Public Finance and Public Policy:
Responsibilities and Limitations of Government

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Presentation notes, chapter 9
CHOICE OF TAXATION

Topics

9.1 Optimal taxation

9.2 Capital and other tax bases

9.3 Fiscal federalism
Taxation has been present in

Public goods
Externalities
Paternalism
Social justice and entitlements
Tax evasion
The Laffer curve
In each case, there was:
(1) a single tax rate
(2) a designated tax base
(3) one government

We now look at:
(1) the structure of tax rates
(2) the choice of the tax base
(3) fiscal federalism or multiple governments
9.1 OPTIMAL TAXATION

Optimal for the trade-off between efficient and socially just taxation

A. The Ramsey rule for efficient taxation

Frank Ramsey (1903–1930) derived the rule in 1929
The Ramsey rule minimizes the excess burden of taxation across markets.
Efficient taxation: tax rates should be inversely related to demand elasticities

\[ \frac{-t_A}{t_B} = \frac{\varepsilon_{DB}}{\varepsilon_{DA}}. \]

Cross price elasticities are here zero

The rule is derived from:

\[ \text{Min } D = \frac{1}{2} \varepsilon_{DA} p_A q_A t_A^2 + \frac{1}{2} \varepsilon_{DB} p_B q_B t_B^2. \]

\[ \text{s.t. } \bar{R} = t_A P_A Q_A + t_B P_B Q_B \]
A leviathan government:

Max \( R = t_A P_A Q_A + t_B P_B Q_B \)

subject to a bound

\[
\bar{D} \leq \frac{1}{2} \varepsilon_{DA} p_A q_A t_A^2 + \frac{1}{2} \varepsilon_{DB} p_B q_B t_B^2
\]

The Ramsey rule applies to a leviathan government that places a bound on the excess burden of taxes in an economy.
Efficient taxation of personal incomes

\[ \frac{t_1}{t_2} = \frac{\epsilon_S}{\epsilon_{S_1}}. \]

The Ramsey rule ensures that public goods and entitlements are financed by efficient taxation.

The leaks in the bucket of redistribution are minimal.
The logic of the Ramsey rule for efficient taxation

For efficient taxation, the marginal losses due to the excess burdens of increases in different taxes should be equal.

The Ramsey rule can contradict social justice

The Ramsey rule calls for high tax rates on necessities, low tax rates on “luxuries”
Social injustice in taxes personal incomes

Person 1 is independently wealthy but is prepared to work if paid enough
Person 2 has no sources of income other than from work and has no choice but to work for a living

\[ \varepsilon_{S1} > \varepsilon_{S2} \]

The Ramsey rule implies regressive income taxation
The Ramsey rule introduces conflict between efficiency and social justice
Efficient taxation and gender differences

In the traditional model of the family, the woman’s labor-supply elasticity is greater than that of the man.

Do men and women differ in labor-market behavior and in home and income responsibilities?
Asymmetric information and the Ramsey rule

- Labor-market intentions and opportunities are private information
  - Is a woman committed to her career or is she prepared to withdraw from the labor market at least temporarily to have children?

The Ramsey rule is subject to asymmetric information, since only people themselves know their labor-market supply elasticities – and their demand elasticities for different goods and services
Taxation of innate ability

- Taxation of innate personal abilities is efficient taxation according to the Ramsey rule
- If innate ability could be measured, would we want people to be taxed according to their ability to earn income – and not according to the incomes they actually earn?

Taxation according to ability is a tax on preferences of people who voluntarily wish to forego high income to seek other sources of personal satisfaction in life.
- Taxes based on ability have high excess burdens because of the acts undertaken in the pretense of displaying low ability

- Taxation of beauty?

Political decision makers in democracies are reluctant to use the Ramsey rule

Economists study the Ramsey rule because of the importance of the social objective of efficiency.
B. The equal sacrifice principle for socially just taxation

We now leave the quest for efficient taxes through the Ramsey rule.

We investigate social justice in taxation.
Progressive taxes

Socially justice in taxation is often associated with a progressive income tax schedule

\[
    t_A \equiv \frac{\text{Total taxes paid}}{\text{Total income earned}} = \frac{R}{Y}
\]

\[
    t_M \equiv \frac{\partial R}{\partial Y}
\]

A tax schedule is **locally progressive** if the average rate of taxation or the marginal tax rate increases with pre-tax income.
To focus on social justice, we temporarily eliminate efficiency questions based on the Ramsey rule by eliminating substitution responses to taxation.

If there were no inefficiency because there is no substitution response to taxation, what would be the grounds for proposing progressive taxation as socially just?
The ability-to-pay and benefit principles of taxation

A personal income tax is based on the principle of “ability to pay”

The ability-to-pay principle is related to two other principles of social justice in taxation
  • Horizontally equitable taxation
  • Vertical equity in taxation

Vertical equity and progressive taxation: when income taxes are progressive, a judgment has been made about taxes paid by people who are unequal in income
Diminishing marginal utility of income

A first place to look for possible justification for progressive income taxes: diminishing marginal utility of income

Diminishing MU of income indicates declining marginal loss of utility from taxation
An income-tax schedule

\[ R = R(Y) \]

A progressive tax function

Increasing marginal tax rate \( t_M \) indicates progressive taxation

Increasing average tax rate \( t_A \) indicates progressive taxation

Tax function \( R = R(Y) \)

45° (\( R = Y \))
An income-tax function with tax brackets

Amount paid in taxes $R$

Pre-tax income $Y$

45° ($R=Y$)

Slope = marginal tax rate $t_m$ in a tax bracket

The increase in $t_A = R/Y$ indicates progressive taxation in the 3rd tax bracket

Proportional taxation in the first tax bracket since $t_m = t_A$
Efficiency and high marginal tax rates

- High marginal tax rates would have effects on efficiency through
  - the substitution between work effort and leisure
  - attempts to hide income from the government

Why would a government want to impose high tax rates given the disincentives for productive activity (or legal productive activity)?

We shall return to efficiency considerations and the motive for high marginal tax rates
The normative question about progressive taxation

To be socially just, does an income-tax structure necessarily have to be progressive?

- We have neutralized efficiency considerations that affect a tax structure
- We are temporarily viewing income taxes as lump-sum taxes with no excess burden of taxation
What do we mean by social justice?

Without uncertainty behind a veil of ignorance, we cannot use the insurance definition of social justice.

Ex-post equality as social justice is now achievable through appropriative taxation and equal redistribution (we have eliminated the excess burden of taxation).

However, we do not wish to use ex-post equality as the definition of social justice.
The ability to pay principle and socially just taxation

The ability-to-pay principle requires that people with higher incomes pay more in taxes.

The ability-to-pay principle does not imply progressive income taxation.

The ability-to-pay principle requires only that the marginal rate of taxation be positive, which is the case whether taxation is progressive or regressive or proportional.
The equal-sacrifice principle of taxation

John Stuart Mill in 1848: “equality of taxation” is “equality of sacrifice”

The total utility loss from payment of taxes should the same for everybody, no matter what a person’s pre-tax income happens to be
The equal-sacrifice principle is defined in terms of:

- total taxes paid
- total personal utility lost

by taxpayers from paying the taxes
Does equal sacrifice imply that income taxes need to be progressive?

Do all progressive income taxes result in equal sacrifice?

Answers

The equal-sacrifice principle cannot be used to justify progressive taxation

Nor can progressive taxes be justified on the basis of the equal-sacrifice principle

A common utility function
We could not define “equal sacrifice” if we did not have a common utility function that can be used to measure and compare taxpayers’ “sacrifices” from paying taxes
We maintain the separation between efficiency and social justice – for the convenience of expositing the equal-sacrifice principle and deriving the equal-sacrifice income tax schedule

We therefore have the most advantageous conditions for progressive taxation – no substitution effects on the work-leisure choice
The derivation of the income tax schedule from equal sacrifice

- $Y$ is pre-tax earned income
  - With no efficiency effects of taxation, $Y$ depends on neither the level of taxation nor the structure of taxes
- The total tax paid by a taxpayer is $R(Y)$
- The utility from post-tax income is $U[Y - R(Y)]$
- The sacrifice from paying taxes is $S$
Equal sacrifice:

\[ S = U[Y] - U[Y - R(Y)] = c = \text{constant} \]

Solve to obtain the equal-sacrifice tax schedule \( R^E(Y) \):

\[ t_A \equiv \frac{R^E(Y)}{Y} = 1 - \frac{U^{-1}[U(Y) - c]}{Y} \]
The tax schedule is progressive if:

\[ \frac{\partial t_A}{\partial Y} \equiv \frac{\partial R^E(Y)}{\partial Y} / Y > 0 \]

The answer depends on the common utility function \( U(Y) \) chosen to represent the utility loss of all taxpayers from paying taxes.

Therefore:

Utility functions with diminishing MU of income are consistent with equal-sacrifice tax functions that can be progressive, proportional, or regressive.
Consider $U(Y)$ for relative risk-aversion $R$ is constant.

$$R \equiv \frac{dMU}{MU} \frac{dy}{y} = \frac{\% \text{ change in } MU}{\% \text{ change in } y}$$

$$U^i = \frac{y_i^{1-R} - 1}{1 - R} \quad \text{for } R \neq 1$$

$$U^i = \log y_i \quad \text{for } R = 1.$$ 

*If $R > 1$, taxation is progressive*

*If $R < 1$, equal sacrifice in taxation requires a regressive structure of income taxes*
For 2 people with pre-tax incomes $y_1 > y_2$, with a constant R utility function

$$\frac{MU_1}{MU_2} = \left( \frac{y_1}{y_2} \right)^R$$

Choice of the utility function is choice of $R$

*With $R = 1$, equal sacrifice implies proportional income taxation*

Conclusion

*The equal-sacrifice principle of taxation does not imply the necessity of progressive taxes*
Alternatively, begin with an observed progressive income tax schedule

Can a utility function be found that will provide equal sacrifice for all taxes that taxpayers have paid?

There is no assurance that a utility function can always be found that yields equal sacrifice in utility lost from paying the total taxes required by the progressive tax schedule

*A progressive tax schedule need not imply equal sacrifice*
9.2 C. Optimal income taxation

The equal-sacrifice principle is based on people supplying labor without regard for reward (no substitution effects and no excess burden of taxation)

We now leave the equal-sacrifice principle

In the realistic circumstances, people’s effort and work decisions depend on the incentives of rewards

- We reintroduce excess burdens of taxation
- We return to the definition of social justice as achieved by maximizing a social welfare function
What is the structure of an income tax that maximizes social welfare when there are efficiency losses from taxation?

The answer to this question is an “optimal income tax” schedule:

The optimal income-tax schedule takes into account the trade-off between efficiency and social justice.
The optimal income tax structure depends on the social welfare function that is chosen

- A Bentham social function exhibits greatest sensitivity to inefficiency
- A Rawls social welfare function exhibits no sensitivity to inefficiency except insofar as inefficiency reduces the utility of the worst-off person
A linear income tax

\[ R_i = -G + tY_i \]

People with \( Y > Y_0 \) pay positive taxes

If personal incomes are random, the income tax provides
social insurance

The progressivity of the linear income tax structure

\[ t_A = a_1 = \frac{R_1}{Y_1} \]

A linear income tax is progressive, although the marginal tax rate is constant.

The effect on incentives to work

Although the tax structure is progressive, the flat rate of income taxation provides favorable incentives to work
The simplicity of the optimal linear tax

There is a need to choose only one rate of taxation

The rate of taxation $t$ determines the income transfer $G$ paid to everybody in the population, by determining the tax revenue $R$ that is available for redistribution
Social insurance and taxation

- Higher $G$ provides more social insurance by providing more income support for the low-income population
- Higher tax revenue $R$ is required to finance the more generous income support
- More tax revenue in turn results in a greater excess burden of taxation
The government’s budget constraint

Choice of the income subsidy $G$ and the tax rate $t$ are linked through the government’s budget constraint

$$t \sum_{i=1}^{n} Y_i = nG$$
A complexity in solving for the optimal linear income tax

\[ nG = t \sum_{i=1}^{n} Y_i(t, G) \]

where

\[ Y_i = Y_i(t, G) \]

Taxable earned income \( Y_i \) depends on the tax rate and on the income transfer received from government

The optimal solution for the tax and income transfer needs to be consistent with the supply of labor that provides that tax base on which the income tax is levied
Choice of the social welfare function for deriving the optimal tax rate

Rawls’s social welfare function will require a higher income transfer $G$ and higher value of the tax rate $t$

There is a greater efficiency loss through the higher excess burden of taxation.
The value of the optimal tax rate

Conclusion from simulations:

Progressive systems of income taxation can be replaced with a “flat” or proportional rate of income taxation of 20 to 25 percent to yield the same revenue as the progressive tax system in place.
If the same tax revenue as provided by progressive taxation can be obtained with greater efficiency by a flat or proportional tax rate, we have another expression of the Laffer curve

A progressive tax structure places the government on the wrong (or inefficient side) of the Laffer curve

Why do governments then retain progressive taxes?
The general optimal income tax problem

- The optimal linear income tax constrains the income tax schedule to be linear
  - The optimal linear income tax requires solving for the two variables $t$ and $G$

- The solution to the general optimal income tax problem is a tax function or tax schedule $R(Y)$
  - The optimal outcome might the linear income tax
James A. Mirrlees set out the problem in 1971

- Ideally for Mirrlees, a society achieves ex-post equality by taxing individuals’ innate abilities to maximize a social welfare function

- Any symmetric social welfare function would give ex-post equality as the solution through appropriative taxation and equal redistribution
Mirrlees

- Ideally tax innate ability but there is asymmetric information about individuals’ abilities
  - A government can only observe and tax personal incomes

- Choose a Bentham social welfare function
- Choose a common utility function

- People differ in unobserved abilities to earn income
  - The government knows the distribution of abilities in the population
• An incentive-compatibility constraint
  - Individual decisions to work maximize personal utility for the structure of taxes that a government chooses

• As in the linear income tax problem, the optimal tax schedule includes negative rates of taxation or income transfers for people with low pre-tax incomes

• The government has a budget constraint that revenue collected is equal to the value of income transfers
The tradeoff between progressive and regressive taxation

- Progressive taxation is desirable because of the objective, in the social welfare function of ex-post (post-tax) equality
- Regressive taxation because of
  - The Ramsey rule
  - The effects of taxation on the tax base
Under regressive taxation, there is a disincentive for low-income people to work

Under progressive taxation, there is a disincentive for high-income people to work at high levels of income
A higher-ability person can always copy the work behavior of the lower-ability person

The solution for the Mirrlees optimal income tax indicates that:

*The tax system should provide incentives for higher-ability people to reveal their ability by earning at least as much income as lower-ability people*

*The tax structure should not therefore discourage more able people from working more than less able people*
The Mirrlees optimal income tax structure has zero marginal tax rates at the bottom and top of the income distribution.

- Regressive marginal tax rates approaching zero for the highest income earners encourage high-ability or high-income people to keep working and to provide income that expands the tax base.
  - A zero marginal tax rate at the highest income is optimal because the highest-income person is not discouraged from working more.
• If everybody is working, the marginal tax rate is zero for the lowest-ability person in the population
  
  o The initial zero marginal rate of income taxation provides incentives to enter the labor force
  
  o Such incentives are provided by an earned-income tax credit at low levels of income or wage subsidies that counteract taxes in the tax schedule at low levels of income
Progressivity or regressivity in the optimal tax schedule

Mirrlees’ expectations and conclusions

*Being aware that many of the arguments used in favor of low marginal tax rates for the rich are, at best, premised on the odd assumption that any means of raising the national income is good, even if it diverts part of that income from rich to poor, I must confess that I had expected the rigorous analysis of income taxation in the utilitarian manner to provide an argument for high tax rates. It has not done so*
I had also expected to be able to show that there was no great need to strive for low marginal tax rates on low incomes when constructing negative-income-tax proposals. The feeling has been to some extent confirmed. But my expectation that the minimum consumption level would be high has not been confirmed. Instead, virtually everybody is brought into the work force.

Computations and simulations of the optimal income tax

- Because of the inconclusiveness of general answers,
proposals for the Mirrlees optimal income tax have been derived from computations and simulations

- Mirrlees concluded: An optimal income tax structure is not very progressive and that the highest marginal rate should not exceed 30 to 35 percent
- Are incentives important? The answer implicit in the utility function chosen determines the “optimal” tax structure
D. Political and social objectives

Taxes are decided through political processes

Subject to rational ignorance and fiscal illusion, political support of an incumbent government depends on how taxes are levied
Complexity of tax structures

Desirable income tax structures are simple

- Few marginal tax rates
- Limited progressivity
- Limited exemptions from payment of taxes
- Limited tax deductions

In practice tax structures are often complex

- Exemptions and deductions are often selectively targeted
• Is there politically determined discrimination among different categories of taxpayers?

• Do complex tax codes result in rational ignorance on the part of taxpayers and citizens about the tax code

• Accountants and tax lawyers benefit from the complexity of tax structures
Tax reform is motivated by

- The Laffer-curve comparison between a linear income-tax system and progressive tax systems with tax deductions and exemptions

Tax reform simplifies the tax code

Eliminate

- Sources of inefficiency
- Complexities of deductions and exemptions

Reduce

- Marginal tax rates are reduced
- The number of tax brackets
Can tax reform introduce Pareto-improving change?

Distributional consequences

Hugh Dalton (1887-1962): There should be no change in the ranking of households in the income distribution

After a simplifying tax reform has taken place, complexity in the tax laws generally returns

Social mobility and taxation

Do high tax rates and high progressivity obstruct social mobility?
We return to the question for which we do not have an answer:

**Why are income taxes progressive?**

**The equal-sacrifice principle**

- The best hope for finding a normative justification for progressive taxes: no allowance is made for the efficiency losses due to taxation
- An outcome where a progressive tax structure is consistent with equal sacrifice can only be fortuitous
- Governments do not design public policy about income tax schedules using the equal-sacrifice sacrifice principle
The Laffer-curve comparison:

- Governments can obtain the same tax revenue from simple low-rate linear income taxes as from complex less efficient progressive income-tax schedules
- Nonetheless, governments in general prefer the progressive income taxes

The political preference for a more complex progressive tax code

- The political benefit from the political discretion to choose who benefits from the deductions and exemptions of the tax code
Voters

Progressive taxation seems “fair” to voters

*Why do voters prefer progressive taxation?*

The feeling of fairness of progressive taxes does not depend on how tax revenue is spent
Envy?

Progressive taxes reduce

- pre-tax income inequality
- post-tax income inequality

*Progressive taxation is consistent with envy, if someone having more time for leisure is envied less than someone having more income*

What are the origins of envy in human behavior?