

The background of the slide features a low-angle, upward-looking perspective of several large, light-colored stone columns. The columns are part of a classical building, with ornate capitals visible at the top. The sky is a clear, pale blue. The text is overlaid on this background.

EFFICIENT AND EQUITABLE TAXATION

Chapter 16

Optimal Commodity Taxation: The Ramsey Rule

- The purpose of the theory of optimal commodity taxation is to provide a framework for answering this question: At what rates should various goods be taxed?
- Goal: Finance the province's given expenditure level with a minimum of excess burden and without using any lump-sum taxes.

$$w(T - I) = P_X X + P_Y Y$$

$$wT = P_X X + P_Y Y + wl$$

$$wT = (1 + t)P_X X + (1 + t)P_Y Y + (1 + t)wl$$

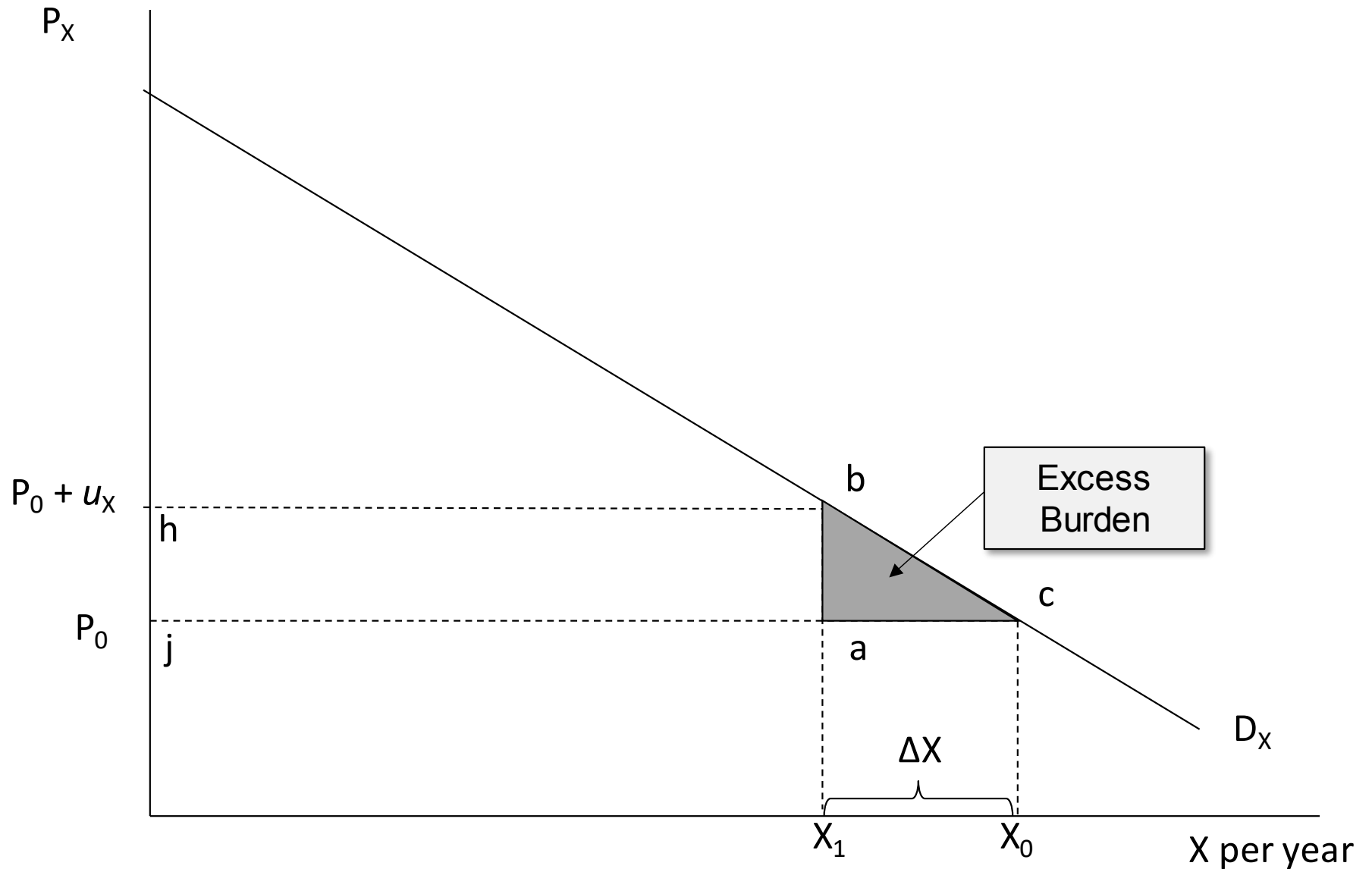
$$\frac{1}{1 + t}wt = P_X X + P_Y Y + wl$$

Optimal Commodity Taxation: The Ramsey Rule

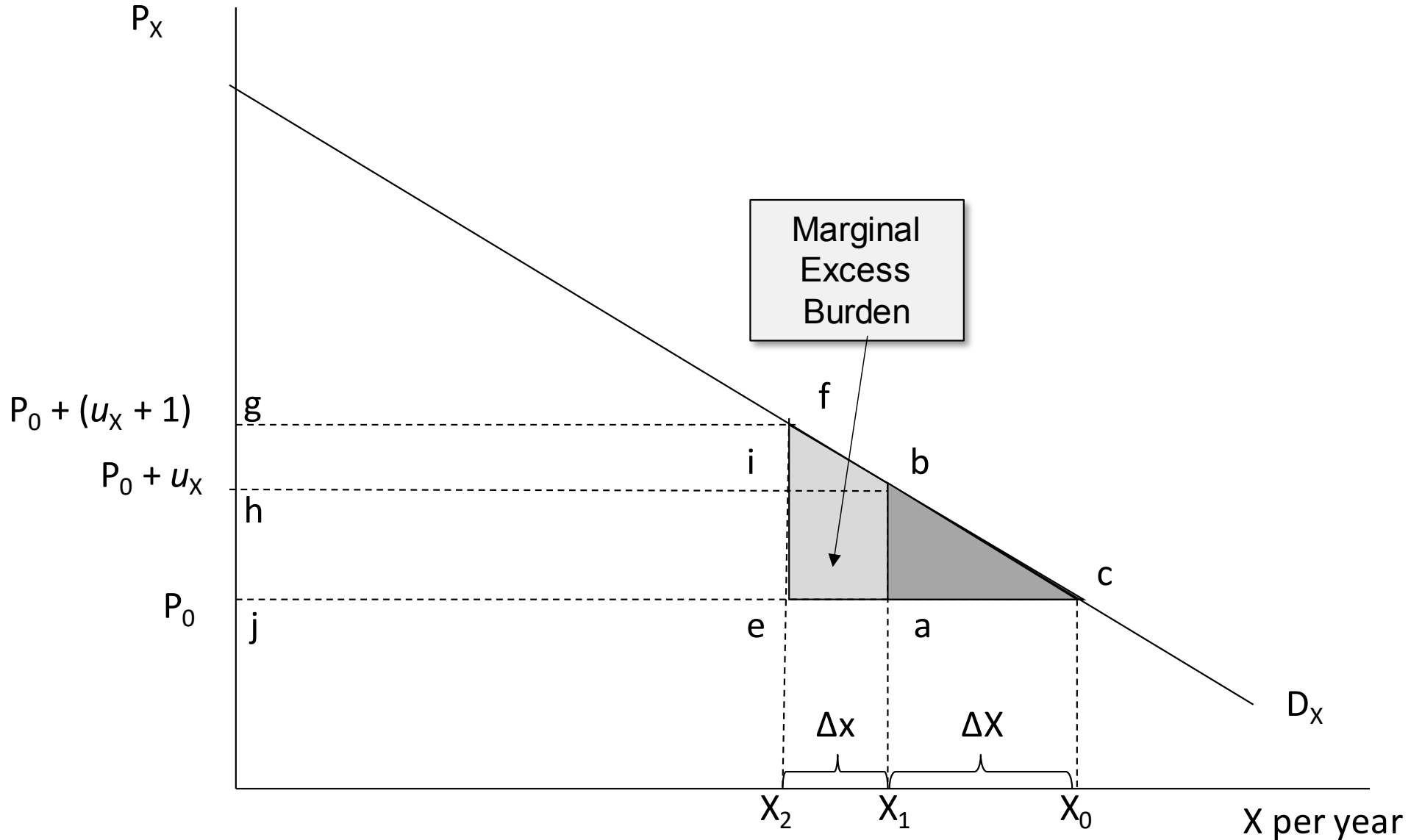
To raise the revenue with the least excess burden possible, how should the tax rates on X and Y be set?

- To minimize overall excess burden, the marginal excess burden of the last dollar of revenue raised from each commodity must be the same.
- Otherwise, it would be possible to lower overall excess burden by raising the rate on the commodity with the smaller marginal excess burden and lowering the rate on the commodity with the larger marginal excess burden.

Marginal Excess Burden



Marginal Excess Burden (cont.)



The Ramsey Rule

Change in tax revenues = area *gfih* – area *ibae*

$$= X_2 - (X_1 - X_2)u_X$$

Marginal tax revenue

$$= X_1 - \Delta X$$

Marginal tax revenue per additional dollar of tax revenue

$$= \Delta X / (X_1 - \Delta X)$$

Marginal tax revenue per additional dollar of tax revenue for good Y

$$= \Delta Y / (Y_1 - \Delta Y)$$

To minimize overall excess burden

$$= \Delta X / (X_1 - \Delta X) = \Delta Y / (Y_1 - \Delta Y)$$

Therefore,

$$\Delta X / X_1 = \Delta Y / Y_1$$

A Reinterpretation of the Ramsey Rule

The relationship between the Ramsey rule and demand elasticities:

- Let η_x be the compensated elasticity of demand for X.
- Let t_x be the tax rate on X, this time expressed as an ad valorem rate rather than a unit tax.

$$t_x \eta_x = t_y \eta_y$$

$$\frac{t_x}{t_y} = \frac{\eta_y}{\eta_x}$$

**Inverse
elasticity rule**

The Corlett-Hague Rule

Corlett and Hague (1953) proved an interesting implication: When there are two commodities, efficient taxation requires taxing commodity complementary to leisure at a relatively high rate.

If it were possible to tax leisure, a “first-best” result would be obtainable.

- Revenues could be raised with no excess burden.

Taxing complements to leisure (e.g., yacht) at high rates.

- Indirect way to “get at” leisure and move closer to the perfectly efficient outcome.

Vertical Equity

The inverse elasticity rule says inelastically demanded goods should be taxed at relatively high rates. Is this fair?

Efficiency versus Equity

- Vertical equity: tax burdens fairly distributed across people with different abilities to pay.

Optimal departure from Ramsey Rule

$$(r-p) = \eta * g$$

social discount rate - rate of time preference
= elasticity * growth rate of consumption

- Strength of egalitarian preferences
- Difference in consumption patterns of rich and poor

Optimal Income Taxation

- We have assumed that a government can levy taxes on all commodities and factors of production.
- We now turn to the question of how to design systems in which tax liabilities are based on people's incomes.
- Income taxation is an obvious candidate for special attention because of its importance in the revenue structures of most developed countries.

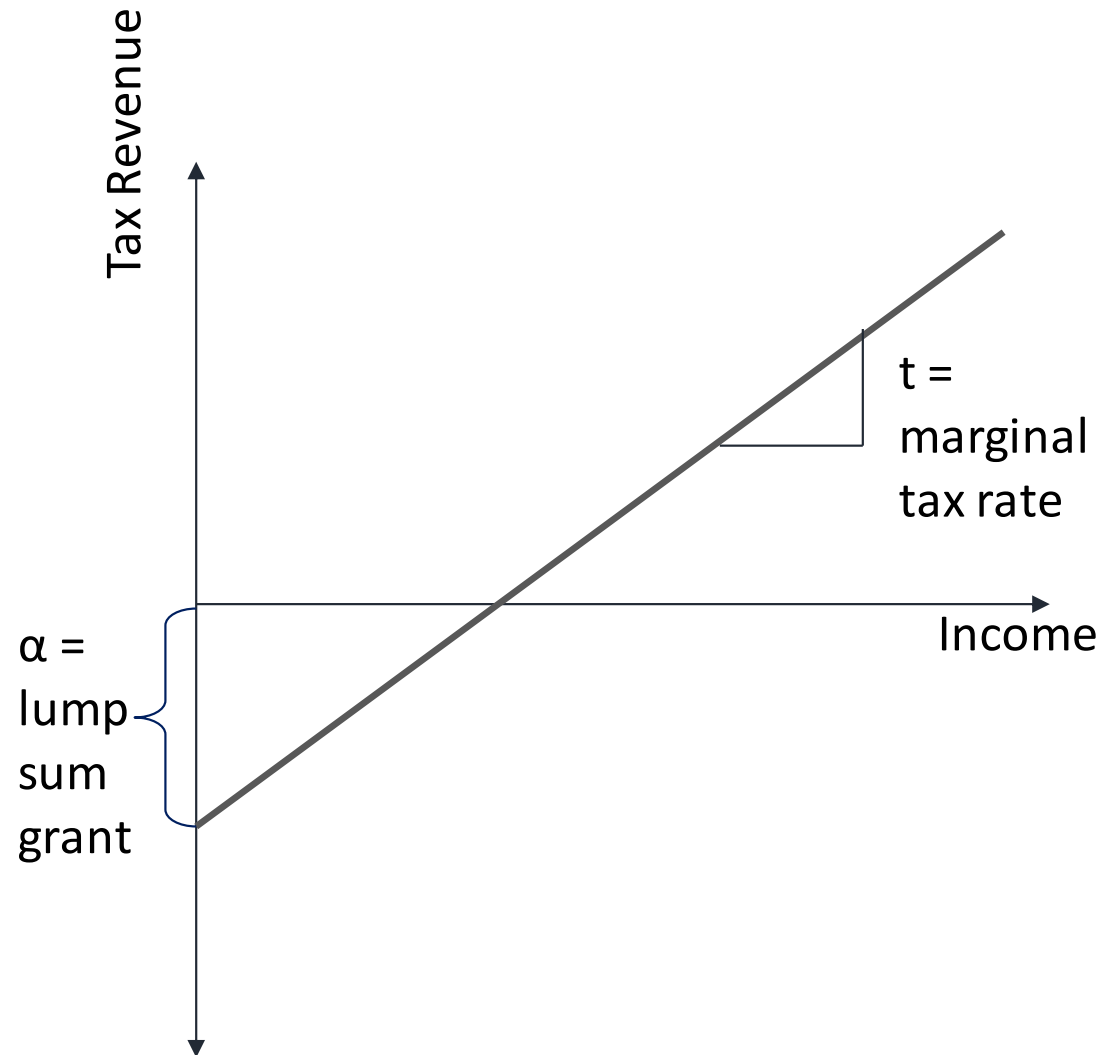
Optimal Income Taxation: Edgeworth's Model

$$W = U_1 + U_2 + \dots + U_n$$

- Individuals have identical utility functions that depend only on their incomes
- Total amount of income fixed
- Implications of model for income tax
- After-tax distribution of income is as equal as possible
- Progressive tax structure

A Linear Income Tax

- Supply-side responses to taxation
 - Linear income tax model (flat income tax)
 - Revenues = $-\alpha + t I$
- Income



Other Criteria for Tax Design

In the context of optimal tax theory, a fair tax is one that guarantees a socially desirable distribution of the tax burden; an efficient tax is one with a small excess burden.

Horizontal equity:

- Optimal taxation depends on the trade-off between “efficiency” and “fairness.”
 - Utility definition of horizontal equity
 - Transitional equity

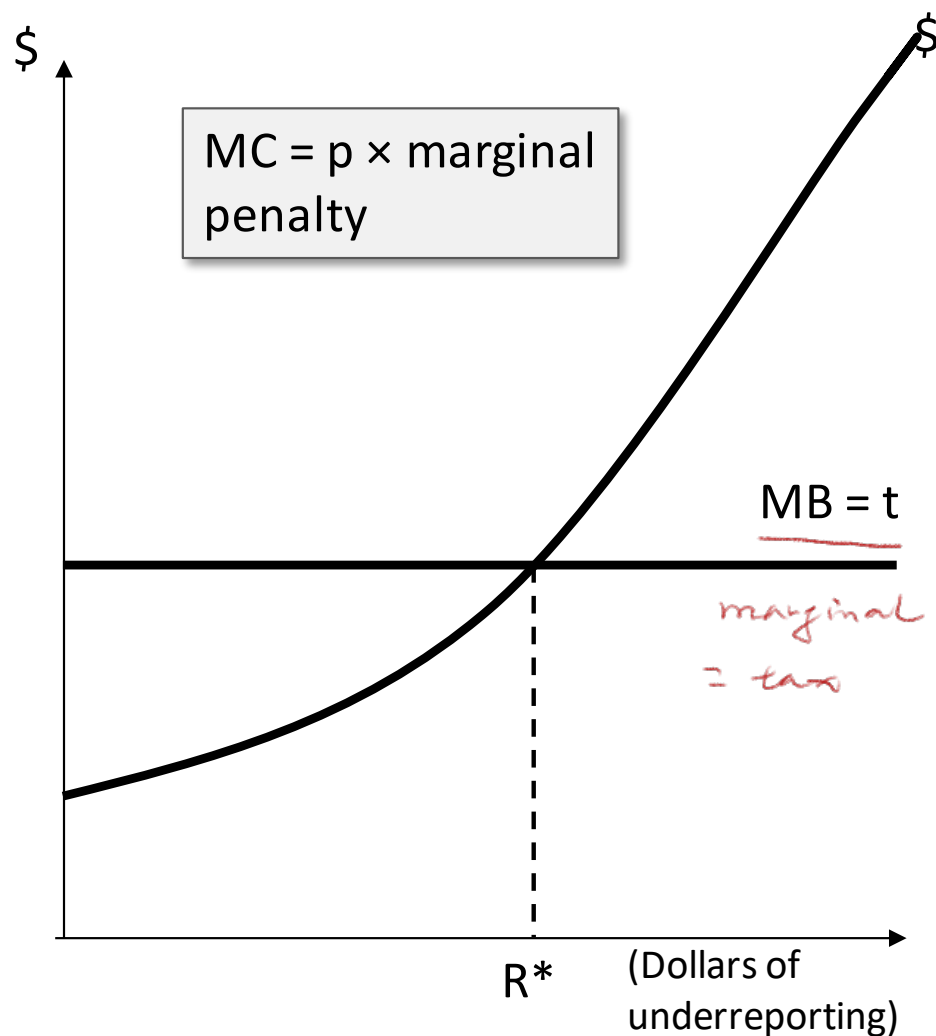
Other Criteria for Tax Design: Administrative Costs

- Tax administration is not a costless activity.
- Costs of administering the income tax in Canada.
 - Vaillancourt (1989); Speer, Palacios, Lugo, and Vaillancourt (2014); Vaillancourt, Roy-César, and Barros (2013).
- Tax authorities require resources to do their job.
- Types of costs
 - Compliance 遵守
 - Administrative
- Key: think carefully about whether the administrative costs are worth the benefits.

Tax Evasion

- The most important problems facing any tax administration: cheating.
- It is important to distinguish between evasion and avoidance.
- Methods of tax evasion:
 - Keeping two sets of books : hiding income
 - Moonlight for cash : doing extra work to get cash paid
 - Bartering ^{以物易物} : Trading goods or service with other good or service
 - Dealing in cash : conducting transactions strictly in cash

Optimal Tax Evasion Is Positive

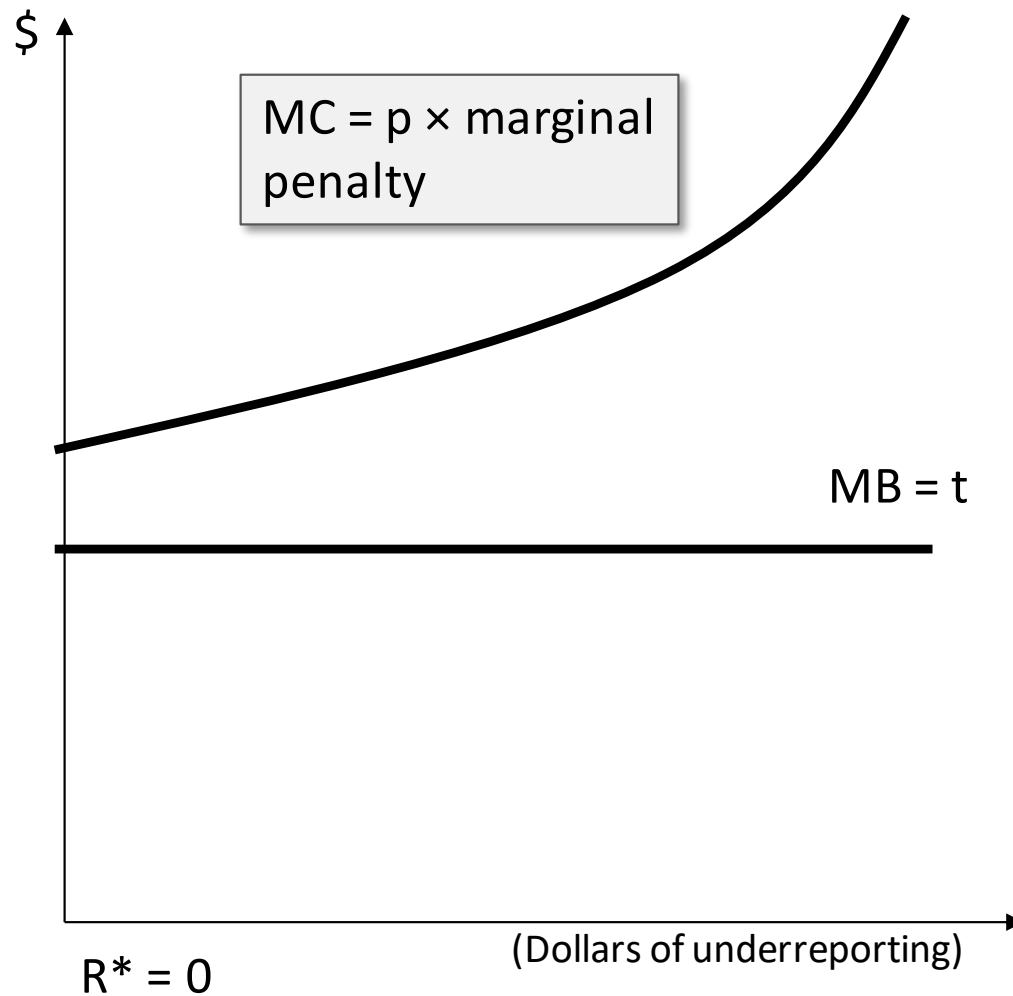


- The marginal benefit (MB) for each dollar not reported is t , the amount of tax saved.
- The expected marginal cost (MC) is the amount by which the penalty goes up for each dollar of cheating (the marginal penalty) times the probability of detection. *probability \times penalty*
- The “optimal” amount of cheating is where the two schedules cross, at R^* .

the optimal case:

$MC = t$

Optimal Tax Evasion Is Zero



- The marginal cost of cheating exceeds the marginal benefit for all positive values of R .
- The optimum R is equal to zero.

Costs of Cheating

Psychic costs of cheating:

- Tax evasion may make people feel guilty.

Risk aversion:

- To the extent that individuals are risk averse, their decisions to engage in what is essentially a gamble may be modified.

Work choices:

- Underground economy.

Normative Analysis of Tax Evasion

Most public discussions of the underground economy assume it's a bad thing.

- Under certain conditions, underground economy raises social welfare.
- What if the underground economy can provide employment to those who would otherwise be unemployed in the legal sector?

Amnesty: allowing delinquent taxes to be paid without prosecution.

Chapter 16 Summary

- Efficient commodity tax theory studies how to raise a given amount of revenue with a minimum of excess burden.
- The Ramsey rule stipulates that to minimize excess burden, tax rates should be set so that the proportional reduction in the quantity demanded of each good is the same.
- When goods are unrelated in consumption, the Ramsey rule implies that relative tax rates should be inversely related to compensated demand elasticities.

Chapter 16 Summary (cont.)

- Edgeworth's early study of optimal taxes stipulated that after-tax incomes be equal; however, when the excess burden of distorting the leisure-income tradeoff is included, marginal tax rates less than 100 percent are optimal.
- Tax systems may be evaluated by standards other than those of optimal tax theory; horizontal and vertical equity, the costs of administration, incentives for tax evasion, and political constraints all affect the design of tax systems.

Chapter 16 Summary (cont.)

- Traditional definitions of horizontal equity rely on income as a measure of “equal position”
 - The utility definition is more precise but leads to radically different policy provisions.
 - Other definitions focus on the rules by which taxes are chosen.
- Administrative and compliance costs affect the choice of the tax base, tax rates, and the amount of evasion.

Questions For Discussion (1 of 4)

In Adam Smith's *The Wealth of Nations*, he describes a "window tax" that was imposed on dwellings in England. The tax per window increased with the number of windows.

- a. Evaluate this tax in terms of the likely cost of administering it.
- b. Evaluate it in terms of vertical equity.
- c. Describe a simple way by which people with already existing dwellings could avoid tax.
- d. Relate such avoidance behaviour to the concept of excess burden.

a) progressive tax

Questions For Discussion (2 of 4)

In Thailand, where commodity taxes account for almost 60 percent of tax revenues, the price elasticities for food, alcohol, and telecommunications are estimated to be -0.10 , -0.84 , and -0.25 , respectively (Chandoevwit and Dahlby, 2007). If the goal of policy is to raise tax revenue with the least excess burden possible, what tax rates should be applied to alcohol and telecommunications, when the tax rate on food is fixed at 1.6 percent? (Suppose the commodities are neither substitutes nor complements.)

Questions For Discussion (3 of 4)

The demand for X is given by $X = 100 - 2P_x$, and its supply is perfectly elastic at $P_x = 14$. The demand for Y is given by $Y = 350 - 3P_y$, and its supply is perfectly elastic at $P_y = 18$. The government aims to raise R dollars by imposing ad valorem taxes t_x and t_y on the consumption of X and Y . What is the optimal ratio of taxes t_x/t_y according to the inverse elasticity rule? If $R = \$1,000$, what are the optimal solutions for t_x and t_y ?

Hint: As a shortcut, the elasticity of demand for good X is -0.39 and the elasticity of demand for good Y is -0.18

Questions For Discussion (4 of 4)

Suppose that Sharlene faces a marginal income tax rate of 35 percent, and if she cheats on her taxes, there is a 2 percent chance that she will be caught. Suppose also that the marginal penalty of tax evasion is $10R$, where R is the amount of unreported income (in thousands of dollars). How much income will Sharlene fail to report?