I. Government Finance and Government Expenditures

Essentially all government finance is motivated by desires for government services of one kind or another.

A king or prince raises taxes to fund a palace or army.

A democratic community might want better roads, police protection, or public water supplies.

A sudden collective emergency may have to be met with tax revenues. A tornado may pass through town, an invading army may be on its way, or the Olympics may be sited in the village.

A town may want to discourage certain activities and impose "sin" taxes on them, to improve the body politic.

Interest groups may want particular activities subsidized from public funds, and such subsidies generally are paid for with taxes of one kind or another.

Overall, it seems clear that if you want to understand tax policies you have to understand the demand for government services and transfers.

To understand the demand for those services, one has to understand both the nature of the services demanded (are they public goods) and

also the effect that those government expenditures have on prices, profits and consumer surplus.

We take up the latter in the next part of the course, and take up public goods and externalities after the midterm.

Government Expenditures, like government taxes, have direct affects on relative prices.

These effects can be modeled using the same tools that we used to analyze the effects of taxation.

For example, subsidies (or cost sharing relationships) have effects that are very much like excise taxes.

Many of the other effects of government purchases or production of services can be analyzed using supply and demand curves. In many markets, the government is "just" another consumer or firm trying to purchase final goods or inputs.

At the level of individuals, indifference curve analysis can also illustrate how different kinds of subsidies (marginal, lump sum, conditional and unconditional) affect rational decision makers.

Digression/Long Footnote. It bears noting that a good deal of government finance involves borrowing and printing money rather than ordinary taxation. Indeed, many governments prefer to just "print the money" or borrow it to pay for their expenditures, and would resort to taxation as a last resort, were it not for the deadweight losses generated by these other methods of government finance.

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.

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

As a consequence, these "financial tools" may be more difficult to use repeatedly than taxation. Why?

Many government programs in modern democracies, essentially reduce the price of a service for consumers or producers rather than produce them directly.

In some cases, this is done with direct cash payments, in others it is done implicitly through matching grants of one kind or another, special pricing, or through regulation.

Consider the case of toll and free highways, copayments in medical programs, partial payments of rent for low income renters, support for R&D with private applications, tax loopholes for charitable activities, and loans at below market rates to encourage specific private investments (as in higher education).

We begin our analysis of government expenditures by looking at the effects of targeted government subsidies.

The distributional effects of a **subsidy** (or transfer) can be measured in two ways:

First, it can be calculated as a cash receipt--in much the same way that ordinary income is calculated.

(This is the most widely used measure by macro-economists, accountants, and newspaper reporters.)

Second, it 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.)

This differs a bit from the money paid out by government, because a subsidy often has a **deadweight loss**, analogous to that of an excise tax.

{ Subsidies tend to extends trades beyond the level at which trade produces marginal benefits greater than marginal costs.

{ The deadweight loss of a subsidy can also be measured as the extent to which "social surplus" is increased by a particular subsidy relative to the cost of the subsidy.

{ (In principle, the cost of a subsidy should include the excess burden of the taxes used to finance it. However, initially we will neglect this portion of the cost and simply focus on the revenues required to fund the subsidy.)

The advantage of calculating the total benefit of a subsidy as the change in social surplus generated by that program rather than total government expenditures is that the benefits of a subsidy are often realized by persons or firms who are do not directly receive the subsidy payments..

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

In such cases, the persons most affected by a subsidy are not the persons who "directly" receive the subsidy!

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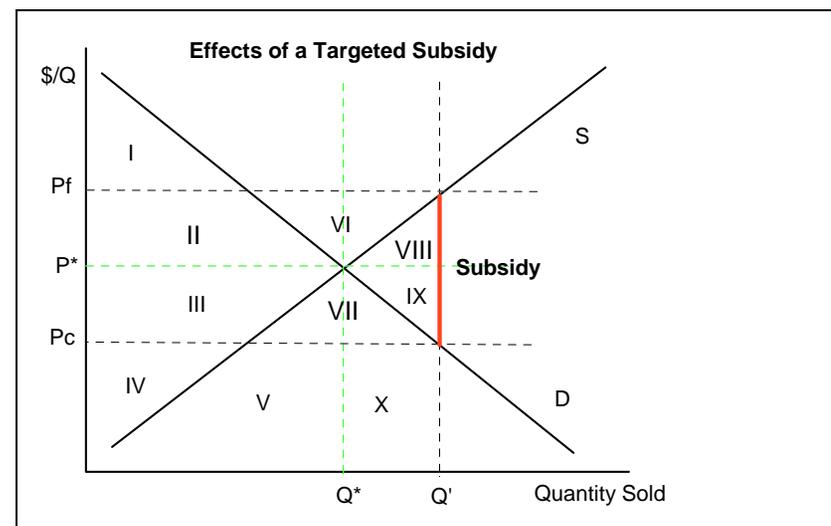
Suppose that a market is initially in an equilibrium without subsidies or taxes, so that demand equals supply at P*. In this case, there is no "subsidy wedge" between the price paid by consumers, Pc, is the same as that received by firms, Pf; so Pf=Pc=P*.

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.

At the new equilibrium output, the demand curve will be exactly B dollars below the supply curve, Qd(Pf - S) = Qs(Pf).

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.

Note that **this increase of consumer and firm net benefits exists regardless of who actually receives the check from the state or federal treasury.**

{ Price movements ultimately determine the actual 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.

The money dispensed by the treasury, **its cost**--neglecting the DWL of the taxes used to finance the subsidy program and the administrative cost of the program, is **S***Q'.

Q' units are sold and the "government" pays **S** dollars toward each unit sold.

Consequently, the total expenditure, **SQ'**, 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 "surplus" 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 benefits" is sometimes referred to as the **deadweight loss of a targeted** (or "marginal") **subsidy**.

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.

Generally, relatively more of the benefit falls on 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.

Insofar as, supply and demand tend to be **more elastic in the long run than in the short run**, the excess burden of a subsidy tends to be larger in the long run than in the short run.

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.

Marshallian competitive markets have perfectly elastic supply curves in the long run, which implies that narrow subsidies on such products are shifted entirely to consumers in the long run.

There are, however, also cases in which 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). In such cases, a subsidy such as a gasoline or highway subsidy may 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.)

Illustrations: effects of an excise subsidy in the short run and long run for different kinds of markets
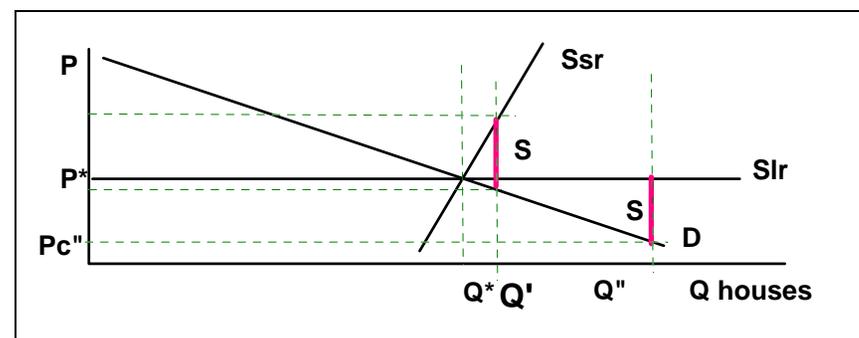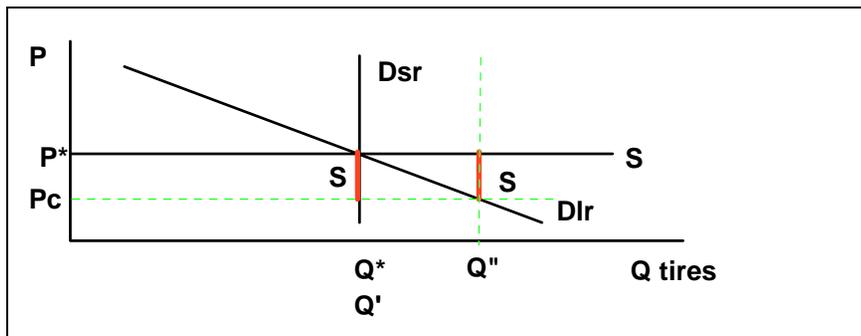
Note that in the first case, supply is more elastic in the long run than in the short run, so the initial benefit from the subsidy is largely for firms, but in the long run the benefit is shifted to consumers. The after subsidy price falls at first for firms, but rises back to P*. The price to consumers 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.

II. Normative Principles of Subsidy Programs

The ideas summarized in these diagrams are have often been used to characterize principles of "ideal" subsidy programs. Most of these ideas are similar to those previously discussed under normative tax theory.

For example, it has long been argued that broad or lump sum subsidies tend to increase welfare by more than a targeted subsidy, other things being equal..

In effect, this argument suggests that a subsidy system should be **NEUTRAL**.

A perfectly neutral subsidy system would not affect private sector decisions across markets for private goods and services, because it would not affect relative prices faced by firms or consumers (although it does, of course, produces revenues for the government).

The logic of lump sum subsidies and other neutral subsidies can be illustrated a bit more easily using indifference curves and budget constraints.

{ Both lump sum and general subsidy program shift the wealth constraint out without changing its slope, whereas a marginal subsidy changes the slope of each consumer's budget constraint, because it changes relative prices.

{ It can be shown geometrically (and mathematically) 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

{ (However, in cases where the purpose of the subsidy is to change behavior, a marginal subsidy will have a larger effect on behavior than a lump sum or general subsidy--and thus may be a more effective tool of public policy.)

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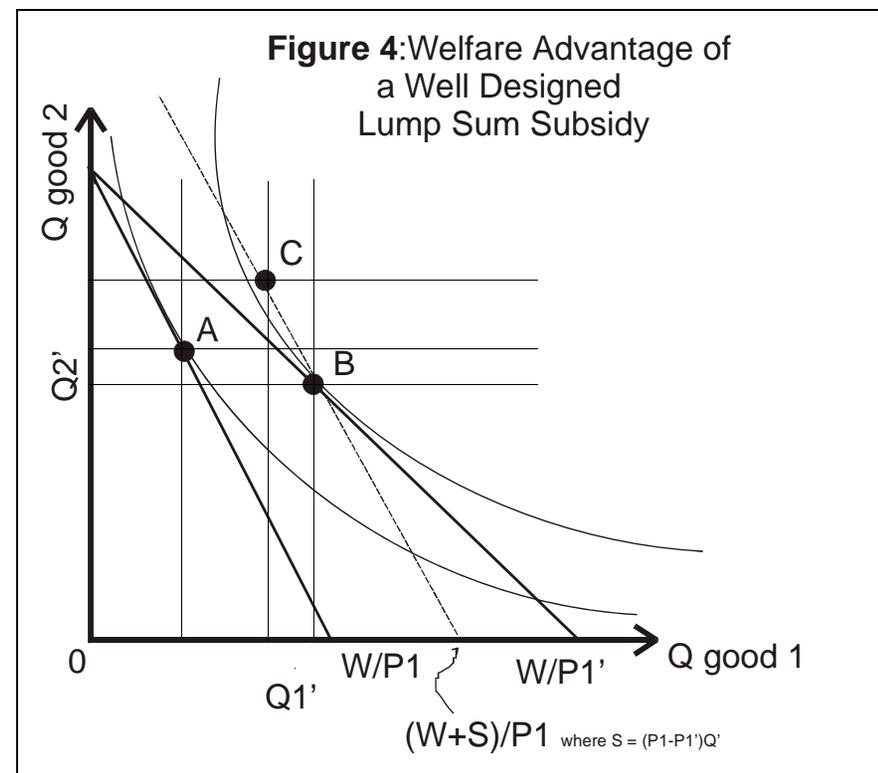
Suppose that "A" is the original bundle consumed by a consumer.

{ Now suppose that a subsidy is created that decreases the relative price of good 1 to P1'

{ This causes the consumer to purchase bundle B.

{ If instead, the same dollar been given with a lump sum subsidy (equal to Q1'P1') the individual could have purchased bundle C which is better than bundle B.

{ This loss in utility (from being on a lower indifference curve) is one measure of the deadweight loss of a non-neutral subsidy.

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 just a bit of **algebra**.

❴ The original budget constraint is $W = P1Q1 + P2Q2$, which includes all the combinations of Q1 andQ2 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 P1 to $Pc = P1-S$ (which is shown as P' in Figure 4), so now: $W = PcQ1 + P2Q2$ or $W = P'Q1 + P2Q2$.

❴ At the specific combination of goods 1 and 2 selected under the "marginal subsidy," the consumer purchases bundle B which is labeled as (Q1', Q2').

❴ The budget constraint under the marginal subsidy includes this point, so $W= PcQ1' + P2Q2'$

❴ We can rewrite Pc as P1-S to get $W= (P1-S)Q1' + P2Q2'$

❴ Which implies that the amount of money actually received from the subsidy (transfer) is SQ1' since the last equation can be written as $W = P1Q1' + P2Q2' - (SQ1')$

❴ If that amount were simply given to the consumer as a "lump sum" his or her new budget constraint would be $W + (SQ1') = P1Q1 + P2Q2$, which is a **different line but still includes** the point (Q1', Q2'), point B on the diagram.

❴ The new budget constraint (under the lump sum subsidy) is parallel to the original one (without a subsidy) because they both have the same slope, namely: $-(P1/P2)$.

Definitions and Relationships:

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 Ti on a holding of Bi, his average subsidy rate is Si/Bi. (If $Si = \$50$ and $Bi = 200$, 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.

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**.

More Definitions and Relationships:

Although the terms progressive, proportional, and regressive are used less frequently to describe subsidy programs than tax systems these terms are occasionally applied.

In principle, the reference point can be either purchases of the subsidized good, or personal income.

❴ That is to say subsidies may rise or fall with his holdings of the subsidized good.

❴ Or, a subsidy program's underlying progressivity may be measured with respect to the recipient's income.

When a subsidy program is designed, its progressivity, proportionality, or regressivity is normally judged relative to the "thing" subsidized.

❴ For example, an agricultural subsidy can be designed to decline (on average) as farm size increases,

❴ or it can be neutral (on average) with respect to size,

❴ or the per unit subsidy can increase (on average) as farm size increases.

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]

Other normative subsidy theories are unconcerned with the fairness of the subsidy system and argue that a subsidy system should attempt to promote economic growth--or at least minimize the reduction in growth associated with raising a given amount of revenue.

Such persons often oppose consumption subsidies in order to encourage saving and investment.

The intuition behind the effect is simply based on supply and demand. If the price of saving increases relative to consumption, individuals will consume more and save less.

And if savings increase, capital will be more rapidly accumulated, which leads to higher income levels and growth rates.

However, if the consumption subsidy is permanent, it does not necessarily have any relative price effect on savings versus consumption.

The lack of clear effect of a consumption subsidy (or tax) on saving is easiest to illustrate with indifference curves and budget constraints defined over consumption in the present and the future.

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.