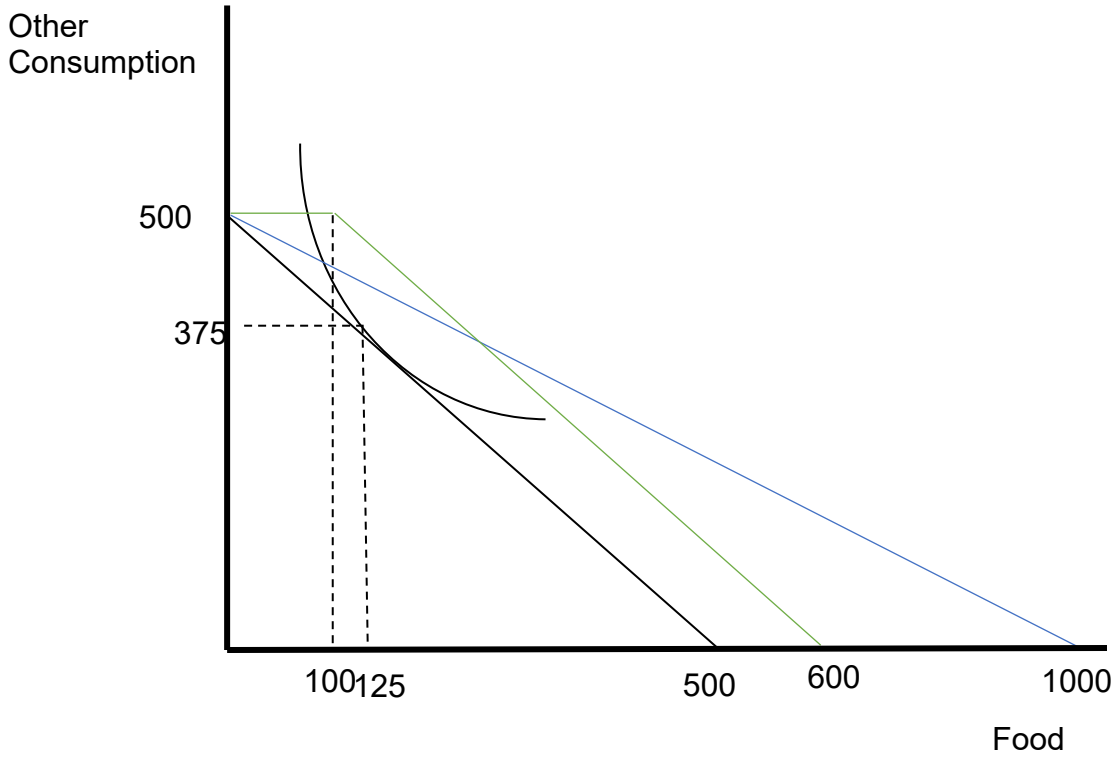
2) Add the budget constraint for the voucher

- With the voucher, the family can purchase up to $600 worth of food, and can purchase $100 worth of food even if they consume $500 of other goods.
- Thus, the voucher is like income, but with a restriction that it can only be used to purchase food (green line).



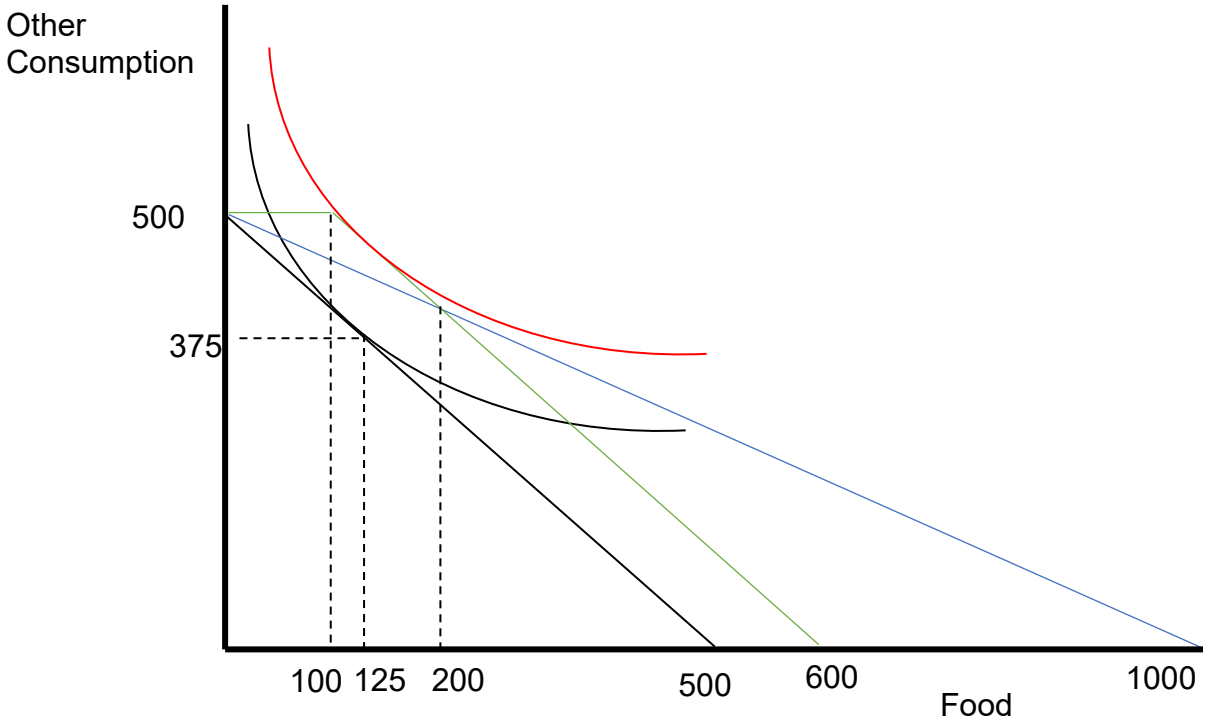
3) Add the budget constraint for the subsidy

- With the subsidy, a typical family's income goes twice as far.
    - They can purchase $1,000 worth of food with their $500 income. Thus, the price of a unit of food falls to $0.50.
    - The budget constraint rotates outward (blue line).



4**) Compare the two policies**

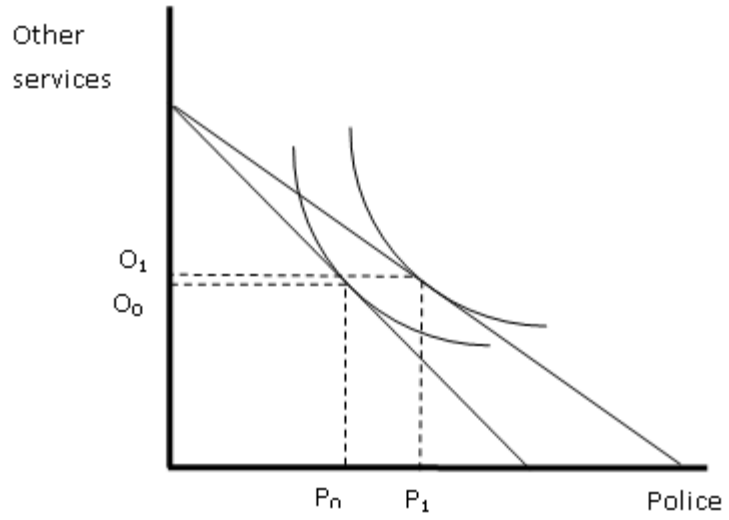
- The key to this problem is that the budget constraints intersect at $200 worth of food. (I will give you this information)
  - With the voucher, consumers get $100 worth of food free, and purchase an additional 100 units for $1 each. They spend $100 to get 200 units of food.
  - Under the subsidy, the family can also purchase 200 units of food for $100, since each unit costs the family $0.50.
- Start with the indifference curves *before* policy – *we know where these go*.
  - Without either policy, a typical family purchases just $125 worth of food.
  - This puts them well to the left of the intersection of the two budget constraints.
- The new indifference curve (red) should be consistent with the original.
  - Remember, for example, that indifference curves cannot cross.
- Now, compare the position of these indifference curves to where the budget constraints for the two policies cross:
  - In this situation, they will prefer the vouchers. Note on the graph that, to the left of the intersection, the budget constraint for the vouchers is higher. I've added an indifference curve consistent with this outcome.



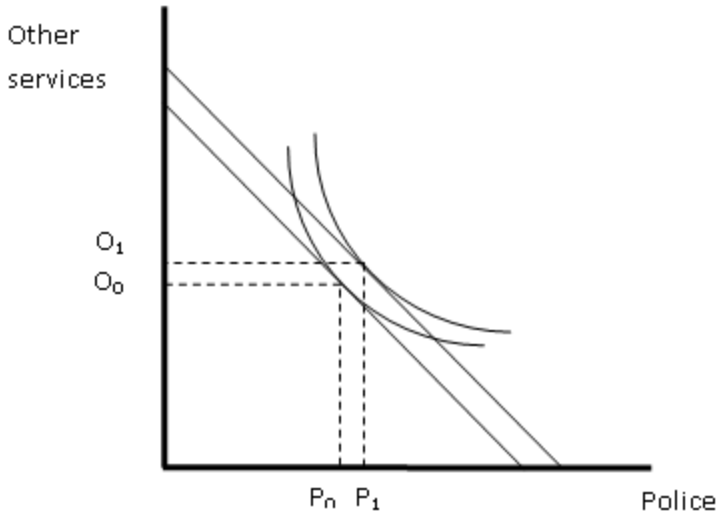
- The intuition here is that, since the typical family doesn't purchase a lot of food, the income it saves under the subsidy is not as valuable as the $100 the family receives under the voucher.
  - A family needs to purchase at least $200 worth of food for the subsidy to provide at least $100 worth of savings.
- Finally, note that while the family likely consumes less than $200 worth of food, the family will choose more than $125 worth of food with the voucher.
  - The voucher provides the family with extra income. Because of the extra income, consumption of both food and other goods increases.

II. Matching vs. Non-matching Grants

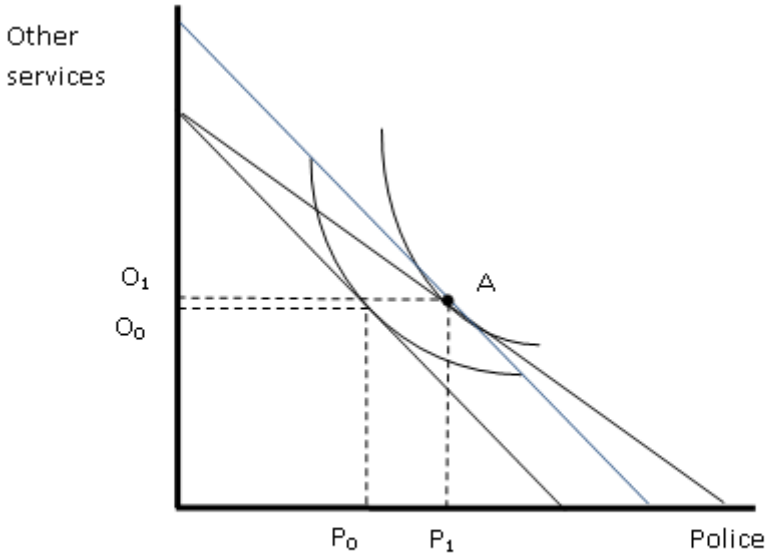
- Here we consider how direct aid compares to a subsidy.
- Matching grants – the federal government subsidizes local spending. For example, for every $2 the local government spends, the federal government adds $1.
    - The figure below illustrates a subsidy for police services.



- Non-matching grants – the federal government gives the local government money to spend without restriction.
    - To simply when we combine graphs, the figure below assumes absolutely no restriction. Since we are not examining a community near the corner solution, this is not a problem.
        - More common would be a tied grant, in which the federal government gives the local government money to spend on a specific use, but provides a fixed amount no matter what the local government spends on its own. This would be similar to our education voucher example from the last class.
    - Note that, while spending for police protection does increase, so does spending for other services. The community is able to reallocate some of what it previously spent on police to other services.



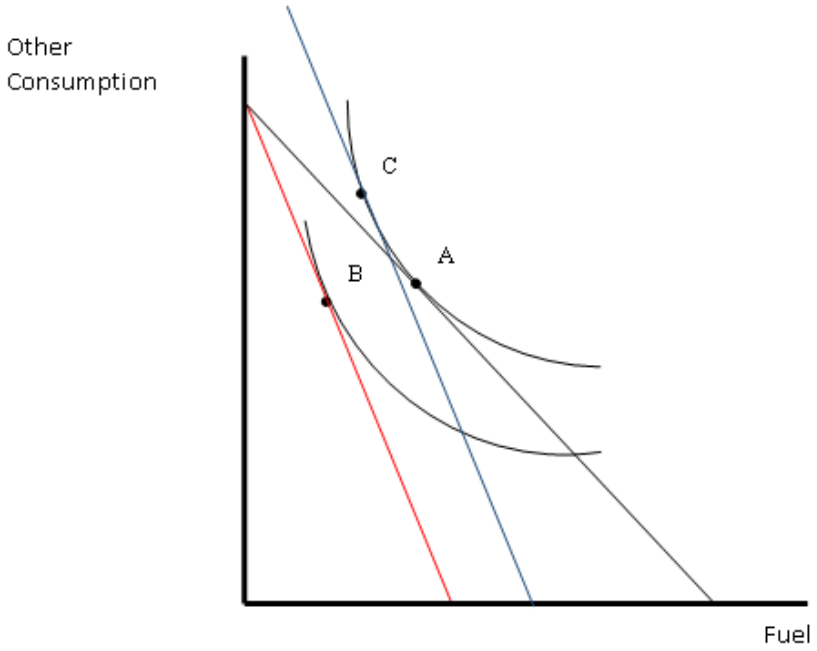
- When we combine both on a single graph, we see that, for a given expenditure level, utility is higher with the non-matching grant.
    - The blue line represents a block grant that costs as much as the matching grant.
        - We know the costs are the same because point A is on both budget lines.
        - Because the blue line goes through the indifference curve, a higher indifference curve (e.g. higher utility) is possible with the non-matching grant.
    - *That is, there is a tradeoff between encouraging a particular change in expenditure and achieving the highest level of satisfaction for a given expenditure.*
    - Also note that, with the non-matching grant, when the constraint does not influence behavior, consumption of both goods will increase.



III. Income and Substitution Effects

- The intuition of what happens depends on two effects. When prices change, two things happen:
    - The purchasing power of the consumer changes (real income changes).
        - For example, if prices fall, you can buy the same bundle that you had before for less money. The money left over is your added purchasing power.
    - Relative prices change (slope of budget constraint changes).
        - Consume more of the cheaper good, less of the expensive good.
- The income effect is the change in the quantity demanded of a good due to the change in purchasing power resulting from a price change.
- The substitution effect is the change in the quantity demanded due ***solely*** to the change in relative prices.
    - Found by changing the person's income to hold ***utility constant*** and ask what bundle they will now consume.
    - The substitution effect always goes in the opposite direction of the price change.
- In the example above, the block grant has only an income effect.
- In contrast, the matching grant has both an income effect and a substitution effect.
    - This substitution effect encourages the recipient to choose more of the favored good

- The figure below illustrates substitution and income effects, using the example of removing fuel subsidies.
    - Removing the fuel subsidy is like a price increase. The budget line rotates from the black line to the red line.
        - Consumption changes from point A to point B. This would be the *total effect* of the price increase. Note that both consumption of fuel and other goods falls.
    - To compensate people for higher prices, suppose the government gave citizens income. If this income perfectly compensated them for the price increase, the new budget constraint would be tangent to their original indifference curve. This is the blue line on the graph.
        - Consumption ends at point C. Going from A to C is the *substitution effect.* Because the blue line compensates people for lost purchasing power, it is the change in consumption due solely to the change in prices. Higher prices encourage people to conserve fuel.
        - Going from C to B is the *income effect*. These are the points on the two parallel lines. It is the change in consumption due solely to the change in purchasing power.
            - Note that it isn't necessary to give the family enough money to be able to once again purchase point A. That would require more money, and would make the family better off, as in the matching/non-matching grant example above.
            - The intuition is that, even if we gave the family enough money to purchase bundle A, they would no longer choose that bundle.
            - Since prices are now higher, they would use some of the extra income to purchase other goods instead.



- For a numerical example showing substitution and income effects, click here. Note that calculating the numbers, as is done in the example, is not required for this class. However, seeing the numbers might help to clarify some of the concepts.