I. Government Expenditures

A. Most taxation and government borrowing is motivated by desires for services of one kind or another, from missiles to medicine, from social insurance to bicycle trails.

  i. In democracies, the services provided reflect moderate voter interests for the most part. The majority of a community may want roads, police protection, and safe water supplies. It may also want public schools, unemployment insurance, festivals, and libraries. Nationally, it will want national security or defense.

  ii. In addition, there are occasional emergencies that they want their governments to take care of. A sudden collective emergency may have to addressed with new social services (temporary emergency housing and food) or social insurance (flood insurance). A tornado may pass through town, an invading army may be on its way, or the Olympics may be hosted.

  iii. In a monarchy or autocracy, the government is less responsible to its citizens, but many of the same services are also provided and have to be paid for in some way. Taxes are again commonplace.

B. There are exceptions to this general rule.

   •Rather than services, voters may want to discourage certain activities and impose "sin" taxes on those activities to discourage them. Here the purpose is not taxation to fund services, but to change behavior.

   •In addition to voter interests, the supply of government services may be influenced by interest groups, who may want particular activities subsidized from public funds, because they expect to profit by producing, rather than consuming, the government services.

   •We'll take up the politics of elections and interest groups after the midterm.

C. However it is clear that **if you want to understand the magnitude of taxes you have to understand the political demand for government services (and transfers).**

II. Government as another "demander"

A. Most of a government's expenditures takes the form of direct payments for (i) goods and services, (ii) social insurance payments to individuals (as with social security, unemployment insurance, and welfare expenditures), and (iii) subsidies of various kinds (such as those for health care, education, and research and development).

B. In cases in which the government produces services, the government is a major input demander. Many services such as national defense, mass transit, law enforcement, and highway construction are paid for entirely with tax revenues.

C. Many others are "hybrids" that are partly paid for by the government and partly by individuals. The government's share in these cases are subsidies--they reduce the cost of the service for individuals and/or firms and so encourage the production and use of such services.

  i. Public universities are a typical "hybrid" service and the the government's share can be analyzed as a subsidy.

    • For example, education at WVU is organized by government agencies, which have buildings constructed, hire teachers, mow the grass, shovel the snow, etc.

    • However, most of the cost is paid for with student tuition. , partly by state tax payers, and partly from grants and gifts of various kinds.

    • State "subsidies" reduce the cost of education through direct payment and through its monosony power as a buyer of large buildings and other facilities. About 15% of WVU's operating costs are paid for by the state government.

D. This handout and the lectures associated with it in class analyze how expenditures, especially subsidies, affect market outcomes.

  i. Government expenditures, like taxes, have direct affects on economic outcomes.

  ii. When governments are major purchasers of goods and services or inputs they affect market prices.

    • They may also affect market structure by contracting with single providers for most of services. This may transform a more or less competitive market into a concentrated industry or monopoly, as in various markets for defense products.

iii. When governments subsidize a good or service, it generates a price wedge between buyers and sellers. Prices move to clear markets, but with firms receiving more for their services and products than consumer pay for them. (Subsidies are like "negative" taxes in terms of their economic effects--as we will see later in this handout.).

E. The micro-economic effects of government expenditures can be modeled using the same tools that we used to analyze the effects of taxation.

i. In the case of purchases of goods and services, or of inputs to use to produce such goods and services, the effect is simply to increase the market demand for these goods, driving up their prices, and inducing greater supply.

ii. However, the new demand curve is no longer a sum of individual marginal benefit curves--since the government is not an individual.

iii. The effects of subsides are similar, but opposite, to those of taxes.

III. On Government Demands for Services

A. Many government services are directly produced by governments.

B. In such cases, governments demand inputs (labor, land, capital) and use those inputs to create public services.

i. Government in such cases is simply another "firm" or "consumer" of particular services or goods.

ii. It's demand for those services, although not grounded in an individual's net benefit calculations is otherwise just another demand curve in the market of interest.

iii. Such demands affect market prices by contributing to the overall demand for the inputs demanded.

iv. (For example, the production of education bids up price for teachers, buildings, and various supplies.)

C. An alternative to producing a service is to induce or pay other organization to produce and distribute services by paying for them.

i. Such cases include much of defense expenditures, which are largely produced by private firms, highway construction, which is largely built by private firms working for the government, and many other services.

ii. In such cases, the government is a major demander of final goods and services and again its demand--although not directly arising from net

benefit maximizing choices--is simply one of many in the relevant market.

iii. Its effects on market prices and output arise are very similar to other increases in demand for goods and services.

D. In what might be regarded as hybrid cases, governments may attempt to induce some goods and services to be produced and purchased by subsidizing them rather than paying their full cost.

- **In this case, the price received by producers is usually greater than that paid by consumers, $P_f = P_c + S$, rather than less than it**.
- Many government programs are subsidies in that they indirectly reduce the price of a service for consumers and raise them for producers.
- Not all "subsidies" are call that by the government or newspapers.

IV. On the Microeconomics of Subsidies

A. The main focus of our analysis of government expenditures is on the effects of targeted government subsidies, because the effects of direct purchases and transfers are so easy to analyze

- In the case of direct purchases, the demand for the service of interest shifts out to the right when governments increase their purchases, causing prices to rise and output to rise in the market of interest.
- A transfer payment increases the income of the recipient, which increases his or her demand for normal and superior goods and reduces them for inferior goods.

B. As with taxes, the distributional effects of a **subsidy** can be measured in two ways:

i. First, it can be calculated as an accountant might, as a cash receipt similar to ordinary income is calculated.

- (This is the most widely used measure by macro-economists, accountants, and newspaper reporters.)
- This approach implicitly assumes that the entire benefit of a subsidy accrues to the persons or firms that receive the "check" from the treasury.

ii. Alternatively, the distribution of benefits can be calculated by determining the **net benefits** generated by the subsidy relative to the "no subsidy state."

- That is to say, the net benefit of a subsidy can be measured as the **increase in consumer surplus and profits** generated by the subsidy.
- (This measure of the effects of a subsidy program is the most widely used among microeconomists and public economists.)

iii. As in the case of taxes, there is a difference between the cost of the subsidy (amount paid out) and the amount of additional consumer surplus and profit generated.

- ♦ Subsidies tend to extends trades beyond the level at which trade produces marginal benefits greater than marginal costs.
- ♦ However, the net benefits of a subsidy tends to be less than the amounts spent and less than the cost of the taxes raised to finance them.
- ♦ The **deadweight loss of a subsidy** is the extent to which "social surplus" is increased by a particular subsidy relative to the cost of the subsidy.

- The dead weight loss of "targeted" or "cost sharing" subsidy is analogous to that associated with an excise tax.

- ♦ The economic cost of a subsidy also includes the excess burden of the taxes used to finance it.
- ♦ The diagrams developed below focus on the expenditures associated with a the subsidy, but the excess burden of the taxes used to pay for the subsidies should be kept in mind--even though they are not included in the diagrams. (A dollar of tax revenue costs more than a dollar to collect.)
- ♦

iv. At the level of individuals, both net benefit diagrams and indifference curve analysis can be used illustrate how different kinds of subsidies (marginal, lump sum, conditional and unconditional) affect rational decision makers.

- We will again focus on the net benefit or supply and demand approach, and spend less time on the utility approach.
- In this case, the utility-approach yields insights that can't be generated using the supply and demand approach. So we'll need to use that tool bag a bit to examine some of the more subtle effects of taxes and subsidies.

v. The market level effects can be analyzed using supply and demand curves, as we did in the previous lectures for excise taxes.

- ♦

C. The Essential Geometry of Subsidies:

Effects of a Targeted Subsidy
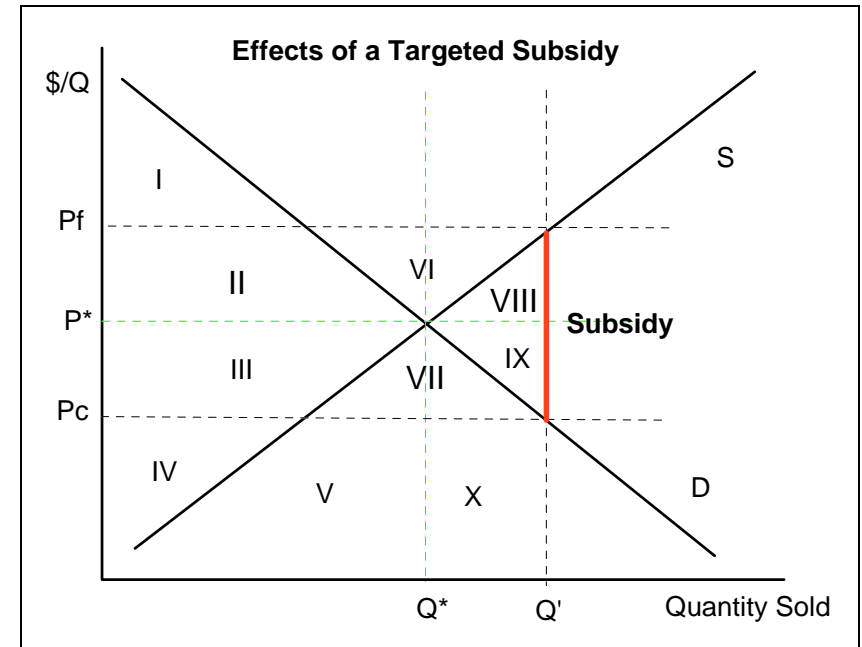
i. Suppose that a market is initially in an equilibrium without subsidies or taxes, so that demand equals supply at P*. In this case, there is no "subsidy wedge" between the price paid by consumers, Pc, is the same as that received by firms, Pf; so Pf=Pc=P*.

- Now, suppose that a subsidy of **S** is imposed on each unit of the good sold in this market, perhaps a rent subsidy.
- After the subsidy is place, P* is no longer a market clearing price:
- If S is simply subtracted from P* by firms, consumers will want to purchase too much at their new price (Pc = P* - S) to match supply, which would remain at Q*.
- On the other hand, if firms simply "kept" the subsidy, they would want to provide more units than can be sold. The supply at Pf = P* + S is greater than the demand at P*, which would remain at Q* since in that case Pc = Q*.
- **To clear the market**, thus, consumers have to pay less than P* per item sold, and firms have to receive more than P*.
- **At the new equilibrium output**, the demand curve will be exactly B dollars below the supply curve, Qd(Pf - S) = Qs(Pf).

ii. At the new equilibrium output, as depicted above, supply equals demand, and the price paid by consumers is exactly **S** dollars lower than the amount firms receive (Pf = Pc + S). Note also that Q' units of the good are sold, with Q'>Q*.

- At this equilibrium, there is a sense in which the targeted subsidy has simply been *taken* by firms, because Pf = Pc + S.
- However, there is another sense in which **the benefit of the subsidy is shared by firms and consumers**, because both consumer surplus and profits have been increased by the subsidy!
- Consumer Surplus increases from area I + II (before the subsidy at Q*) to area I + II + III + VII after the subsidy is in place and output rises to Q'.
- Similarly, Profit increases from III + IV (before the subsidy at Q*) to area III + IV +II+VI (after the subsidy at Q').
- Thus, the benefit for consumers is III + VII , and for firms is II+VI.

D. Note that **the increase of consumer and firm net benefits exists regardless of who actually receives the check from the state or federal treasury as long as demand curves slope downward and supply curves slope upward.**

i. Price movements ultimately determine the division of benefits between firms and consumers.
- ♦ If firms receive the check, their effective "receipt" is reduced by the decrease in price paid by consumers.
- ♦ If consumers receive the checks, their effective "receipt" is reduced by the price increase of firms in the market subsidized.

ii. The money paid out by the treasury is **its fiscal cost, S***Q'.
- Q' units are sold and the "government" pays **S** dollars toward each unit sold.
- Consequently, the total expenditure, **S**Q', can be measured with area II + III +VI + VII + VIII + IX in the diagram. (The area of a rectangle Q' wide and S tall is Q'S.)
- Note that this "cash" measure of the cost of the subsidy is **larger** than the "net benefits" generated by it.
- The increase in industry profit plus the increase in consumer surplus equals (II + +VI) + (III + VII).

- The total benefit of this subsidy is VIII + IX smaller than the cost of the program.
- This area of "lost net benefits" is sometimes referred to as the **deadweight loss of a targeted** (or "marginal") **subsidy**.

iii. The **true economic cost** of a subsidy is larger than the direct fiscal cost of the subsidy, because of the DWL of the taxes used to finance the subsidy program and the administrative cost of both the subsidy program and tax collection.

E. Both the extent of the deadweight loss and the distribution of the benefits vary with the slopes of the supply and demand curves in the subsidized industry.

i. Generally, relatively more of the benefit is realized by the side of the market with the least price sensitive curves.
- That is to say, if the demand curve is less elastic than the supply curve more of the benefit is received by consumers than firms. (In the extreme case in which market demand is completely inelastic or the industry supply curve is completely elastic, all of the benefit falls on consumers!)
- On the other hand if the demand curve is very elastic, because good substitutes exist, or the supply curve is relatively inelastic then more of the benefit of a subsidy goes to firms in the subsidized industry. (In the extreme case in which the market supply of the product of interest is completely inelastic or consumer demand is perfectly elastic, all of the benefit goes to suppliers.)
- The excess benefit of a subsidy tends to increase with the price sensitivity (slope or elasticity) of the demand and supply curves.

F. Supply and demand curves tend to be **more elastic in the long run than in the short run**, so the excess burden of a subsidy tends to be larger in the long run than in the short run.

i. Insofar as long run supply is relatively more price sensitive (elastic) than demand in the long run, the benefit of a new subsidy or increase in subsidy tends to be *gradually shifted from firms to consumer* in the long run.
- For example, Marshallian competitive markets have perfectly elastic (horizontal) supply curves in the long run, which implies that narrow subsidies on Marshallian products are shifted entirely to consumers in the long run.

- In cases in which only consumer demand is more price elastic in the long run than in the short run (as when demand for a good is determined in part by consumer capital goods, like automobiles), a subsidy for gasoline or highway use tends to be gradually shifted from consumers to firms (owners of capital and natural resources) in the long run.

- In cases where both sides of the market (firms and consumers) are more price elastic in the long run than in the short run, the LR distribution of the benefit will reflect their relative abilities to adjust. However, all such long run adjustments imply that deadweight losses from targeted subsidies are larger in the long run than in the short run. (The height of the DWL triangle does not change but its length increases.)

ii. Illustrations: effects of an excise subsidy in the short run and long run for different kinds of markets--one with short and long run supply curves, the other with short and long run demand curves.
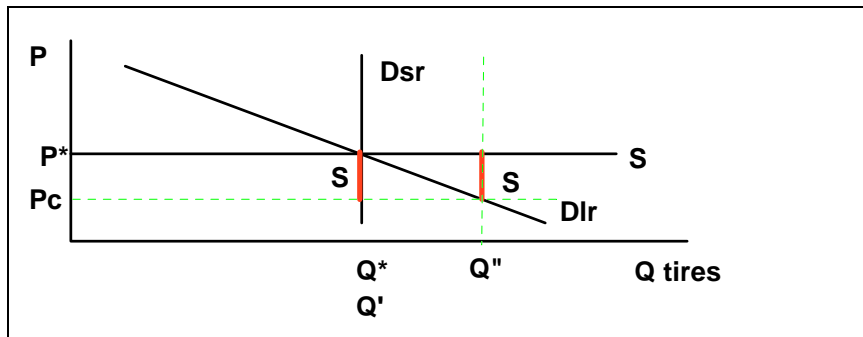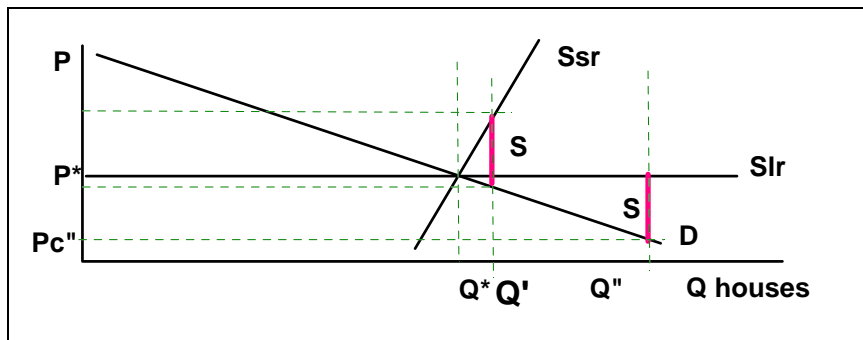
- Note that in the first case, supply is more elastic (flatter) in the long run than in the short run, so the initial benefit from the subsidy is largely for firms, but in the long run the benefit is shifted to consumers.

♦ The after subsidy price falls at first for firms, but rises back to P*. The price to consumers falls just a bit at first, but falls to P*+Pc in the long run.

- The second case is an unusual case where demand is more price sensitive (elastic) in the long run than in the short run.

♦ However, because supply is completely elastic in both the long and short run, the benefit falls entirely on consumers in both the short and long run.

- **As an exercise, construct a case in which the benefit goes entirely to firms in both the long and short run.**

G. **One advantage of calculating the benefit of a subsidy as the change in profit and consumer surplus generated by that program** rather than total government expenditures **is that allows one to calculate how the benefits of a subsidy are distributed within the markets subsidized.**

i. The benefits of a subsidy are often realized by persons or firms who are do not directly receive the subsidy payments.

ii. For example, a rent subsidy is normally paid to renters who are able to pay more for housing than they could before.

This bids up rents and the prices of rental housing, which benefits land lords and builders.

Calculated as cash payments, one could say that the benefit of a rent subsidy is realized entirely by renters.

However, if landlords increase their prices (rent), then the benefit of the subsidy has really been "shifted" forward from renters to land lords, even though landlords never actually receive a check from the government treasury.

iii. In many cases, the persons most affected by a subsidy are not the persons who "directly" receive the subsidy checks or coupons

iv. **Thought question: why do farmers favor food stamps?**!

V. Normative Principles of Subsidy Programs

A. Evaluating the normative merits of a subsidy program requires analysis of net benefits associated with a subsidy.

  i.   Based on the geometry above, it is clear that the net benefits of most subsidies are smaller than their costs, because the increase in social surplus is normally less than the money spent on the program.

  ii. The diagram actually underestimates the deadweight loss because it neglects the cost of raising that money, which includes the deadweight loss of the tax used and other collection costs.

  iii. In cases in which, equity or redistribution is the goal of a subsidy (as with **food stamps** and many rent subsidies), the distribution of net the subsidy benefits will also matter.

  • Do the benefits mostly go to the poor, or to those selling services to the poor?

  • In such cases, "distribution of burden" diagrams are necessary to analyze the relative merits of alternative subsidy programs (or, their equivalent mathematical representations).

  iv. There are also cases in which social net benefits increase as a consequence of the subsidy (Pigovian subsidies), but these will be dealt with after the midterm.

  • In all of these cases, distribution of burden diagrams can also be used to analyze political incentives that various groups have to lobby in favor or against particular subsidy or tax programs, as we will see in future lectures.)

B. It is also possible to utility-based geometric tools to determine the relative merits of alternative subsidy programs as we did with alternative taxes. (See the appendix of hand out 3.)

  • Lump sum subsidies will generally have a smaller deadweight loss, as shown below, than marginal subsidies or matching grants.

C. The relative merits of lump sum and marginal subsidies (block and matching grants) can be assessed using the indifference curves and budget constraints in a manner very similar to that used at the end of hand out 3 to analyze the effects of lump sum and marginal taxes (uniform broad based and narrow based taxes).

D. Illustration of the inefficiency of matching grants (marginal subsidies).

  i.   Suppose that "Al" is purchase two goods and that one of these is subsidized in a manner that reduces its effective price (as in the demand and supply diagrams above).

Figure 4: Welfare Advantage of a Well Designed Lump Sum Subsidy
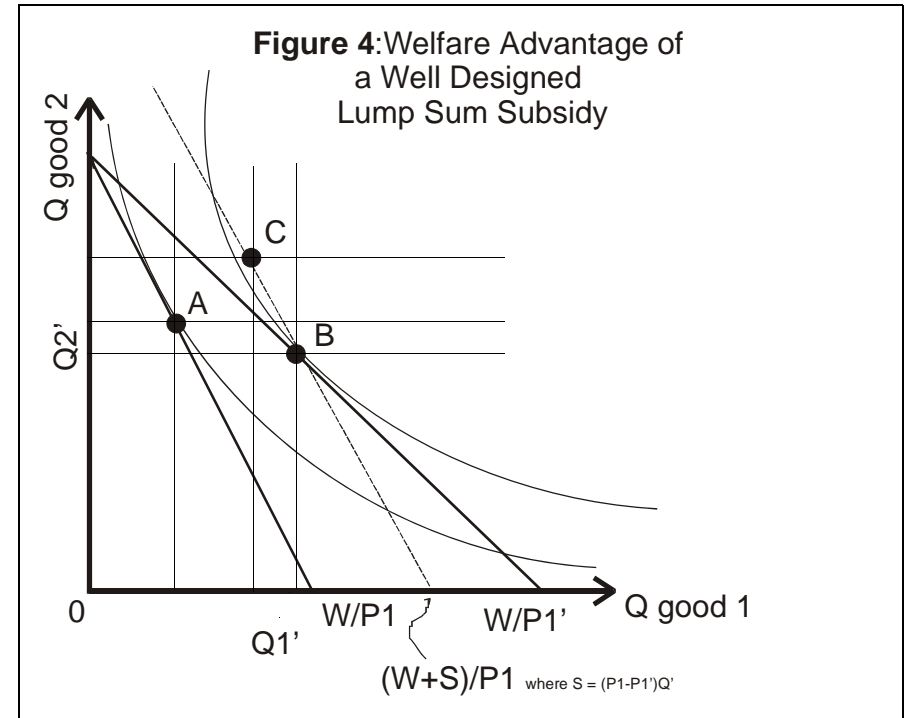
  • Suppose that "A" is the original (pre subsidy) bundle consumed by a consumer.

  • The subsidy decreases the relative price of good 1 from P1 to P1'

    ♦ This change in prices causes a new budget constraint and induces the consumer to purchase bundle B.

    ♦ Note that the consumer has more utility at B than at A, because she is on a higher indifference curve.

    ♦ However, the same amount of government money would have increased her utility by even more, if it were given as a lump sum grant or subsidy.

  ii. The **cash-equivalent lump sum subsidy** produces a budget constraint parallel to the original one (with the same relative prices) passing through bundle B.

  • Note that under the equivalent lump sum subsidy, Al could have purchased bundle C which is better than bundle B.

- C is on a higher indifference curve than B is, so it produces more utility for Al than B does.
  - ♦ The cash equivalent lump sum subsidy is equal to [(P1-P1')*Q1', the change in the consumer's price induced by the subsidy time the number of units purchased.
  - ♦ Notice that this is an intuitive result--most people would prefer cash to a discount coupon, because the cash can be spent on many things and the coupon only on the thing being discounted.

iii. The difference between the utility produced by a lump-sum subsidy and the marginal subsidy is a measure of the deadweight loss or inefficiency of a marginal subsidy.
  - The lower utility of the targeted subsidy suggests that such subsidies (ones that directly change relative prices) tend to be less efficient than those which do not, as with a lump sum tax.
  - That is to say "**neutral**" subsidies tend to be more efficient ways to increase recipient utility (welfare) than marginal or matching grants.

iv. Normatively, this diagram implies that a subsidy system "should be" **NEUTRAL** if it wants to maximize its effect on consumer welfare represented with utility.
  - The above diagram demonstrates that a marginal subsidy yields a smaller increase in welfare than possible from an equally expensive lump sum or general subsidy--other things being equal
    - ♦ A perfectly neutral subsidy system does not directly affect private decisions across markets for private goods and services, because it does not affect relative prices faced by firms or consumers.
    - ♦ It does however, increase demand for normal goods and reduce demand for inferior goods, which will have some relative price effects.
    - ♦ And, of course, even neutral subsidies have to be paid for with taxes or loans.
  - (In cases where the purpose of the subsidy is to **change behavior**, a marginal or targeted subsidy tends to be more effective than a lump sum subsidy, because they have a larger direct effect on behavior. We take up "Pigovian subsidies and taxes after the mid term exam.)

v. This effect is harder to analyze with supply and demand curves, although they can be represented with those curves as well.
  - ♦ A direct subsidy or marginal subsidy has the effect in the diagrams at the beginning of this section.

- ♦ A lump-sum subsidy increases consumer income and increases his or her demand for all goods.
- ♦ However, there is no way to determine which is better for consumers without knowing exactly how all the demand curves shift and measuring the associated net benefits.
- ♦ This is, of course, why we use indifference curve analysis here. It is the only case in this course in which the conclusions of utility-based analysis are clearer and easier to represent than those grounded in the net-benefit maximizing model.

E. ALGEBRAIC APPENDIX FOR CASH EQUIVALENT SUBSIDIES

  i. That the line passing through bundle B and parallel to the original budget constraint characterizes the consumer's budget constraint under the **equivalent** (equally costly) lump sum subsidy to the marginal (or matching) subsidy assumed can be demonstrated with a bit of **algebra**.
  - The original budget constraint is $W = P_1Q_1 + P_2Q_2$, which includes all the combinations of Q_1 and Q_2 that can be purchased for W dollars at the (pre subsidy) market prices P1 and P2.
    - ♦ The budget constraint after the marginal subsidy on good 1 reduces the consumer's price for good 1 from P_1 to $Pd = P_1-S$ (which is shown as P1' in Figure 4).
    - ♦ So the budget constraint with the subsidy can be written as: $W = PdQ_1 + P_2Q_2$ or $W = P_1'Q_1 + P_2Q_2$.
  - The specific combination of goods 1 and 2 selected by the consumer under the marginal or targetted subsidy is bundle B which is labeled as (Q1', Q2').
    - ♦ That point lies on the subsidized budget constraint so $W = PdQ_1' + P_2Q_2'$
  - It is convenient to rewrite Pd as P_1-S to get W= (P1-S)Q1' + P2Q2'
    - ♦ so $W= PdQ_1' + P_2Q_2'$ $W = (P_1-S)Q_1' + P_2Q_2'$ which implies that
    - ♦ $W = P_1Q_1' + P_2Q_2' - (SQ_1')$ (at point B)

  ii. If the amount SQ_1' had been simply given to the consumer as a "lump sum," rather than the cost of good 1 subsidized, his or her new budget constraint would have been:
    - ♦ $W + (SQ_1') = P_1Q_1 + P_2Q_2$
    - ♦ Note that this **new budget line includes** the point (Q1', Q2'), point B on the diagram.

- The "lump sum equivalent" budget constraint, thus, passes through point B and is parallel to the original one (without a subsidy).
  - ♦ Both the pre-subsidy budget constraint and the budget constraint with a lump sum subsidy have the same slope, namely: $-(P1/P2)$.

VI. More Complex Subsidies: Conditional Marginal and Lump-Sum Subsidies

A. The above examples are what might be called "unconditional" subsidies. The lump sum subsidies could be spent on anything that a person wants and the cost reducing subsidies applied to all units of the good purchased.

  i. These are not the only kinds of subsidy programs that can be designed.

  ii. Subsidy programs can also be conditional in the sense that the amount received under a lump sum subsidy might have to be spent on particular things (such as food) or a cost reducing subsidy might only be available for small purchases or for large purchases.

  iii. Such conditional subsidies can also be analyzed with our geometric tool box, although the geometry (and mathematics) tends to be more complicated.

B. Illustrations of Conditional Subsidies

  i. Consider a lump sum grant that has to be spent on food (as in the present food stamp program).
  - ♦ Note that if one simply spent all of the conditional lump sum subsidy on food one can purchase amount F of food and W/Po of the other goods.
  - ♦ However, if less than F units of food are purchased, one will not get the subsidy and be on his or her original budget line.
  - ♦ There is a kink in the budget constraint at F (assuming that the food cannot be resold on the black market).
  - ♦ Note that a person that finds this "corner" to the his or her utility maximizing combination of food and other goods will not necessarily be at a point where his or her indifference curve is tangent to his or her budget constraint. (Draw this case and explain why this happens.)

budget constraint given F

-
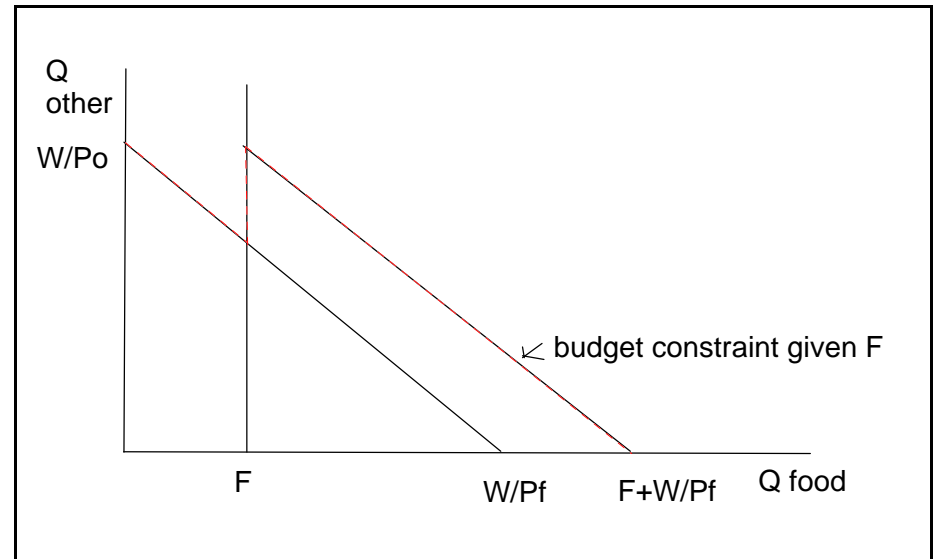
  ii. Consider a similar targeted (cost reducing) subsidy that applies only to the first F units of food purchased.
  - ♦ The price of food falls by S dollars per unit for the first F units. After the subsidy is exhausted, the consumer has to pay the prevailing market price for additional food.
  - ♦ Note that there is again a kink in the budget constraint, but one that is less sharp.

budget constraint with first F units of food subsidized
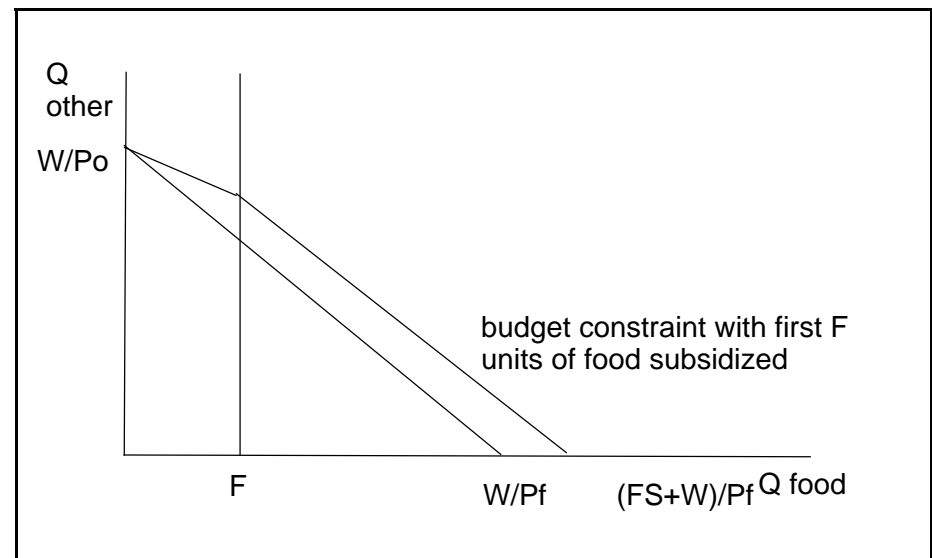
•iii. Our earlier analysis suggests that it is possible to shift from a conditional targeted grant to a conditional lump sum grant and make (most) persons better off.

♦ Is this true in this case? Why or why not?

♦ As an exercise illustrate this point and explain its logic. Hint, a conditional lump sum grant for many people is equivalent to an unconditional lump sum grant.)

VII. Appendix: Tax Subsidies, Printing Money, and Borrowing

A. Most income tax systems include a variety of exemptions and deductions that define taxable income.

i.   On the one hand, these simply define what the tax base is.

ii. In some cases, adjustments are necessary to determine economic income, itself, which is net receipts concept.

iii. On the other hand, many of the deductions are implicit subsidies of one kind or another, in the sense that one can think of a deduction or exclusion as a separate subsidy program.

 • For example, suppose that there was a simple flat tax of 25% on all economic income and that interest on mortgages is deductible.

 • That implies an implicit 25% subsidy for mortgages because a tax schedule of:

 ♦ T" = .25(Y - M) where Y is economic income and M is the mortgage payment is equivalent to a flat tax T = .25Y plus a subsidy of S = .25M

 ♦

 ♦ Note that the taxpayer's after tax income in this case is

 ♦ Y-T+S = .75Y + .25M

 ♦ which is the same as that under the first tax with a mortgage deduction

 ♦ Y-T" = Y-(.25(Y - M)) = Y-.25Y+.25M = .75Y + .25M

 • In this sense, many adjustments to an income tax can be thought of as "tax subsidies."

iv. The normative implications of such subsidies can be analyzed with either tax or subsidy normative theories, but some of the equity arguments are clearest when one applies the subsidy norms.

 ♦ Is it appropriate for other tax payers to subsidize housing purchase? Especially those of the relatively wealthy?

B. Digression-Long Footnote on debt and printing money.

i.   It bears noting that a good deal of government finance involves borrowing and printing money rather than ordinary taxation.

 ♦ Indeed, many poorly run governments prefer to just "print money" to pay for their expenditures.

 ♦ Others would prefer to borrow all moneys spent,

 ♦ and would resort to taxation as a last resort, **were it not for the deadweight losses** generated by these other methods of government finance.

ii. In terms of the language used to discuss taxation, printing money may have a larger economic and political burden in the future than taxation, by both reducing the value of money held by private persons, producing inflation, and distorting relative prices throughout the economy.

 ♦ Inflation is an implicit tax on those who hold money.

 ♦ Discuss the extent to which it satisfies or conflicts with normative theories of taxation.

iii. Borrowing shifts the burden of tax payments from current taxpayers to future ones (or at least from those not generationally connected to individuals that are).

 ♦ Discuss the effects of posponing taxation (or shifting it to other generations) using our tax and/or subsidy normative theories.

 ♦ It also has macro-economic effects on the distribution of capital within a society that may affect long term growth rates.

 ♦ As a consequence, both printing money and debt-finance may be more difficult to use repeatedly than taxation. Explain Why?

VIII. Appendix: Progressive, Proportional and Regressive Subsidies

A. Normative theories that focus on "equity" often support subsidies that redistribute wealth or income from relatively rich persons to relatively poor persons.

i.   For example, society A would be considered better than society B under most distributional theories, if **everyone** is richer in A than in B (Rawls).

ii. Other normative distributional theories might regard society A to be better than A if most persons are richer in A than in B, or if the average person is richer in society A than in society B.

♦ (In this last theory that attempts to maximize average income, only economic efficiency matters. why?)

B. The **Pareto principles**:

i. State A is better than (or *Pareto superior to*) state B if at least one person is better off at A than B and no one is worse off.

ii. A Pareto optimal state occurs when no Pareto superior moves are possible.

iii. The Pareto principle implies that inequality that increases total wealth or total social net (by for example creating incentives to work a bit harder or more productively) benefits tends to improve the state of the world as long as no one is harmed by the new wealth or new social net benefits.

C. In contrast, many mainstream normative theories imply that there are "efficiency-equity" tradeoffs.

i. That is to say, in some cases it is all right to sacrifice a bit of equity if efficiency increases enough.

ii. And conversely, in some cases it is all right to sacrifice a bit of efficiency if equality increases enough.

iii. What "enough" means varies according to the normative theory (or normative intuition) being applied.

D. Definitions and Relationships useful for characterizing positive characteristics of subsidy schedules that are relevant for distributional normative theories:

• The **subsidy base**, B, is the activity, good, or service that is subsidized. (food, rent, work, oil production, bus tickets, corn production, R&D, etc.)

• The **average subsidy rate** of a particular subsidy often varies with an individual's holding of the subsidy base. If an individual pays subsidy T_i on a holding of B_i, his average subsidy rate is S_i/B_i. (If S_i = $50 and B_i = 200, the average subsidy rate for this subsidy is $50/200 = 0.25$ or 25%.)

• The **marginal subsidy rate** of a particular subsidy is the change in subsidies owed for a one unit increase in holdings of the taxable base, $\Delta S/\Delta B$. (So, if a subsidy payer earning 50,000/year pays a subsidy of 10,000 and a taxpayer earning 50001 pays a subsidy of 10,000.50, his or marginal subsidy rate is $0.50/1 = 50\%$. Fifty percent of each

additional dollar earned is taken from the "last" dollar of income earned by a taxpayer earning 50,000/year.)

• In a **diagram of subsidy** schedules. If MSR is above ASR, then the ASR curve will be rising (the marginal subsidy rate will be pulling the average up). If MSR is below ASR, then the ASR curve will be falling (the marginal subsidy rate will be pulling the average down). If the MSR = ASR, the ASR will be neither rising nor falling.

i. Since **individual decisions are determined by marginal cost and marginal benefits at various quantities, it is the marginal subsidy rate rather than the average subsidy that affects subsidy receiver behavior**.

E. Calculating the Progressivity (etc) of subsidy schedules

i. Although the terms progressive, proportional, and regressive are used less frequently to describe subsidy programs than tax systems these terms can be applied, and are often important in policy discussions about the relative merits of a particular subsidy schedule or program.

ii. In principle, the reference point for calculating "progressivity" can be either the subsidy "base," or personal income.

♦ For most positive analyses, the "base" tends to be used.

♦ For most normative analyses personal income tends to be used.

• Calculated relative to its base, a progressive subsidy schedule has an average subsidy rate that falls with purchases of the subsidized good, etc..

• Calculated relative to income, a progressive subsidy program's has an average subsidy rate that falls with income.

♦ Such progressive subsidies are said to promote "equity."

iii. When a subsidy program is designed, its positive characteristics have to be determined, and so its progressivity, proportionality, or regressivity is normally judged relative to the "thing" subsidized (that is with respect to its base).

♦ For example, the average subsidy rate of an agricultural subsidy can be designed to decline (on average) as farm size increases (progressive).

♦ The average subsidy rate of an agricultural subsidy can also be designed to be the same for all sizes of farms (proportional).

♦ Or, the average subsidy rate can be designed to increase as farm size increases (regressive).

iv. In public policy debates, the discussion of subsidies and other transfer programs often centers on a subsidy's relationship to personal income. (Do poor people get more than rich people, or vice versa?)

- Using income as the reference point, a **progressive subsidy** is a subsidy whose average benefit falls as the income of an individual increases.

    ♦ [Such subsidies often have marginal subsidy rates that decrease with the "base," although not all progressive subsidies have this property. This tends to be true, for example, of social security benefits.]

- A **proportional subsidy** is a subsidy whose average subsidy benefit does not change with income. (Such subsidies normally have a constant marginal subsidy rate, as true of most sales subsidies and some income subsidies. A flat (proportional) subsidy on income has the form: $S = aY$.) [farm subsidies and unemployment insurance]

- *Using income as the reference*, a **regressive subsidy** is a subsidy whose average subsidy benefit increases with income. Such subsidies often have declining marginal subsidy rates with ownership of the item or activity subsidized, however, not all regressive subsidies have this property. [state subsidized higher education]

F. Some Geometric Puzzles:

i. Economic efficiency-based normative theories are sometime said to oppose consumption and borrowing subsidies, but to favor subsidies that encourage saving and investment, because these are argued to increase long run economic growth.

- The intuition behind the effect is based on supply and demand.

- If the price of saving increases relative to consumption, individuals will consume more and save less.

- As capital is accumulated, the productivity of labor increases and so does national income.

ii. However, you can use an indifference curve diagram to show that a **permanent saving's subsidy does not** have any relative price effect on savings versus consumption decisions.

- As an exercise draw the effect of an investment-savings subsidy in a two period intertemporal choice diagram.

- Note that a subsidy that proportionately reduced the absolute price of consumption in both periods , would **not change relative prices** of consumption now and in the future, and so would operate like a lump sum tax.

- Does a permanent savings subsidy really increase saving? Why or why not?

    ♦