We have studied extensively how government policy affects the economy. At least as important are effects of the economy on policy. We learned something about these effects in "Derivation of Ramsey's Optimal Tax Formula", where we saw that a government attempting to minimize dead weight costs would tax elastically demanded goods less heavily. But it is unclear whether actual governments attempt to minimize dead weight costs. Here I show that we can go a lot further towards understanding actual government decision-making by applying the tools of micro and macroeconomics that you've already learned.

I. Interest Groups and the Government Budget

Consider a simple model of competition for political power between two interest groups, A and B (this is an application of the political competition model developed by Becker, 1983). Assume that the government has a balanced budget, and the political competition results in group A being taxed T, to finance equal subsidies G to group B. Group A spends resources, A, on lobbying legislators, influencing voters, etc. to persuade them to vote to keep taxes relatively low. Similarly, B spends resources, B, also trying to influence legislators and the electorate to raise the transfers to them.

Much of the political science literature tries, not very successfully, to model formally the process of government decision-making. That could be the goal of a complete analysis of the political process, but we will not try to incorporate such a model into the analysis of interest group competition. We merely assume a reduced form function that is the end result of what may be a very complicated process of electoral voting, legislative decisions, and executive branch initiatives. In this reduced form, government spending and revenue directly depend on the amounts spent by A and B on gaining political influence:[1]

$$\text{total government revenue} = \text{total government expenditure} = F(B/A)$$
$$F'(B/A) > 0,\ \ F''(B/A) < 0$$

More pressure by the subsidized group increases the size of government while more pressure by the taxed group decreases it. Both pressures run into diminishing returns. In order to simplify the analysis, we have assumed that it is only the ratio of pressures applied by the two groups that determines the transfer from one group to another. However, we do not necessarily assume that there are no transfers when each group applies the same amount of pressure (mathematically, we do not necessary assume $F(1) = 0$).

Obviously, the taxes paid by Group A are part of government revenue and subsidies enjoyed by Group B are part of government expenditure. In addition, we allow there to be both some nontax revenue E and some "non-Political" spending D:

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[1] Government revenues, expenditures, and political pressure are measured as fractions of GDP.

$$T + E = F(B/A) = G + D$$

The left-hand side, total government revenue, is the sum of tax revenue and nontax revenue. The right hand side is the sum of subsidies and "non-Political" spending.

We consider three important examples of "nontax revenue". The first example relates to the "oil shocks" of the 1970s; when oil prices increased dramatically, OPEC and other governments owning substantial oil fields enjoyed extraordinary nontax revenues. A second source of nontax revenues is the "aid" that some governments receive from other public and private agencies. For example, the Israeli government enjoys aid from American citizens and from the U.S. government and reparations from the German government amounting to almost 10 percent of its GDP. American state governments enjoy substantial revenues from the U.S. federal government. A third example of substantial "nontax revenue" are the monies enjoyed by the Alaskan state government from sales of its natural resources and judgments against the Exxon Corp.

We also consider to examples of "non-Political spending". The first is monies required for defense or to fight a war. Second is "reparations" owed to foreign governments such as those owed by Germany after the world wars or those taxes (which may amount to "reparations") owed by some European governments after unification.

II. Dead Weight Costs

The taxed group A minimizes the sum of its political spending and the cost to members of its group of the taxes assessed against it, given the spending by the subsidized group, B. The cost of the taxes equals the sum of tax revenue and Δ, the dead weight cost (dwc) of taxes. So A minimizes

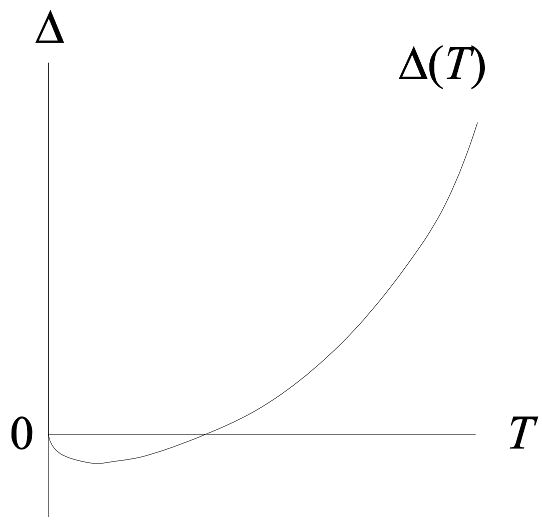
$$A + T + \Delta(T) = \text{net cost to group A, with}$$
$$T = F(B/A) - E, \;\; \Delta'' \geq 0$$

As we proved in "Derivation of Ramsey's Optimal Tax Formula", the cost to taxpayers of taxes is not the same as (and probably more than) the revenue enjoyed by the government because taxpayers change their behavior in order to reduce this revenue. In particular, taxpayers substitute the consumption of untaxed goods for the consumption of taxed goods, reducing their tax liability but leaving them with a consumption bundle which they would not demand in the absence of taxation. Hence, the dwc of taxes is itself a function of the amount transferred T and we assume that function is nonconcave.[2] Δ is typically positive, although we do not rule out the possibility $\Delta < 0$ which occurs, for example, when the behavioral changes induced by taxes delivers a Pareto-improving allocation. If this also occurred for marginal taxes, then $\Delta' < 0$.

The tax system and the nature of the economy determine the form of the function Δ(T). It is

[2] In "Derivation of Ramsey's Optimal Tax Formula" we derived, for special case, a quadratic formula for the dwc as a function of the tax rate, which implies a convex function of tax revenue.

important to distinguish tax systems whose dwc's differ for a given size of government from tax systems whose dwc's differ merely because different amounts of revenue are raised. In other words, the distinction is between a movement along and a shift of the function Δ(T), shown in the following graph.



Movements along the curve represent changes in the amount of taxation occurring without any change in the tax system or in the structure of the economy. For example, additional national defense needs may be to a larger government budget which is achieved merely by increasing the rates for taxes which are already in place, but without introducing any new forms of taxation or without a change in the structure of the economy. Or changes in the pressure applied by either of the groups will change the amount taxed without shifting the Δ(T) schedule. Movements to the right along the curve increase marginal dwcs and, if it were the case that marginal dwcs were positive, increase total dwcs, but do not change the dead weight cost schedule (ie, shift the curve).

Shifts of the curve represent changes in the tax system or in the structure of the economy which involve more or less dwcs for any given amount of tax revenue to be raised. For example, a "reform" of the tax system may introduce new forms of taxation to replace older forms which have more dwcs per dollar of tax revenue. The "flat tax" is one example - it would replace the current income tax with an income tax that could raise the same revenue with lower rates of taxation and hence fewer distortions of behavior. Changes in the structure of the economy can also shift the dead weight cost schedule if, for example, the changes involve a different elasticity of response to taxes. Increased international trade is one case where taxpayers may be more sensitive to taxes (because they can move activity abroad), which we would represent by an upward shift in the dead weight cost schedule. A decline in the agricultural sector may cause taxpayers to be less sensitive to taxes because home production (which is typically not taxed) becomes less economical; we would represent the decline as a downward shift of curve. Changes in the structure of the economy can also lead to tax reform (ie, the introduction of new more efficient forms of taxation). A decline in agriculture and increased technological sophistication, for example, makes income taxation a viable source of revenue which can substitute for the inefficient trade taxes that must be relied on by the governments of less developed agricultural nations.

Tax reform may also be associated with constitutional changes as in the United States with the passage of the 16th Amendment in 1913. The marginal dwc of taxes is also partly determined by special interests who lobby for tax exemptions and thereby narrow the income tax base. Differing degrees of political power affect the number and type of tax exemptions, and therefore the marginal dwc of the income tax.

B maximizes the difference between the value to members of B of the subsidies it receives and the amount it spends on political activity, given the spending by Group A. The value of the subsidy equals the difference between the amount received from the government and Σ, the dwc of subsidies. So B maximizes

$$G - \Sigma(G) - B = \text{net gain to B, with}$$
$$G = F(B/A) - D, \ \Sigma'' \leq 0$$

Subsidies also have a dwc Σ because in many cases members of group B change their behavior in order to obtain the subsidy. Σ depends on the amount subsidized G and we assume Σ is nonconcave. Σ is typically positive, although we do not rule out the possibility $\Sigma < 0$ which occurs, for example, when the behavioral changes induced by subsidies delivers a Pareto-improving allocation. If this also occurred for marginal subsidies, then $\Sigma' < 0$.

Movements along the curve represent changes in the amount of subsidies occurring without any change in the subsidies system or the structure of the economy. For example, changes in the pressure applied by either of the groups will change the amount subsidized without shifting the $\Sigma(G)$ schedule. Movements to the right along the curve increase marginal dwcs and, if it were the case that marginal dead weight cost were positive, increase total dwcs, but do not change the dead weight cost schedule.

Shifts of the curve represent changes in the subsidy system or in the structure of the economy which involve more less dwcs for any given amount of subsidies. For example, a "reform" of the subsidy system may eliminate waste and increased the benefit enjoyed by those subsidized per dollar of subsidies (ie, increase $1\text{-}\Sigma'(G)$).

Notice that $T = G$ is the *net* transfer from A to B. It may be that A members, members of the net taxed group, receive some subsidies and B members pay some taxes. To the extent this “cross-hauling” occurs, it will typically be the case that greater dead-weight losses are suffered per dollar of net transfer than would be imposed in the absence of cross-hauling. Thus a downward shift of the $\Delta(T)$ function may be due to a reduction in the amount of gross taxes paid by Group A per dollar of net taxes paid by Group A. Similarly, a reduction in the amount of gross taxes paid by Group B per dollar of net subsidy received by Group B would produce a downward shift of the function $\Sigma(G)$.

III. Political Equilibrium

We assume that the government budget is determined as a Nash equilibrium of a "game" between the two interest groups. Remember from microeconomics that a "Nash equilibrium" just means that each group ("player") maximizes its objective taking the pressure ("strategy") of the other group as given. The first order conditions for each group are:

$$\begin{aligned} \frac{B}{A^2}\, F'(B/A)\,[1 + \Delta'(T)] &= 1 \\ \frac{1}{A}\, F'(B/A)\,[1 - \Sigma'(G)] &= 1 \end{aligned} \qquad \textbf{(1)}$$

Dividing the first order conditions, we can obtain implicit formulas for B/A and the size of the budget:

$$\begin{aligned} \frac{B}{A} &= \frac{1 - \Sigma'(G)}{1 + \Delta'(T)} \\ T + E = F&\left(\frac{1 - \Sigma'(G)}{1 + \Delta'(T)}\right) = G + D \end{aligned} \qquad \textbf{(2)}$$

where the middle term in the bottom equation is obtained by plugging our expression for B/A into the pressure function.

IV. Comparative Statics and Interpretation

By totally differentiating the left-hand equality from the bottom half of expression (2) above, we can algebraically analyze some of the effects of the economy on policy:[3]

$$\begin{aligned} &\left\{[1 + \Delta'(T)]^2 + [1 - \Sigma'(G)]\, F'(B/A)\, \Delta''(T)\right\} dT \;+\; [1 + \Delta'(T)]^2\, dE \\ &\quad + \; [1 + \Delta'(T)]\, F'(B/A)\, \Sigma''(G)\, dG \;= \\ &-F'(B/A)\left\{[1 + \Delta'(T)]\, d\sigma + [1 - \Sigma'(G)]\, d\delta\right\} \end{aligned} \qquad \textbf{(3)}$$

In doing so, I have introduced the parameters δ and σ to denote shifts in the marginal dead weight cost schedules $\Delta'(T)$ and $\Sigma'(G)$:

[3]The same results can be obtained by differentiating the right-hand equality.

$$\Delta'(T) \equiv \tilde{\Delta}'(T) + \delta$$

$$\Sigma'(G) \equiv \tilde{\Sigma}'(G) + \sigma$$

where $\tilde{\Delta}'(T)$ and $\tilde{\Sigma}'(G)$ are functions not depending on δ and σ. In words, more δ represents an upward shift in the marginal dwc schedule $\Delta'(T)$ while more σ represents an upward shift in the marginal dwc schedule $\Sigma'(G)$.

IV.A. Wartime

Let wartime be a period with $dD > 0$, $dE = d\delta = d\sigma = 0$. In words, wartime is an increase in "nonpolitical" spending, but no change in non-tax revenue or the efficiency of the tax or subsidy systems. Equation (3) simplifies to:

$$\left\{[1 + \Delta'(T)]^2 + [1 - \Sigma'(G)]\, F'(B/A)\, \Delta''(T)\right\} dT \; + \; [1 + \Delta'(T)]\, F'(B/A)\, \Sigma''(G)\, dG \; = \; 0$$

From this and the government budget constraint $dT = dG + dD$ we can compute the change in the size of the budget (dT/dD) and the change in political spending (dG/dD) per dollar of defense spending.

$$\frac{dT}{dD} = \frac{[1 + \Delta'(T)]\, F'(B/A)\, \Sigma''(G)}{[1 + \Delta'(T)]^2 + [1 - \Sigma'(G)]\, F'(B/A)\, \Delta''(T) + [1 + \Delta'(T)]\, F'(B/A)\, \Sigma''(G)} \in (0,1)$$

$$\frac{dG}{dD} = \frac{dT}{dD} - 1 \in (-1,0)$$

We see that taxes and the government budget increase in response to more defense spending, but less than dollar for dollar. Subsidies decrease, but less than dollar for dollar. The effect on subsidies would be dollar for dollar and the effect on taxes zero if those subsidized did not respond. In this case, by definition, the size of the government budget would be unchanged and subsidies would have to be reduced dollar for dollar. But fewer subsidies decrease the marginal dead weight cost of subsidies (according to Σ'') and thereby increase the incentive of those subsidized to apply pressure to expand government. Taxes and government expand as a result of the decreased subsidies.

IV.B. Oil Shocks, Aid, Reparations, and Other Flypaper Effects

Consider a case with $dE > 0$, $dD = d\delta = d\sigma = 0$. This might represent the situation faced by an oil-exporting country during times of high prices or a region that enjoys grants to its government from foreign or federal governments. Equation (3) simplifies to:

$$\left\{[1+\Delta'(T)]^2 + [1-\Sigma'(G)]\,F'(B/A)\,\Delta''(T)\right\} dT \;+\; [1+\Delta'(T)]^2\, dE$$
$$+\; [1+\Delta'(T)]\,F'(B/A)\,\Sigma''(G)\,dG \;=\; 0$$

From this and the government budget constraint $dT + dE = dG$ we can compute the change in the size of the budget (dG/dE) and the change in tax revenue (dT/dE) per dollar of nontax revenue.

$$\frac{dG}{dE} = \frac{[1-\Sigma'(G)]\,F'(B/A)\,\Delta''(T)}{[1+\Delta'(T)]^2 + [1-\Sigma'(G)]\,F'(B/A)\,\Delta''(T) + [1+\Delta'(T)]\,F'(B/A)\,\Sigma''(G)} \in (0,1)$$

$$\frac{dT}{dE} = \frac{dG}{dE} - 1 \in (-1,0)$$

We see that subsidies and the government budget increase in response to more nontax revenue, but less than dollar for dollar. Tax revenues decrease, but less than dollar for dollar. The effect on tax revenues would be dollar for dollar and the effect on subsidies zero if those taxed did not respond. In this case, by definition, the size of the government budget would be unchanged and taxes would be reduced dollar for dollar. But fewer taxes decrease the marginal dead weight cost of taxes (according to Δ'') and thereby decrease the incentive of those taxed to apply pressure to limit the size of government. Subsidies and government expand as a result of the decreased tax revenues.

The fact that taxpayers do not enjoy the entire benefit of increased nontax revenues is known as the "flypaper effect", and is sometimes thought to be inconsistent with economic analysis. I think our analysis suggests otherwise, but students may want to look at the survey by Hines and Thaler (1995).

IV.C. Tax Reform

Consider a case with $d\delta < 0$, $dD = dE = d\sigma = 0$, representing the tax reform (ie, a reduction in the marginal dwc associated with raising a given amount of tax revenue). Equation (3) simplifies to:

$$\left\{[1+\Delta'(T)]^2 + [1-\Sigma'(G)]\,F'(B/A)\,\Delta''(T)\right\} dT \;+\; [1+\Delta'(T)]\,F'(B/A)\,\Sigma''(G)\,dG \;=$$
$$-\,F'(B/A)\,[1-\Sigma'(G)]\,d\delta$$

From this and the government budget constraint $dT = dG$ we can compute the change in the size of the budget ($dT/d\delta$) associated with a unit increase in marginal dwcs.

$$\frac{dT}{d\delta} = \frac{dG}{d\delta} = -\frac{[1-\Sigma'(G)]\,F'(B/A)}{[1+\Delta'(T)]^2 + [1-\Sigma'(G)]\,F'(B/A)\,\Delta''(T) + [1+\Delta'(T)]\,F'(B/A)\,\Sigma''(G)} < 0$$

A tax reform is supposed to reduce δ, so the formula above tells us that government grows in response to tax reform. Furthermore, notice that ($dT/d\delta$) and (dG/dE) differ only by the factor Δ'', which means we can learn a lot about the effect of tax reform on the size of government from the flypaper effects.

Tax reform reduces the dwc of taxes but, because government expands and dwcs of spending grow with the amounts spent ($\Sigma''>0$), the total dwcs government activity may actually grow as a result of tax reform.

IV.D. Reducing Wasteful Spending

Consider a case with $d\sigma < 0$, $dD = dE = d\delta = 0$, representing the reduction in the wasteful components government spending (ie, a reduction in the marginal dwc associated with raising a given amount of spending). It is straightforward to show that government grows in response ($dT/d\sigma < 0$) . Furthermore, it need not be the case that the reduction wasteful spending produces the total dead weight costs associated with government activity.

IV.E. Economic Development and "Women's Liberation"

Consider again the case with $d\delta < 0$, $dD = dE = d\sigma = 0$. This case may describe the consequences of economic development and/or "women's liberation" because both are associated with a movement away from household or nonmarket production, which are ways of escaping taxation. When there's less household production, taxpayers are less able to avoid taxes and, as we learned in "Derivation of Ramsey's Optimal Tax Formula", taxes become more efficient. Since $dT/d\delta < 0$ and government grows in response to more efficient taxes, we expect government to grow in response to economic development and/or "women's liberation". The growth of government with economic development occurs often enough in fact that it is known as "Wagner's Law."

V. References

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