Lecture 5 - The Expenditure Function: An Application to the Economics of Food Stamps

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1 The Expenditure Function

We are next going to look at a potentially richer (and better) application of consumer theory: the value of Food Stamps.

Before that, we need some more machinery.

So far, we've analyzed problems where income was held constant and prices changes. This gave us the Indirect Utility Function.

Now, we want to analyze problems where utility is held constant and expenditures change. This gives us the Expenditure Function.

These two problems are closely related – in fact, they are '*duals*.'

Most economic problems have a *dual problem*, which means an inverse problem.

For example, the dual of choosing output in order to maximize profits is minimizing costs at a given output level; cost minimization is the dual of profit maximization.

Similarly, the dual of maximizing utility subject to a budget constraint is minimizing expenditures subject to a utility constraint. Minimizing costs is the dual of maximizing utility.

1.1 Setup of expenditure function

Consumer's primal problem: maximize utility subject to a budget constraint.

Consumer's dual problem: minimizing expenditure subject to a utility constraint (i.e. a level of utility you must achieve)

This dual problem yields the "expenditure function": the minimum expenditure required to attain a given utility level.

Setup of the dual

1. Start with:

$$\max U(x, y)$$
$$s.t.\ p_x x + p_y y \quad \leq \quad I$$

2. Solve for x^*, $y^* \Rightarrow v^* = U(x^*,\, y^*)$ given p_x, p_y, I.

   $V^* = V\,(p_x, p_y, I)$

   V is the indirect utility function.

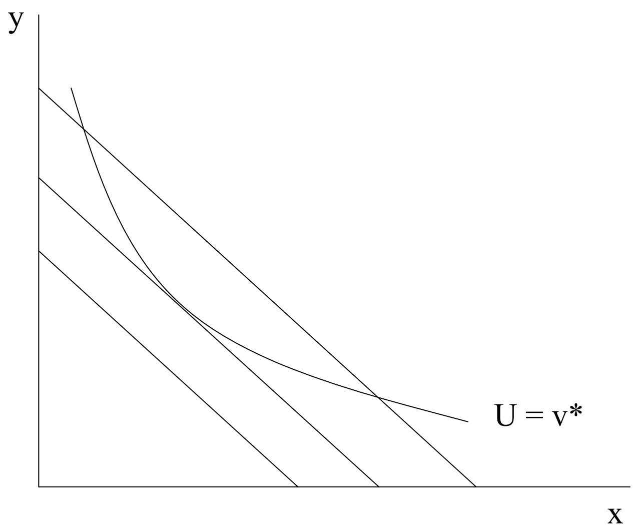
3. Now solve the following problem:

$$\min p_x x + p_y y$$
$$s.t. U(x, y) \quad \geq \quad v^*$$

   gives $E^* = p_x x^* + p_y y^*$ for $U(x^*,\, y^*) = v^*$.

   $E^* = E\,(p_x, p_y, V^*)$

1.2 Graphical representation of dual problem



The dual problem consists of choosing the lowest budget set tangent to a given indifference curve.

Example:

$$\begin{aligned} \min E &= p_x x + p_y y \\ s.t.\ x^{.5} y^{.5} &\geq U_p \end{aligned}$$

where U_p comes from the primal problem.

$$L = p_x x + p_y y + \lambda \left(U_p - x^{.5} y^{.5} \right)$$

$$\begin{aligned} \frac{\partial L}{\partial x} &= p_x - \lambda .5 x^{-.5} y^{.5} = 0 \\ \frac{\partial L}{\partial y} &= p_y - \lambda .5 x^{.5} y^{-.5} = 0 \\ \frac{\partial L}{\partial \lambda} &= U_p - x^{.5} y^{.5} = 0 \end{aligned}$$

The first two of these equations simplify to:

$$x = \frac{p_y y}{p_x}$$

We substitute into the constraint $U_p = x^{.5} y^{.5}$ to get

$$\begin{aligned} U_p &= \left(\frac{p_y y}{p_x}\right)^{.5} y^{.5} \\ x^* &= \left(\frac{p_y}{p_x}\right)^{.5} U_p, \quad y^* = \left(\frac{p_x}{p_y}\right)^{.5} U_p \\ E^* &= p_x \left(\frac{p_y}{p_x}\right)^{.5} U_p + p_y \left(\frac{p_x}{p_y}\right)^{.5} U_p \\ &= 2 p_x^{.5} p_y^{.5} U_p \end{aligned}$$

1.3 Expenditure function: What is it good for?

The expenditure function is an essential tool for making consumer theory operational for public policy analysis.

Using the expenditure function, we can 'monetize' otherwise incommensurate trade-offs to evaluate costs and benefits.

The need for this type of calculation arises frequently in policy analysis and is the basis for most cost-benefit analyses.

As we have stressed earlier the semester, we don't know that 'utils' are. This presents a problem if we want to determine *how much* harm or benefit a certain policy imposes on an individual.

The expenditure function gives us a convenient way to potentially circumvent this problem.

Though we don't know how to measure utils, we do know that money increases utility (i.e., through the indirect utility function by relaxing the budget constraint).

Using the expenditure function, we can figure out *how much money* we would have to give or take away from the consumer to leave her equally well off after a policy is implemented. So, the expenditure function permits us to calculate a 'money metric.'

Example: We might consider a policy of banning sales of new Sport Utility Vehicles because they cause a disproportionate share of air pollution and increase oil dependence.

How much harm does this policy do to potential buyers of SUVs?

We can't answer this question in utils. We can potentially answer it by determining how much money we would need to give these buyers to leave them equally well off as before the ban. This calculation depends on the expenditure function.

Let's say that consumer utility of would be SUV-buyers prior to the ban is given by $\bar{U}$ and expenditures by:

$$E_{pre} = E\left(p_a, p_{suv}, \bar{U}\right)$$

To attain the same level of utility after the ban, would-be buyers would need this much :

$$E_{post} = E\left(p_a, p_{suv} = \infty, \bar{U}\right).$$

The difference $E_{post} - E_{pre}$ is the amount of money that we would need to compensate SUV buyers to leave their utility unaffected by the ban.

Of course, we don't usually *know* the expenditure function, so this isn't as easy in practice as it is in theory.

But it turns out that if we have an estimate of the compensated elasticity of demand for a good, this is often enough to make a rough calculation

You'll see this in the Whitmore article.

1.4 Relation between Expenditure function and Indirect Utility function

How do solutions to Dual and Primal problems compare?

Examining the relationship between the expenditure and indirect utility functions:

$$\begin{aligned} V(p_x, p_y, I_0) &= U_0 \\ E(p_x, p_y, U_0) &= I_0 \\ V(p_x, p_y, E(p_x, p_y, U_0)) &= U_0 \\ E(p_x, p_y, V(p_x, p_y, I_0)) &= I_0 \end{aligned}$$

Expenditure function and Indirect Utility function are *inverses* one of the other.

Let's verify this in the example we saw above.

Recall that primal gave us factor demands $x_p^*,\ y_p^*$ as a function of prices and income (not utility).

Dual gave us expenditures (budget requirement) as a function of utility and prices.

$$x_p^* = \frac{I}{2p_x},\ y_p^* = \frac{I}{2p_y},\ U^* = \left(\frac{I}{2p_x}\right)^{.5}\left(\frac{I}{2p_y}\right)^{.5}$$

Now plug these into expenditure function:

$$E^* = 2U_p p_x^{.5} p_y^{.5} = 2\left(\frac{I}{2p_x}\right)^{.5}\left(\frac{I}{2p_y}\right)^{.5} p_x^{.5} p_y^{.5} = I$$

Finally notice that the multipliers are such that the multiplier in the dual problem is the inverse of the multiplier in the primal problem.

$$\begin{aligned} \lambda_P &= \frac{U_x}{p_x} = \frac{U_y}{p_y} \\ \lambda_D &= \frac{p_x}{U_x} = \frac{p_y}{U_y} \end{aligned}$$

1.5 Demand Functions

Now, let's use the Indirect Utility function and the Expenditure function to get Demand functions.

Up to now, we've been solving for:

- Utility as a function of prices and budget
- Expenditure as a function of prices and utility

Implicitly we have already found demand schedules because a demand schedule is immediately implied by an individual utility function. For any utility function, we can solve for the quantity demanded of each good as a function of its price, holding the price of all other goods constant *and* holding *either* income *or* utility constant.

1.5.1 Uncompensated ('Marshallian') demand – Holding *income* constant

In our previous example where:

$$U(x, y) = x^{.5}y^{.5}$$

we derived:

$$\begin{aligned} x(p_x, p_y, I) &= .5\frac{I}{p_x} \\ y(p_x, p_y, I) &= .5\frac{I}{p_y} \end{aligned}$$

In general we will write these demand functions (for individuals) as:

$$
\begin{aligned}
x_1^* &= d_1(p_1, p_2, ..., p_n, I) \\
x_2^* &= d_2(p_1, p_2, ..., p_n, I) \\
&... \\
x_n^* &= d_n(p_1, p_2, ..., p_n, I)
\end{aligned}
$$

We call this "Marshallian" demand after Alfred Marshall (who first drew demand curves). You are also welcome to call it uncompensated demand.

1.5.2 Compensated ('Hicksian') demand – Holding *utility* constant

Similarly we derived that:

$$
\begin{aligned}
x(p_x, p_y, U) &= \left(\frac{p_y}{p_x}\right)^{.5} U_p \\
y(p_x, p_y, U) &= \left(\frac{p_x}{p_y}\right)^{.5} U_p
\end{aligned}
$$

In general we will write these demand functions (for individual) as:

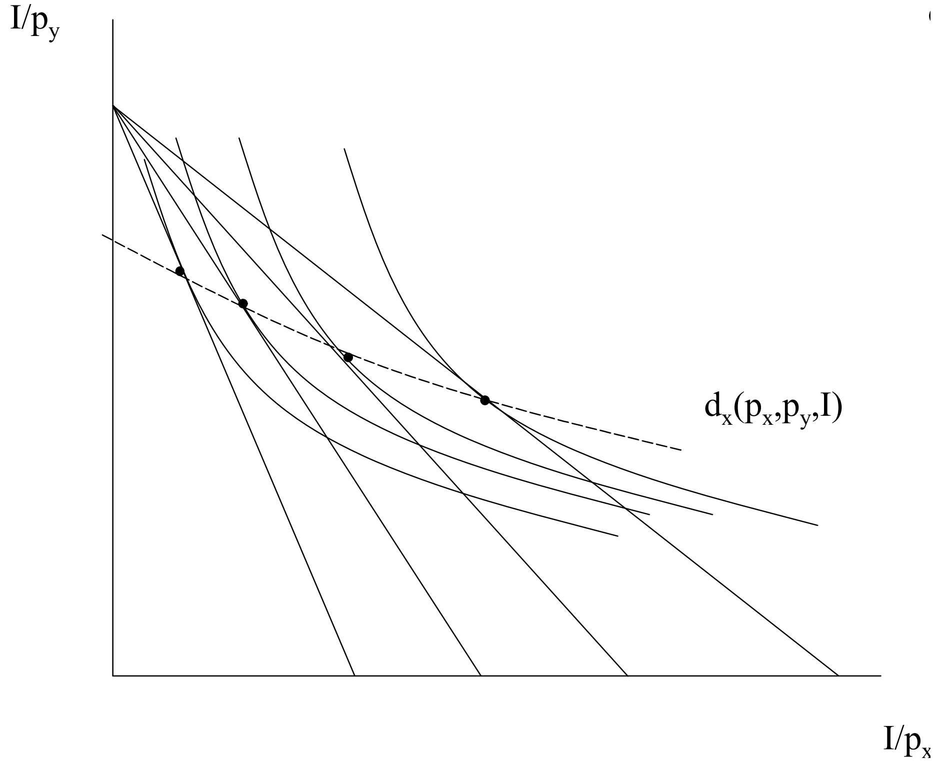
$$
\begin{aligned}
x_{1,c}^* &= h_1(p_1, p_2, ..., p_n, U) \\
x_{2,c}^* &= h_2(p_1, p_2, ..., p_n, U) \\
&... \\
x_{n,c}^* &= h_n(p_1, p_2, ..., p_n, U)
\end{aligned}
$$

This is called "Hicksian" or compensated demand after John Hicks.

This demand function takes **utility as an argument, not income**. This turns out to be an important distinction.

1.6 Graphical derivation of demand curves

A demand curve for x as a function of p_x

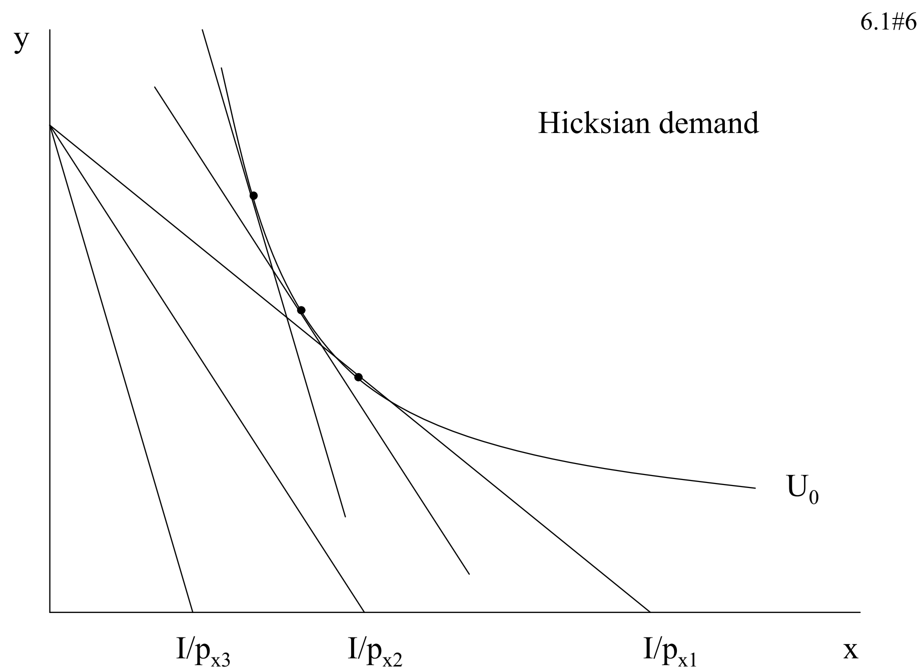


So a demand function is a set of tangency points between indifference curves and budget set holding I and p_y (all other prices) constant.

What type of demand curve is this?

-Marshallian ('uncompensated') $d_x(p_x, p_y, I)$. Utility is not held constant, but income is.

Below is a Hicksian ('compensated') $h_x(p_x, p_y, I)$ demand curve. Here, utility is held constant, which means that the budget set must rotate as prices change to keep the consumer on the same indifference curve.



Now, we have the tools to analyze the Food Stamp program.

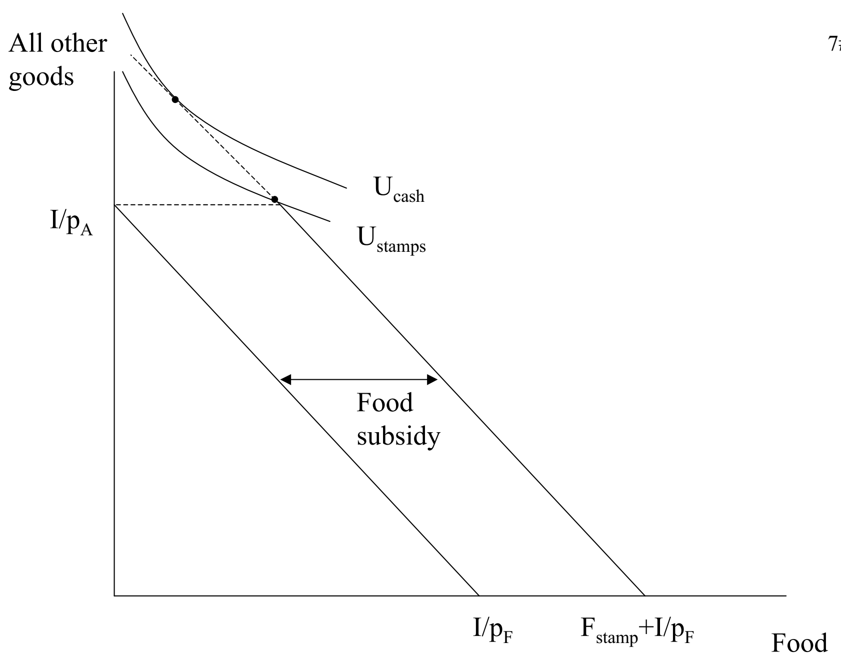
2 In-Kind Transfers: An application of consumer theory

- As noted in a prior lecture, there are numerous 'in-kind' (versus cash) transfers made by government to citizens:
  - Food stamps.
  - Public housing.
  - Child care assistance.
  - Medical care.
  - Schooling.
- These transfers have two economic effects:

– They shift the budget set outward so that the consumer can potentially buy more of the subsidized good *and* all other goods.

– They place a kink in the budget set at the subsidy level of the in-kind good–thus they 'force' consumption of at least the threshold level of the in-kind good.

- See figure below:



- What are the consequences of this type of transfer for consumer welfare?

– For a consumer who consumes on non-kinked section of new budget set?

– For a consumer who consumers at the kink?

– Can this transfer make a consumer worse off?

2.1 Food-stamps

2.1.1 The U.S. Food Stamp Program: Some facts

- [Now called 'SNAP' — Supplemental Nutrition Assistance Program']
- Administered by the U.S. Department of Agriculture, which is not normally considered a welfare agency.
- In June of 2010, the program served 41.3 million participants (13.4 percent of U.S. population!) in 19.1 million households.
- Distributed an average of $133 per month per participant, and $288 per household.
- Thus, average annual benefit per person is about $1,600.
- Benefit costs for 2009 projected at $66 billion (that's 98% more than 2007!)
- Administrative costs typically add another 9% ($5.9 billion)

Why use in-kind transfers instead of cash transfers?

2.1.2 Advantages of in-kind transfers

1. Guarantee nutrition?
2. Prevent use of cash on drugs, alcohol cigarettes$\Longleftrightarrow$Paternalism: invalid preferences of individuals
3. What is "valid" use of public money? Food versus recreation.
4. Political necessity (for public support).

2.1.3 Disadvantages of in-kind transfers

1. Restrict/distort choice. Economists think this is a bad.
2. Administration/enforcement costs. Estimated that **half** of the cost of food stamp administration is fraud prevention.
3. Who is made better off for enforcing this restriction? (Does it pass a Pareto test?)
4. Creation of underground market for trade in stamps ('shadow market').
5. Creation of criminals.

3 The value of food stamps: Policy questions

Key policy questions to consider in comparing cash to in-kind food stamp transfers?

1. Are recipients "distorted?" That is, do they indeed spend more on food than they otherwise would if food stamps were given in cash?
2. Does cash versus in-kind have any effect on nutrition?
3. How costly are cash versus in-kind programs to administer?
4. What share of food stamps are 'trafficked'? And at what price?

3.1 The value of food stamps: the Whitmore study.

- Analyzes a pair of food-stamp experiments in San Diego and Alabama implemented in the early 1990s by the U.S. Department of Agriculture.
- "Cash out" experiments: Food stamp benefits paid in cash to a random subset of recipients instead of food stamp coupons.

- Idea: Compare food and other expenditures among households receiving stamps and equivalent households randomly assigned cash instead.

- Notice: There is no pre-period (i.e., baseline data), so this is not a "difference-in-difference" comparison (unlike Card and Krueger or Jensen and Miller).

- Is that a problem? Not necessarily. If the randomization is valid and we have a reasonably sized sample, we can be fairly confident that the counterfactual outcomes for the treatment and control groups are comparable. In that case, we can compare outcomes in the post period to assess the counterfactual for either group.

- For concreteness, let $Z = 1$ denote cash and $Z = 0$ denote stamps. Let Y_0 equal food expenditures if assigned to stamps and Y_1 equal food expenditures if assigned to cash. If the randomization is valid, $E(Y_1|Z=1) = E(Y_1|Z=0)$ and $E(Y_0|Z=1) = E(Y_0|Z=0)$, which implies that $E(Y_1 - Y_0|Z=1) = E(Y_1|Z=1) - E(Y_0|Z=0)$. Hence, the contrast in food expenditures in the treatment ($Z = 1$) and control ($Z = 0$) groups gives the causal effect of cash versus stamps on food expenditures.

3.2 'Distorted' versus 'non-distorted' households

- Would we expect all or even most households to be made worse off by food stamps? Answer: No. Low income families spend a considerable share of their income on food–*about 30 percent of the household budget in the Whitmore sample, which is twice what average Americans spend.*

- And food stamps are not that generous: \$111 - \$370 per month for households of 1 - 4 children at the time of the study. This is less than 1/3rd of the typical low-income household budget.

- How do you measure which households are 'distorted?'

  In a pre-post experiment, this would be easy. How? Look at households that decreased their food consumption after they were 'cashed out.' They were distorted by the program.

  In Whitmore's study, this is harder because there is no baseline data.

- Whitmore's first approach is to label a household distorted if its monthly food spending is less than it's food stamp amount.

  For the cash-recipient households, this poses no problem.

  For the check recipients, this means that they don't spend all of their food stamps.

- By this definition, **18 to 21 percent** of households are distorted.

- What does consumer theory say about these households? By the axiom of non-satiation, they should not exist. Or alternatively, they exist but they are selling stamps to the black market.

- Or, perhaps they are disorganized; the USDA reports that about 5 percent of all stamps distributed are unspent in each year. This is potentially consistent with 20 percent of households spending only 75 percent of their stamps.

- Whitmore uses a number of other definitions, but they lead to similar conclusions.

- SEE WHITMORE TABLES 2a and 2b. Using the difference in food spending among 'distorted' households that do and do not receive the cash grant, Whitmore calculates a rough measure of the 'distorted share' of food stamp benefits. This is simply the difference between what they would have spent on food and what they did spend on food divided by what they would have spent:

$$DS = \frac{F_s - F_c}{F_c},$$

where c stands for cash transfer and s is for stamps.

- Note the counter-factual assumption here (made valid by the experimental design): the stamp households would have spent the same on food as the cash households except for the stamp restrictions.

3.3 Estimating the welfare loss

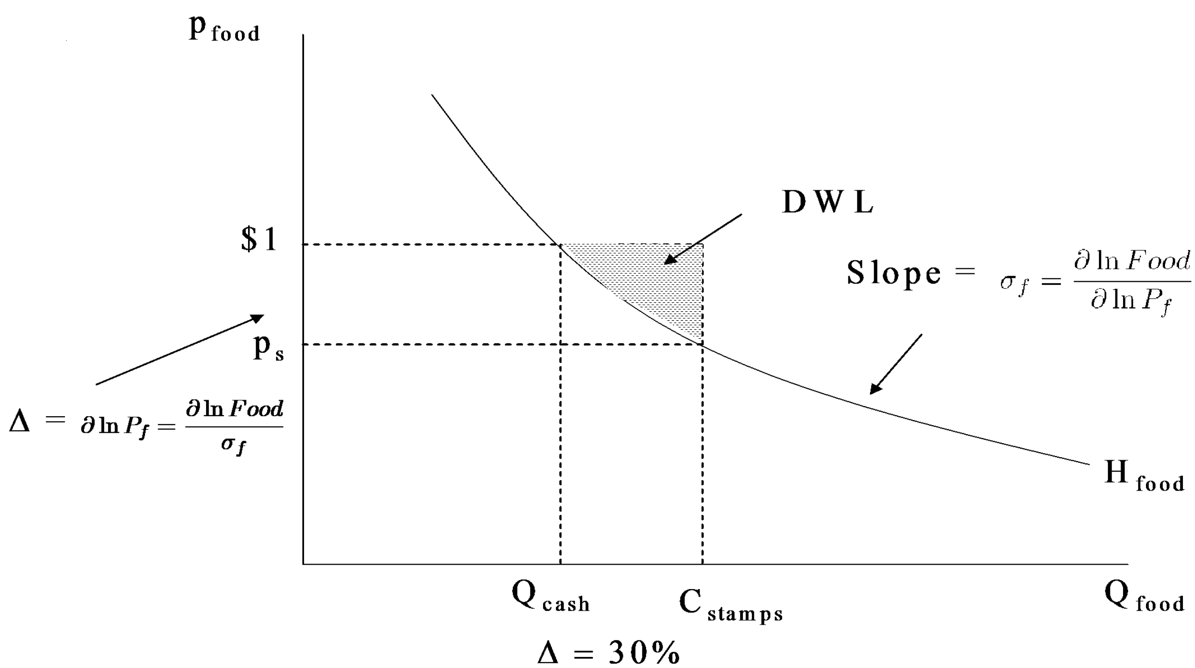
- Is this amount $F_s - F_c$ equal to the welfare loss for these households?
- No. They still value the food by some positive amount, even if they would have preferred to spend the money on other goods. So $F_s - F_c$ strictly exceeds the welfare loss (a deadweight loss, DWL).
- To calculate the DWL, it's useful to refer to the diagram below plotting using the compensated (Hicksian) demand function for food.
- What's the marginal utility of $1 food for 'non-distorted' consumers relative to all other goods? Must be $1 at the margin.
- We know how much extra food the 'distorted households are consuming.' Roughly 1/3rd more than they want to.
- So, if we know the slope of the compensated demand function, we could figure out how much utility they are losing *in cash equivalent terms*. That is, how much more cash they'd need to be as well off as the households receiving cash transfers instead of stamps.
- [Subtle point: You may be wondering, since utility functions are only defined up to a monotone transformation, doesn't this mean the welfare loss calculations *in dollars* are not uniquely defined for a given

utility function. Actually, it does not.

Consider the following thought experiment. Utility functions $U_1(\cdot)$ and $U_2(\cdot)$ are identical for consumer theory; $U_2(\cdot)$ is a monotone transformation of $U_1(\cdot)$. Hence, these two utility functions have identical preference rankings and choose the same bundles of goods for given income and prices. If we gave $U_1(\cdot)$ and $U_2(\cdot)$ each \$100 in cash, they would consume identical bundles to one another. Likewise, if we gave them \$100 in food stamps, they would consume identically.

Imagine that $U_1(\cdot)$ and $U_2(\cdot)$ are 'distorted' by food stamps so that they are forced to consume more food using \$100 in stamps than they would if given \$100 cash. How much additional cash (in addition to food stamps) would it take to make $U_1(\cdot)$ and $U_2(\cdot)$ indifferent between \$100 in cash versus \$100 in stamps plus additional cash? We don't know the numerical answer without an explicit functional form. But we do know that the answer must be the same for $U_1(\cdot)$ and $U_2(\cdot)$. Why? Both $U_1(\cdot)$ and $U_2(\cdot)$ would choose to buy the same bundles using the extra cash to get back on the original indifference curve associated with receiving \$100 in cash (and of course those bundles would cost the same since all consumers face the same prices). Hence, the DWL associated with food stamps (in dollars – not 'utils') is identical for both utility functions, despite the fact that the functions are not identical. To demonstrate this to yourself, try working an example with $U_1(X, Y) = X^{1/2}Y^{1/2}$ and $U_2(X, Y) = 1/2 \ln X + 1/2 \ln Y$.]

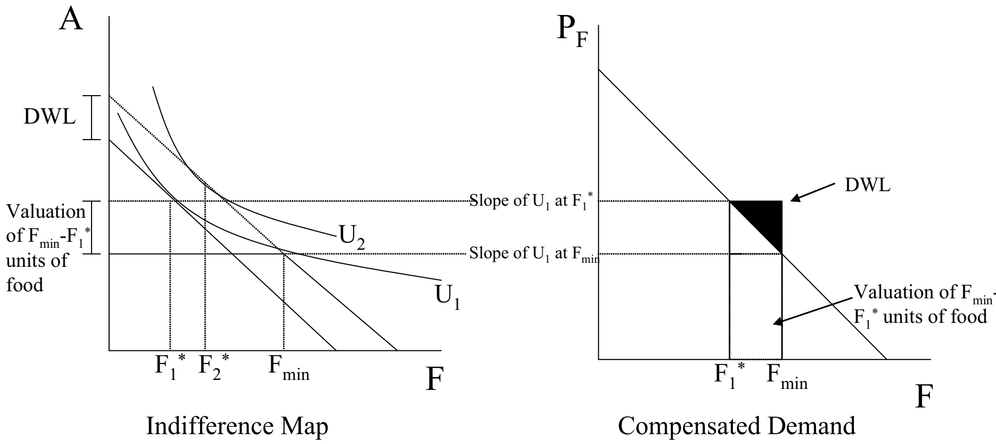
- Note that an upper limit on this amount is $F_s - F_c$. If we these households all of the extra money they spent on food (and let them keep the food), they would be *at least* as well off. But in fact they'd be strictly



better off unless they placed no value on food at the margin (violates Axiom 4, Non Satiation).

- See figure below.
- The shaded area is the dead weight loss. This is the cost of extra food consumed minus the amount of 'utility' (in dollar terms) they obtain from this food. How can we put utility in dollar terms? The compensated demand curve allows us to calculate how much Additional Money the consumer would need to be indifferent between Stamps + Additional Money versus Cash exclusively.
- We know the following:
  - Shadow value of the marginal food items for un-distorted house-

Graph 53



holds in terms of other goods foregone. This is \$1.00.

- We know the difference in quantity of food consumed P_c. About 20-30% more.
- We'd like to know the welfare loss for 'distorted' households in cash equivalent terms.

- To get this, we need the Compensated Demand Elasticity for food, which is defined as $\sigma_f = \frac{\partial \ln Food}{\partial \ln P_f} = \frac{\partial Food}{\partial P_f} \times \frac{P_f}{Food}$.
- **Why the compensated, not uncompensated elasticity? Because we are trying to figure out how to make the consumer as well off – hence, we are holding utility constant.**
- So, plug in from some existing studies. It's in the range of -0.16 to -0.28. That is a 10 percent increase in food prices reduces demand by 2 to 3 percent (it's inelastic).
- Notice from the from the definition of the elasticity :

$$\sigma_f = \frac{\partial \ln Food}{\partial \ln P_f} \Rightarrow \partial \ln P_f = \frac{\partial \ln Food}{\sigma_f}$$

- So we can solve for the change in shadow value of marginal food items using the above, which is the change in height of the demand curve at the two quantities using a linear approximation to the elasticity.

- We can then approximate the area of the DWL triangle (in dollar terms) as ($\frac{1}{2} base.height$):

$$\begin{aligned} DWL &\simeq \frac{1}{2} \Delta\% Food \cdot \Delta\% P_f \\ &\simeq \frac{1}{2} \cdot \partial \ln Food \cdot \partial \ln p_f \\ &= \frac{1}{2}(0.3) \times \left(\frac{0.3}{-0.2} \right) = -0.225 \end{aligned}$$

- Hence, on average \$0.23 of value is lost on each dollar of food consumption above F_1^*. Another way of saying this is that food stamps above the unconstrained amount are valued at \$0.77 on average (we are using the percentage changes as opposed to the absolute values as we want to compute the welfare loss per \$1 of food stamps).

- What is the total welfare loss? Food stamp distribution in 2010 is about \$66 billion. Approximately 20 percent of recipients are distorted, to consume about 30% more food, and their welfare loss on the extra amount of food consumed is \$0.23 on the dollar. Hence, $DWL \approx 66 \times 0.20 \times 0.3 \times 0.23 = \$0.91$ billion.

- Bottom line: the welfare loss is about $0.91/66.0 = 0.0138$, or roughly 1.38% of total program disbursements.

- A more positive way to put this result. The USDA could 'cash out' food stamps and simultaneously reduce benefits by $\sim$ \$0.9 billion without making recipients worse off. Or, it could 'cash out' food stamps and keep benefit levels the same and make recipients $\sim$ \$0.9 billion better off ($\sim$ \$15 per recipient). However, notice that it would only want to reduce benefits to 'distorted' consumers—there is no welfare loss to those who are inframarginal. This would be administratively infeasible.

- If cashing out food stamps also reduced administrative costs, this would also be an important savings.

- If cashing out also shut down the underground market (eliminating transfers to criminals), this would increase targeting efficiency – more of the benefits would go to recipients rather than the grocers willing to traffic in food stamps.

3.4 Nutrition

The exercise above analyzes how efficiently the food stamp program maximizes the *utility* of participants. In fact, this is not the program goal. The goal is to,

> "...safeguard the health and well-being of the nation's population by raising levels of nutrition among low-income households."

So, perhaps the relevant question is whether cash transfers do a better or worse job than food stamps. What would you predict? What is the greater 'nutrition' problem facing most households – not enough calories, or too many?

- SEE TABLE 8C.

- Largest expenditure reductions due to 'cash out' are for:

    - Vegetables
    - Fruit
    - Meat

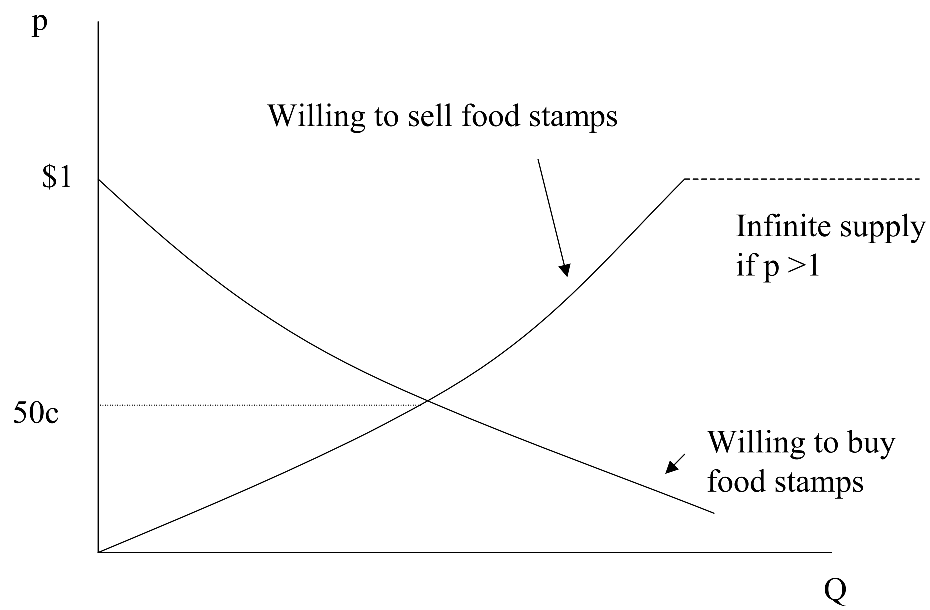
  - Legumes
  - Juice and soda

- No impact on alcohol consumption.
- No data on cigarette consumption.
- SEE TABLE 9A.
- In terms of "Recommended Daily Allowances:"
  - Reduction in calories from 126% to 119% of RDA. *On average, people still overeating, but less so.*
  - On average, all RDA's still met.
- Looking at the share meeting the RDA:
  - 10 percentage point reduction in share eating 100% of RDA of calories.
  - 3 percentage point reduction in share eating 200% of RDA of calories.
  - Only other categories that appear affected are Iron and Calcium.
- So, the evidence on nutrition is not crystal clear but it's quite possible that reduction in calories outweighs reductions in other nutrients A lot of marginal money appears to go into soda and juice.
- TABLE 10A.
- Some evidence that check recipients spend more on utilities. That's not necessarily bad.

3.5 The underground market for food stamps

One interesting wrinkle that these calculations neglect is the underground market.

- Since some consumers value food at less than $1.00 at the margin while others do not, there are potential *gains from trade*. I can buy your food with my stamps, you can buy me something else.
- Moreover, grocers could in theory just give stamp holders cash (or sell them alcohol, cigarettes and other non-stamp goods) and redeem the stamps from the government at face value–though Electronic Benefits Transfer cards have made this harder.
- Will this market function efficiently such that stamps sell for $1.00 each? No.
  - First, this is fraud. Sellers could lose their stamp privileges, and buyers could be jailed.
  - So, buyers will demand a 'risk premium.'
  - Consequently, sellers will not get full face value.
- See figure 7#3. There will be a downward sloping demand curve of risk takers and an upward sloping supply curve of recipients who don't value food much at the margin. The intersection of these curves MUST be below $1.00.



- But government will still pay $1.00 per stamp to the grocer. So, part of the food stamp money is a transfer to grocers who traffic in food stamps.
- What is the underground selling price?
- See Whitmore TABLE 6.
- "Survey Says:" Food stamps sell for about $55 to $65 dollar per $100. Which is a large transfer to stamp traffickers.
- This survey *does not* tell us what share of stamps sold on black market since Whitmore could not ask this in survey (would not get reliable answers: "Hello, I'm calling from Princeton for a research project. Are you a criminal?").
- The USDA estimated in 1996-1998 that about 3.5% of every dollar of food stamps was trafficked.

- Note additional costs of trafficking:
  - Enforcement costs of reducing trafficking
  - People in jails
- One further refinement. Imagine that there was no law enforcement in this market (and hence no risk premium) and so food stamps sold on the open market at face value ($100 in food stamps sold for $100). In this market, there would be no efficiency loss since it would function identically to a 'cashed out' program. By contrast, the 'black market' in which food stamps sell at $65 per $100 face value has two flaws (ignoring criminal enforcement costs):
  1. There is a dead weight loss due to the fact that food stamp recipients will presumably continue to buy food until the marginal utility of consumption is only $0.66 per $1.00 of food stamps (this is the DWL we calculated above). They will presumably sell their remaining stamps rather than buy food where the marginal utility of consumption is $0.65.
  2. There is a loss in targeting efficiency. For, stamps that are sold on the black market, $0.35 of every public dollar is a transfer to criminals (e.g., crooked grocers). Observe that this is *not* a dead weight loss – it is a *transfer* – since grocers value the $0.35 gain at the margin like a cash transfer. But from the perspective of taxpayers, who ultimately bear the full costs of food stamps, this will be viewed as a waste of public resources.

3.5.1 Note: other 'shadow markets'

1. Human organ sales.
2. Adopted children.

3. Donor eggs for infertile couples.

4. Prostitution.

5. Recreational drugs.

- General principle: When you prevent trades that people would otherwise engage in, market will attempt to undo this distortion through a 'shadow market.'

- The cost of enforcement to prevent this market from operating may be high:

  - Society must spend extra resources on monitoring, enforcement, imprisonment.
  - Some otherwise law-abiding citizens will engage in crime, go to jail, and perhaps commit other ancillary antisocial activities.
  - Examples: Consider U.S. experience with banning consumption of alcohol in the 1920s and 1930s ('prohibition'). Or consider the violence associated with the illicit drug trade. Open question: Would the world be more or less violent if cocaine were legalized?

3.6 Conclusions

1. Are Food Stamp recipients "distorted?" That is, do they indeed spend more on food than they otherwise would without food stamps?

   - Yes they are. About 23 cents is wasted on the dollar.

2. Does cash versus in-kind have any effect on nutrition?

   - Cashing out does reduce caloric intake.
   - Not clear it harms nutrition.

3. What share of food stamps are trafficked, and at what price?

    - About 3.5 percent of food stamps are trafficked illegally.
    - They sell at 50 to 60 percent at face value.

4. How costly are cash versus in-kind programs to administer?

    - Cash versus EBT: EBT is about $2.16 more expensive per person per month than sending checks.
    - Nationally, that's about million per year.
    - It is estimated that retailers also spend about $1.04 billion per year to administer EBT.
    - Hence, EBT is very likely to reduce fraud, but there is substantial enforcement costs.

Other considerations:

- Food stamps have political support that welfare checks do not have because stamps are *not* as likely to be viewed as a handout.

- Food stamps also have lobbying clout. The Farm lobby believes (or acts as if it believes) that food stamps are ultimately spent on farm products. Farmers therefore view food stamps as a subsidy to them too, and they actively support the food stamp program (as noted above, the food stamp program is run by the Department of Agriculture, which is otherwise hard to understand). If food stamps were cashed out, lobbying support would likely decline.

- It thus appears plausible that cashing out the program would help recipients in the short run, harm them in the long run.

- Other considerations?

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