EE 442
Economics of Public Revenue

Topic 10
Corporation Income Tax

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Why tax corporations?

- Does it make sense to have a special tax system for corporations in the first place?
- From a legal point of view: Corporations are people.
- But only real people can pay a tax.
  - If so why should corporate activity be subject to a special tax?
  - Why not just tax the incomes of the corporation owners via the personal income tax?

- Reasons for a separate corporation tax:
  - Corporations, especially very big ones, really are distinct entities. Large corporations ⟶ thousands of stockholders and the managers.
  - The corporation receives a number of special privileges from society: limited liability of the stockholders.

    The corporation tax ⟶ user fee for this benefit.
  - The corporation tax protects the integrity of the personal income tax. In the absence of a corporation tax, the earnings of a corporation which is retained by the corporation creates no tax liability. The money will be taxed when it is eventually paid out. Note: taxes deferred are taxes saved.

Not taxing corporate income creates opportunities for personal tax avoidance.

Structure

- *Earning* is the revenue of the corporation from selling goods and services in the market.
- *Expense* is the spending on operating the businesses which are
  - Cash flow which is used in running business: salary, wages, raw material costs, utilities and etc.
  - Depreciation allowance

    Economic depreciation is the depreciation in machine or previous investment.

    EX: The firm buys machine at 10,000 baht. After running the machine, the real value reduced to 9,000 baht. The loss in value is economic depreciation. In practice, it is very difficult to measure the economic depreciation so we need to know the depreciation schedules.

Investment tax credit

- Tax code may include an investment tax credit (ITC), which permitted a firm to subtract some portion of the purchase price of an asset from its tax liability at the time the asset was acquired.
- EX: If the air conditioner costs 20,000 baht and if the firm was allowed an ITC of 10%, ⟶ the purchase of an air conditioner lowered the firm's tax bill by 2,000 baht.

The effective price of the air conditioner (before depreciation allowances) is 18,000 baht.

- In general, If ITC is k and the acquisition price is q, the effective price of the asset was (1-k)q.
- The value to the firm of an ITC did not depend on the corporate income tax rate because the credit was subtracted from tax liability rather than taxable income.

Treatment of dividends VS retained earnings

- Corporate profits may either be retained by the firm or paid to stockholders in the form of dividends.
- Dividends paid are not deductible from corporation income and are subject to the corporation income tax.
- Dividends received by shareholders were treated as ordinary income and taxed at the individual's marginal income tax rate.
- Such payments were taxed twice:
  - ✓ at the corporation level and
  - ✓ when distributed to the shareholders.

Incidence and excess burden

- Q: Who ultimately bears the tax burden?

  What are the costs of any inefficiencies it induces?

A tax on corporate capital

- The firm is not allowed to deduct from taxable income the opportunity cost of capital supplied by shareholders.
- The corporation tax is a tax on capital used in the corporate sector.
- The corporation tax is a partial factor tax.
- In general equilibrium model, the tax on corporate capital leads to a migration of capital from the corporate sector until after-tax rates of return are equal throughout the economy.

- As capital moves to the noncorporate sector, the rate of return to capital there is depressed so that ultimately all owners of capital are affected.
- The return to labour is also affected.
- Efficiency aspects:
  - The corporation tax induces less capital accumulation in the corporate sector than otherwise would have been the case.
  - The corporation tax diverts capital from its most productive uses and creates an excess burden. The excess burden of corporation tax is very high (Jorgenson and Yun (2001)), about 24% of the revenues collected.

A tax on economic profits

- Another view is that the corporation tax is a tax on economic profits.
- The tax base is determined by subtracting costs of production from gross corporate income, leaving only "profits."
- If a firm maximizes economic profits, a tax on them induces no adjustments in firm behavior (no changes in decisions on prices and production).

- There is no way to shift the tax.
- The owners of the firm have to bear the tax burden at the time the tax is levied.
- The tax leaves behavior unchanged ⟶ it generates no misallocation of resources. ⟶ The excess burden is zero.

- The base of a pure profits tax is computed by subtracting from gross earnings the value of all inputs including the opportunity cost of the inputs supplied by the owners.
- No such deduction for the capital supplied by shareholders is allowed. ⟶ The base of the tax includes elements other than economic profits.
- Thus, modelling the corporation tax as a simple tax on economic profits is almost certainly wrong.

- EX: A firm purchases of a machine costing 1 baht.
- Suppose the before-tax value of the output produced by the machine is known with certainty to be G baht.
- Suppose the firm finances the purchase with debt. It borrows 1 baht and must pay an interest charge of r baht.
- No tax: the firm buys the machine if the net return (total revenue – depreciation – interest) > 0.

$$G - r > 0 \quad \text{----- (1)}$$

- Imposing corporation tax:

  1.) Net income is taxed at rate θ.

  2.) Net income is computed by subtracting interest costs from total revenue.

- What is the effect on the firm's decision?
- The firm must choose on the basis of the after-tax profitability of the project.
- The firm taxable income = G- r.
- The project creates a tax liability = $\theta(G - r)$.
- The after-tax profit on the project = $(1 - \theta)(G - r)$.
- The firm undertakes the project only if the after-tax profit is positive, which is, if

  $(1 - \theta)(G - r) > 0$ ----- (2)

- Any project that passes the after-tax criterion [(1 - **ϴ**)(G – r) > 0] also satisfies the before-tax criterion [G – r > 0]. (divide equation (2) by (1 - **ϴ**) ⟶ get equation (1)).
- The tax leaves the firm's investment decision unchanged. ⟶ The owners of the firm continue to behave exactly as they did before the tax.
- They lose some of their profit on the investment to the government.
- In this sense the tax is equivalent to an economic profits tax. ⟶ Its incidence is on the owners of the firm, and it crates no excess burden.

- The conclusion depends on the underlying assumptions, and these can easily be questioned.
- We assume that firms finance their additional projects by borrowing.
- There are several reasons why they might instead raise money by selling shares or using retained earnings.

EX: Firms may face constraints in the capital market and be unable to borrow all they want.

If a firm is uncertain about the project's return, it might be reluctant to finance the project by borrowing. If things go wrong, the greater a firm's debt, the higher the probability of bankruptcy, other things being the same.

- We cannot conclude that the corporate tax has no excess burden.
- The key insight is that the impact of the corporation tax depends in an important way on the structure of corporate finance.

The Incidence of the corporation income tax and its effects on efficiency

- Suppose that firm does not finance their business by loan (does not get benefit from interest payment deduction allowance.)
- Corporation tax ⟶ after-tax return of capital ↓ in corporate sector in the S-R.

But in the L-R, if supply of capital is fixed and is perfectly mobile between corporate and noncorporate sectors, when return on corporate capital < noncorporate capital ⟶ corporate sector substitute labour for capital ⟶ labour shifts from the noncorporate sector to corporate sector.

Products from corporate sector is more expensive. With new equilibrium between these 2 sectors, the return on corporate capital and noncorporate capital are equal. ⟶ Capital in all sectors have to bear tax burden in the economy.

Consumers bear some of the cost in the form of higher price.

Labour partially bear tax burden. If corporate sector is far more labour intensive than noncorporate sector. When the demand in corporate sector $\downarrow \longrightarrow$ demand for all labour $\downarrow$ (severe result). If we can easily substitute capital for labour in noncorporate sector. So noncorporate sector will substitute capital for labour because price of capital is cheaper.

The share of tax burden between each group, consumers, capital owners and labour, depends on price elasticity of demand, elasticity of substitution and labour intensity between 2 sectors.

The effects of corporation tax in the S-R and L-R may be different.

Empirical study (John Shoven)

- Corporation tax creates dead weight loss (DWL) = 12% from tax revenue. Consumers and labour also have to bear tax burden.

The share of the burden borne by owners of capital is measured by the change in the income of capital divided by total corporate tax revenues.

If tax burden > 100% ⟶ income of capital ↓ > tax revenue.

Mostly, corporate sector is relatively capital intensive. When demand moves toward noncorporate sector ⟶ ↓ demand for capital and ↓ returns to capital.

When the elasticity of substitution in corporate sector is smaller ⟶ return to capital will ↓ more in order to absorb capital which is release from changes in components of demand. This explains the result of Shoven's study. He found that capital bear 162% of tax burden in case of the elasticity of substitution of noncorporate sector is very low compare to corporate sector and consumer's demand elasticity is low.

If we don't know price elasticity of demand and elasticity of substitution, we will not know that capital bares tax burden > or < 100%. ⟶ Cannot conclude that corporation tax is a tax on capital or consumers.

Shifting of the corporate tax in the L-R

- Harberger model interested in the effects of taxation in general equilibrium.
- When imposing tax in one sector, it will affect the whole economy.
- If capital is perfectly mobile, capital will equally bear tax burden in both sectors.
- Tax burden in general equilibrium model will be different to the direct effect. In some cases, capital will bear tax burden more than 100%.

- The criticism of Harberger model.

1. The assumptions that stock of capital is constant and can move freely among economic sectors may not be true.

If stock of capital is not constant, it will give different results.

EX: A small country which has perfectly price elastic of supply of capital at interest rate, r*. Return after-tax is not changed.

a) After-tax, cost of production in corporate sector increases.

b) The production moves to noncorporate sector.

c) Demand for labour will be increased or decreased depends on the labour intensity in noncorporate sector is more than or less than in corporate sector.

- No tax burden on owner of the capital.
- Consumers in corporate sector always bear some tax burden.
- Labour may or may not be affected.

2. Tax itself is not collect only on return to capital. The interest payment can be deducted from the tax base. The depreciation allowance reduces cost of capital and stimulate capital usage.

The user cost of capital

- Suppose that cost of a machine = p.
- Suppose that the firm rents machine for 1 year in competitive capital market.
- Interest rate = r.
- Interest = rp baht.
- Depreciation rate = δ.
- Depreciation = δp baht.
- If R is return on machine, the firm will rent this machine if

$$R > (r + \delta)p \quad \text{---- (3)}$$

- The effects of corporation tax depend on the deductibility allowances. EX: If the firm rents machine, the whole amount of rent should be deductible.
- From (3), if rent and depreciation do not change. After-tax, we multiply both sides of the equation by (1- t) ⟶ tax does not create any distortion. ⟶ The firm still rent the machine as long as $R > (r + \delta)p$, the same way as before-tax.

- Assume that the firm buys the machine. The interest payment for loan can be deductible.
- Assume that the firm borrows money in the proportion of α. $\longrightarrow$ The interest payment that can be deducted = αrp.
- δp is the real economic depreciation. But most of the time, the firms can deduct depreciation more than δp.
- Suppose that "a" is the proportion of depreciation which can be deducted more than the real depreciation. $\longrightarrow$ The depreciation deductible = $a\delta p$ ($a > 1$).
- The government can also give the firm investment tax credit.

- EX: If the cost of machine = 100 million baht.
- If the government provides tax credit = 5%. $\longrightarrow$ tax paid $\downarrow$ by 5 million baht. (similar to government pays 5% of the cost or price of the machine $\downarrow$ by 5%).
- Given c is the rate of tax credit. $\longrightarrow$ The cost of capital per year = $(r + \delta)p(1-c) - t(\alpha r + a\delta)p(1 - c)$.
- The first term is cost per year after investment tax credit.
- The second term is the value of income tax that can be deducted.

- Suppose that the firm borrows the whole amount of money to invest ($\alpha = 1$), no depreciation which is more than real depreciation ($a = 1$) and no investment tax credit ($c = 0$). $\longrightarrow$ The cost of capital $\downarrow$ = $\downarrow$ in return of capital $\longrightarrow$ no distortion.
- If no investment tax credit, the firm which borrows money to finance their investment by 80% $\longrightarrow$ the benefit from depreciation deductible more than the real depreciation > taxing equity if

$$(a - 1)\,\delta > .2r$$

- The benefit from depreciation which is more than real depreciation will be more in the case of durable goods.
- If imposing corporation tax, it may lead to over-investment in durable goods and under-investment in non-durable goods.

Imposing corporation tax on the firm which has no constraints on borrowing

- In previous section, the firm has constant debt to equity ratio. (the firm can finance their investment by borrowing money in the proportion of α.)
- To see the result of deductible interest payment, we assume that depreciation deductible reflects the decreasing in factory and machines' prices after long usage.
- If no depreciation deductible more than it is supposed to be, no investment tax credit and the firm finances their investment by borrowing money $\longrightarrow$ no distortion.
- The return $\downarrow$ = (1 – t). But the cost of capital $\downarrow$ in proportion.

- In economic decision making, we have to consider the effects on return and cost of capital at margin.
- At margin, the firm in capital market can choose to finance their investment by borrowing. ⟶ their MC will ↓ by (1 – t) (reduce in the same proportion as return of capital) ⟶ no effects on investment decision after corporation tax.

- EX: Long life durable goods (with no depreciation).
- Suppose that the firm borrows money to buy this asset.
- Price of the asset = p baht.
- Cost of the asset before-tax = rp
- Cost of the asset after-tax = r(1 – t)p
- At the margin, is it worth to borrow a little bit more to invest a little bit more?

- Neoclassical theory: If firm has no limit in borrowing money at the margin (marginal investment debt financed) with interest payment deductible, ⟶ corporation tax does not create investment distortion.
- In practice, most of the investment is financed by borrowing.
- At the margin, the firm uses their retained earnings (the amount that has left after dividend payment) to invest. The big investment, the firm finances by loan.

Imposing corporation tax on the firm which has constraints on borrowing

- If the firm cannot borrow money or cannot sell their shares, they have to invest by using their retained earnings. (With tax ⟶ less capital to invest ⟶ less investment.)
- The effects of corporation tax depend on the average tax rate (the decreasing in funding that can be used for new investment.)

- New firms will sell their shares to finance their investment. Normally, it is the only source of funding that they can get.
- Banks think that long term loan for these new business is too risky.
- These business units are too small to issue long term bonds.
- Firms do not want to invest in the long run with short run loans.
- In the short run, the entrepreneurs would like to get most of their return from their shares (more than payment in the form of salary). ⟶ Corporation tax with interest payment deductible will have the opposite effects to the investment of new firms which has constraint on borrowing money to finance their investment.

- If this result is correct, the effects of corporation tax in long run will not be related to resource reallocation between corporate and noncorporate sectors.
- We have to consider the level of innovation in corporate sector and the rate of progression in technology. The size of the effects depends on the elasticity of supply of the entrepreneurs and the level of risk acceptance.
- Summary: the effects of corporation tax depend on tax preferable such as interest payment deductible and the status of corporation (with or without loan constraint.)

- Many researches which study the effects of corporation tax assume that marginal cost of capital = average cost of capital.
- If the firm can finance the marginal investment by loan (if depreciation deductible = real economic depreciation)

  ⟶ may not create marginal distortion from corporation tax and marginal cost of capital may not = the average cost of capital.

Corporation tax ⟶ Tax on monopoly profits

- Monopoly ⟶ monopoly profit
- Pure profit or excess profit (total revenue – total cost)
- In the L-R, in competitive market with constant return to scale ⟶ no excess profit
- Corporation tax ⟶ related to tax on monopoly profit ⟶ lump sum tax on monopolist (Monopolists would like to maximize profit ($\prod$))
- Suppose that tax rate = t.
- After-tax profit = $(1 - t)\prod$
- Firm tries to maximize profit ⟶ Max: $(1 - t)\prod$.

- Whether the economic distortion from corporation tax in monopoly market will be more or less than in competitive market, is uncertain.
- If the corporation tax ⟶ tax on excess profit ⟶ no distortion.
- On the other hand, assume the corporation tax as an excise tax. So imposing tax on products in corporate sector (monopoly market) ⟶ production in that sector < the optimal level ⟶ distortion.

- The price of product under monopoly market may ↑ more than tax per unit.
- Under monopoly market, with constant demand price elasticity ⟶ the mark up price > the marginal cost (including tax).
- If the mark up = 20%, that means if MC ↑ by 1 baht from taxation ⟶ price ↑ by 1.20 baht.
- If the corporate sector composes of a lot of monopoly industries ⟶ tax will be shifted to consumers and price of product ↑ > tax revenue.

Managerial firms: an alternative perspective

- The analysis so far has assumed that firms maximize their after-tax returns.
- There are a number of aspects of firms' behavior that do not agree with this view.
- For instance, later we shall show that firms should not pay dividends; there are better (from a tax perspective) ways of distributing funds from the corporate to the household sector.
- The fact that firms have continued to distribute as much of their earnings as they have is called the "dividend paradox." Firms' dividend policy is not the only inexplicable aspect of corporate behavior.

- Accelerated depreciation provides another “tax paradox.”
- When the firms and individuals have the right to depreciate their assets at an accelerated rate. ⟶ The total nominal depreciation allowances are unaffected. (= the cost of the machine – its salvage value)
- More rapid depreciation ⟶↓ reported income and taxes in the early years of the asset.
- All firms should take advantage of this opportunity.
- Firms should make it clear to their shareholders that the firm has made use of accelerated depreciation. The shareholders would take such a report as a positive signal of good management, and the absence of such a report as negative signal.

- Firms have a choice of how to treat their inventories.
- Assume a firm that is selling steel beams bought some steel at 40,000 baht per ton and some at 100,000 baht per ton a few months later (as a result of rapid inflation in the industry). Both kinds of steel are in its inventory.
- When steel beams are sold for 110,000 baht per ton, it does not say that its cost of purchase was 40,000 or 100,000 baht per ton.
- The internal revenue service allows the firm to choose what to say, so long as it does so in a consistent manner.
- It can say either that it is always selling the item most recently acquired or it is selling the first item acquired.

Explanations for tax paradoxes

- 2 explanations.

1. Managers of the firms have considerable discretion in managing their firms, sometimes pursuing their own interests at the expense of shareholders' interests. They may not pursue value-maximizing strategies.

- They may wish to maximize the rate of growth of the firms. They may do this because they believe that the larger their firm and the faster its rate of growth, the larger their salary or simply because they enjoy the excitement that accompanies expansion and the personal recognition that it affords.
- In this view, the discipline of the marketplace simply is not strong enough to ensure that managers act in a profit- or value- maximizing manner.
- Firms which, rather than maximizing profits, pursue the interests of managers are called managerial firms.

2. Firms (or their managers) are rational but that shareholders are irrational. Shareholders do not understand how the tax system (or corporations) work.

- They would see the firm's current reported profits decline, and they would believe that the firm was not doing as well as it was.
- As a result, the price of the firm's shares would decline. Managers whose compensation often depends partly on the market value of the firm, thus prefer to keep shareholders "happy" by engaging in policies that do not minimize the firm's tax liabilities.
- Both explanations probably are partially correct.

Treatment of dividends VS retained earnings

- Understanding how the corporate and personal tax structures interact is important.
- Corporate profits may either be retained by the firm or paid to shareholders in the form of dividends.
- Dividends paid are not deductible from corporation income and are subject to the corporation income tax.
- Dividends received by shareholders were treated as ordinary income and taxed at the individual's marginal income tax rate.
- In effect, such payments are taxed twice. Once at the corporation level and again when distributed to the shareholder.

- To assess the tax consequences to the shareholder of retained earnings is a bit more complicated.
- Suppose that XY retains 1 baht of earnings. If the stock market accurately values firms, the fact that the firm now has one more baht causes the value of XY stock to increase by 1 baht.
- Income generated by ↑ in value of stock-capital gain- is treated preferentially for tax purposes. This is because the gain received by a typical XY stockholder is not taxed until it is realized, and even then the rate is relatively low.
- The tax system thus creates incentives for firms to retain earnings rather than pay them out as dividends.

Effective tax rate on corporate capital

- The statutory tax rate on capital income in the corporate sector is currently 20%. (not the effective tax rate)
- At the corporate level, computing the effective rate requires considering the effects of interest deductibility, depreciation allowances, and inflation.
- Corporate income in the form of dividends and realized capital gains is also taxed at the personal level.
- Any such calculation requires assumptions on items such as the appropriate choice of discount rate, the expected rate of inflation, the extent of true economic depreciation, and so forth.
- The effective burden of the corporate tax depends in part on how investment is financed, by borrowing, issuing stock, or using internal funds.

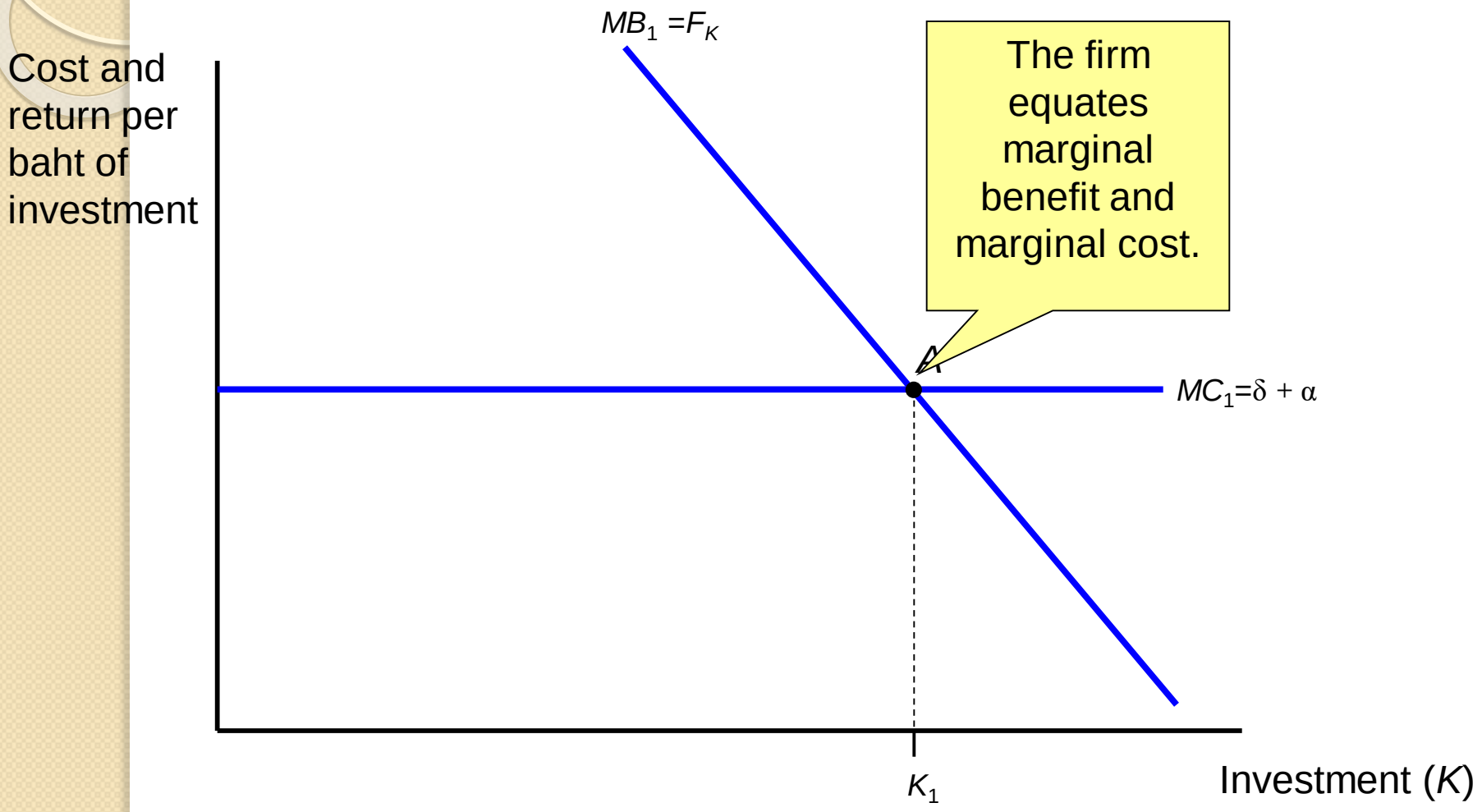
Corporation tax burden

- We can use general equilibrium analysis to analyze tax burden.
- Who bears tax burden?
- Tax can be easily shifted forward and backward because the price elasticity of demand is not perfectly elastic.

- The firms also have to bear some parts of the tax burden.
- The price elasticity of labour supply is also not perfectly elastic so workers also have to bear some tax burden.
  - In the S-R, capital (such as machines) cannot easily be moved ⟶ they bear most of tax burden.
  - In the L-R, machines can be moved freely between sectors or moved to aboard, capital will adjust easily.
  - The adjustment of factors of production in country will affect the production in non-corporate sector. ⟶ Every sector will share tax burden.

Corporation tax and investment decision

- Investment decision ⟶ compare between marginal benefits (MB) and marginal costs (MC) of investment
- Corporation tax affects MB, MC and depreciation allowance ⟶ effects on investment decision.

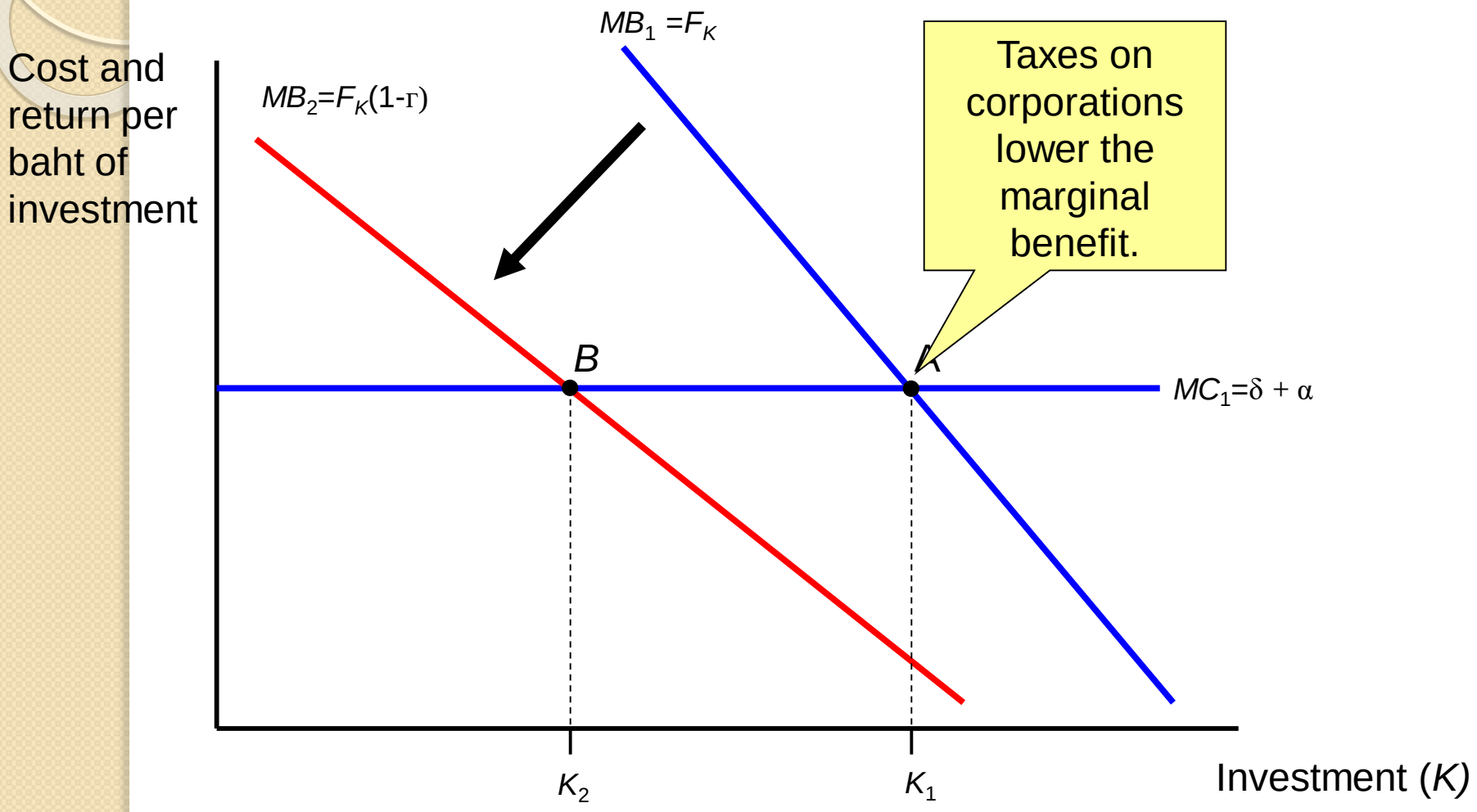

Cost and return per baht of investment
$MB_1 = F_K$
The firm equates marginal benefit and marginal cost.
A
$MC_1 = \delta + \alpha$
K_1
Investment (K)

Corporation tax and investment decision

- MB of production is productivity of the investment $\longrightarrow F_K$.
- MB is diminishing marginal returns the same way as general production.
- Suppose that MC is fixed: MC = depreciation cost (δ) + financing costs (α).
- Given investment = K_1.

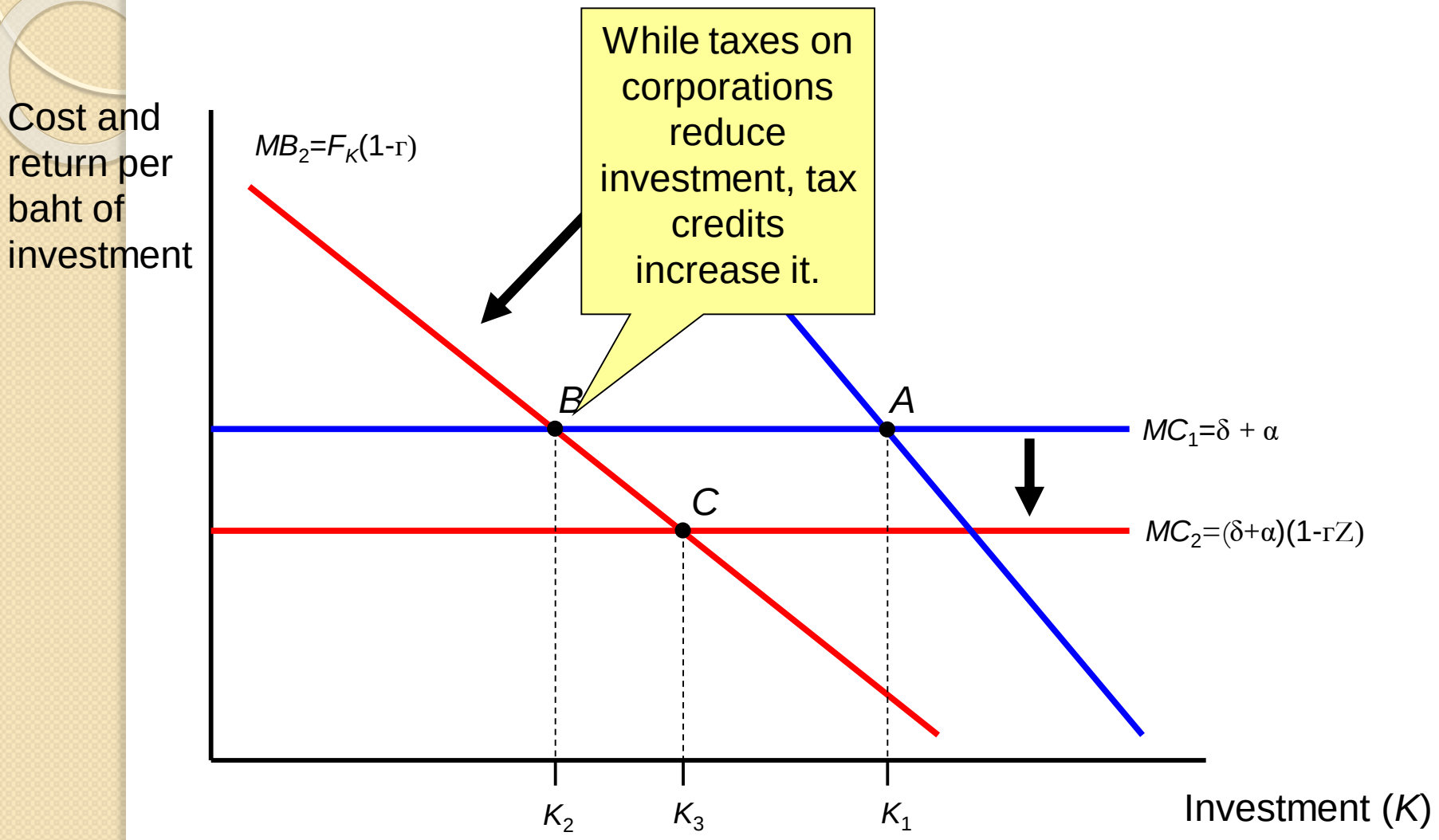
Corporation tax and investment decision

- How does corporation tax affect investment decision?
- After imposing tax, return on capital ↓ from F_k to $(1-\Gamma)F_K$.
- Γ is tax rate.


Cost and return per baht of investment
$MB_1 = F_K$
$MB_2 = F_K(1-\tau)$
Taxes on corporations lower the marginal benefit.
B
A
$MC_1 = \delta + \alpha$
K_2
K_1
Investment (K)

Corporation tax and investment decision

- Corporation tax ⟶ MB shifts down to MB_2.
- Firm will invest less.
- Government will get tax revenue from returns on private investment.
- After-tax return is still more than depreciation and financing costs of the firm ($\delta+\alpha$).
- Investment reduced to K_2.


Cost and return per baht of investment
While taxes on corporations reduce investment, tax credits increase it.
$MB_2=F_K(1-\tau)$
B
A
C
$MC_1=\delta+\alpha$
$MC_2=(\delta+\alpha)(1-\tau Z)$
K_2
K_3
K_1
Investment (K)

Corporation tax and investment decision

- Corporation tax affects on 3 kinds of decision.

1. The amount of physical investment (buildings, machines and etc.)

2. Types of physical assets which the firm needs to buy.

3. Financing methods.

Total physical investment

- Net investment during a given period is the increase in physical assets during that time.
- The main policy question is:
  - Do features such as accelerated depreciation and the investment tax credit stimulate investment demand?
- The answer depends on the views of how corporations make their investment decisions.
- Many different models have been proposed, and there is no agreement of which is the best.
- 3 investment models are as follows.

1. Accelerator Model

- Suppose the ratio of capital to output in production is fixed.
- EX: Production of every unit of output requires 3 units of capital. ⟶ for each unit ↑ in output, the firm must ↑ its capital stock (invest) 3 units of capital.
- The main determinant of the amount of investment is changes in the level of output demanded.

- This is the theory of the “Accelerator model” which implies that depreciation allowances and ITCs are basically irrelevant when it comes to influencing physical investment.
- It is only the quantity of output that influences the amount of investment, because technology dictates the ratio in which capital and output must be used.
- In other words, tax benefits for capital may make capital cheaper, but in the accelerator model this does not matter, because the demand for capital does not depend on its price.

2. Neoclassical Model

- The ratios of capital to output is not technologically fixed.
- Rather, the firm can choose among alternative technologies.
- How does it choose?
- Jogenson's neoclassical model: A key variable is the firm's user cost of capital (the cost the firm incurs as a consequence of owning an asset).
- The user cost of capital includes both the opportunity cost of forgoing other investments and direct costs such as depreciation and taxes.
- The user cost of capital indicates the rate of return a project must attain to be profitable.

- EX: If the user cost of capital on a project is 15%, a firm undertakes the project only if its rate of return > 15%.
- The higher the user cost of capital ⟶ the lower is the number of profitable projects, and the lower the firm's desired stock of capital.
- In the neoclassical model, when the cost of capital ↑ ⟶ firms choose less capital-intensive technologies, and vice versa.
- To the extent that tax policy ↓ the cost of capital ⟶ it can ↑ the amount of capital that firms desire and ↑ investment.

- 2 important questions:

1. How do changes in the tax system affect the user cost of capital?

2. Just how sensitive is investment to changes in the user cost of capital?

The user cost of capital

- Mr. A can lend his money and receive an after-tax rate of return of 10%.
- Mr. A is a sole of stockholder in a corporation that runs a chain of hotels.
- He can always earn 10% simply by lending in the capital market, ⟶ he will not make any investment in the hotel that yields less than that amount.
- Assume that Mr. A is considering the acquisition of a vacuum cleaner that would experience economic depreciation of 2% annually.
- Ignoring taxes first.
- The user cost of capital for the vacuum cleaner would be 12%, because the vacuum cleaner would have to generate a 12% return to earn Mr. A the 10% return that he could receive simply by lending his money.

- If r is the after-tax rate of return.
- δ is the economic rate of depreciation.
- The user cost of capital is $(r + \delta)$.
- If the vacuum cleaner cannot earn $(r + \delta)$ (or 12%) after taxes, $\longrightarrow$ there is no reason to purchase it.

- Assume that the corporate tax rate is 35%.
- Mr. A marginal tax rate on dividends is 15%.
- All of the corporation's earnings are paid out to Mr. A as dividends.
- If the corporation earns 1 baht, a corporation tax of 0.35 baht (= 0.35 x 1) is due, leaving 0.65 baht available to distribute to Mr. A.
- When Mr. A receives the 0.65 baht as dividends, he pays individual income tax at a rate of 15%, leading to a tax liability of 0.098 baht (= 0.15 x 0.65), which leaves him with 0.552 baht.

- If ϴ is the corporate tax rate.
- t is the individual tax rate on dividend income.
- The after-tax return from 1 baht of corporate profits is (1 - ϴ) x (1 – t).

- How do these taxes affect the cost of capital?
- We have to find a before-tax return such that, after the corporate and individual income taxes, Mr. A receives 12%.
- The user cost of capital (C) $\longrightarrow$

  $(1 - 0.35) \times (1 - 0.15) \times C = 12\%$

  or $C = 21.7\%$
- Mr. A is unwilling to purchase the vacuum cleaner unless its before-tax return is 21.7% or greater.

- The user cost of capital is the value of C which solves the equation:

$$(1 - \Theta) \times (1 - t) \times C = (r + \delta)$$

or

$$C = \frac{r + \delta}{(1 - \Theta) \times (1 - t)}$$

- Corporate and individual tax rates ↑ the user cost of capital.

- Other provisions in the tax code such as accelerated depreciation $\longrightarrow \downarrow$ the cost of capital.
- Defined γ is present value of the depreciation allowances that flow from a 1 baht investment.
- Suppose that the γ for the vacuum cleaner is 0.25.
- In effect, depreciation allowances $\downarrow$ the cost of acquiring the vacuum cleaner by ¼ $\longrightarrow \downarrow$ by ¼ the before-tax return that the firm has to earn to attain any given after-tax return.
- From our example, instead of having to earn 21.75%, the vacuum cleaner now only has to earn 16.3% [21.75 x (1 – 0.25)].

- Depreciation allowances lower the cost of capital by a factor of $(1 - \gamma)$.
- An investment tax credit at rate k, ↓ the cost of a 1 baht acquisition to $(1 - k)$ baht.
- In the presence of both depreciation allowances and an investment tax credit, the cost of capital ↓ by a factor of $(1 - \gamma - k)$.
- The expression of C in the previous equation must be multiplied by $(1 - \gamma - k)$ to adjust for accelerated depreciation and ITCs:

$$C = \frac{(r + \delta) \times (1 - \gamma - k)}{(1 - \theta) \times (1 - t)}$$

- The equation summarizes how the corporate tax system influences the firm's user cost of capital.
- By taxing corporate income, the tax makes capital investment more expensive, other things being the same.
- However, depreciation allowances and ITCs tend to lower the user cost.
- Any change in the corporation tax system influences some combination of θ, γ and k, and hence changes the user cost of capital.

Effect of user cost on investment

- If the Accelerator Model is correct, even drastic reductions in the user cost have no impact on investment.
- On the other hand, if investment responds to the user cost of capital, depreciation allowances and ITCs can be powerful tools for influencing investment.
- Chirinko (2002) found that an elasticity of investment with respect to the user cost of 0.4 is pausible.

- An important implicit assumption in this discussion is that the before-tax price of capital goods is not affected by tax-induced changes in the user cost of capital.
- EX: Firms start purchasing more capital goods in response to the introduction of an ITC, this does not increase the price of capital goods.
- In more technical terms, the supply curve of capital goods is perfectly horizontal.

- Goolsbee (2003) found that the introduction of an ITC ↑ the relative wages of workers who produce capital goods, which would tend to ↑ the price of capital goods.
- Hence, some of the ↑ in investment induced by the credit is dampened by an ↑ in the before-tax price of capital goods.

3. Cash Flow Model

- Cash flow is the difference between revenues and expenditures for inputs.
- The more money that is on hand, ⟶ the greater the capacity for investment.
- In contrast, cash flow is irrelevant in the neoclassical investment model.
- Neoclassical investment model: Internal funds and borrowed money both have the same opportunity cost, the going rate of return in the economy. ⟶ The firm can borrow as much money at the going rate of return as it wishes. ⟶ If the return on producing a new kind of computer chip > the opportunity cost, the firm will make the chip, whether it has to borrow the money or use internal sources.

- A critical assumption behind the neoclassical story is that the cost to the firm of internal and external funds is the same.
- Many economists believe that this is a bad assumption.
- Why?
- Suppose that the managers of the firm have better information about the prospects for the computer chip than the potential lenders do. In particular, the lenders may view the project as being more uncertain than management and so charge a very high interest rate on the loan. Or they might not be willing to lend any money at all.
- Thus, the cost of internal funds is lower than the cost of external funds, ⟶ the amount of investment depends on the volume of these internal funds, the cash flow.

- Stein (2003) showed that there is a statistical relationship between cash flow and investment.
- However, the interpretation of this finding is not clear, - do firms invest because their cash flow is high, or do successful firms have both high cash flow and investment?

- If the cash flow theory is correct, it has major implications for the impact of taxes on investment behavior.
- EX: In neoclassical model, a lump sum tax on the corporation has no effect on investment.
- In contrast, in a cash flow model, investment falls.

Types of Asset

- The tax system affects the types of assets purchased by firms as well as the total volume of investment.
- EX: The system encourages the purchase of assets that receive relatively generous depreciation allowances.
- Gravelle (2004) computed the effective marginal tax rates on various types of assets and found that structures were taxed slightly more heavily than equipment.

Corporate Finance

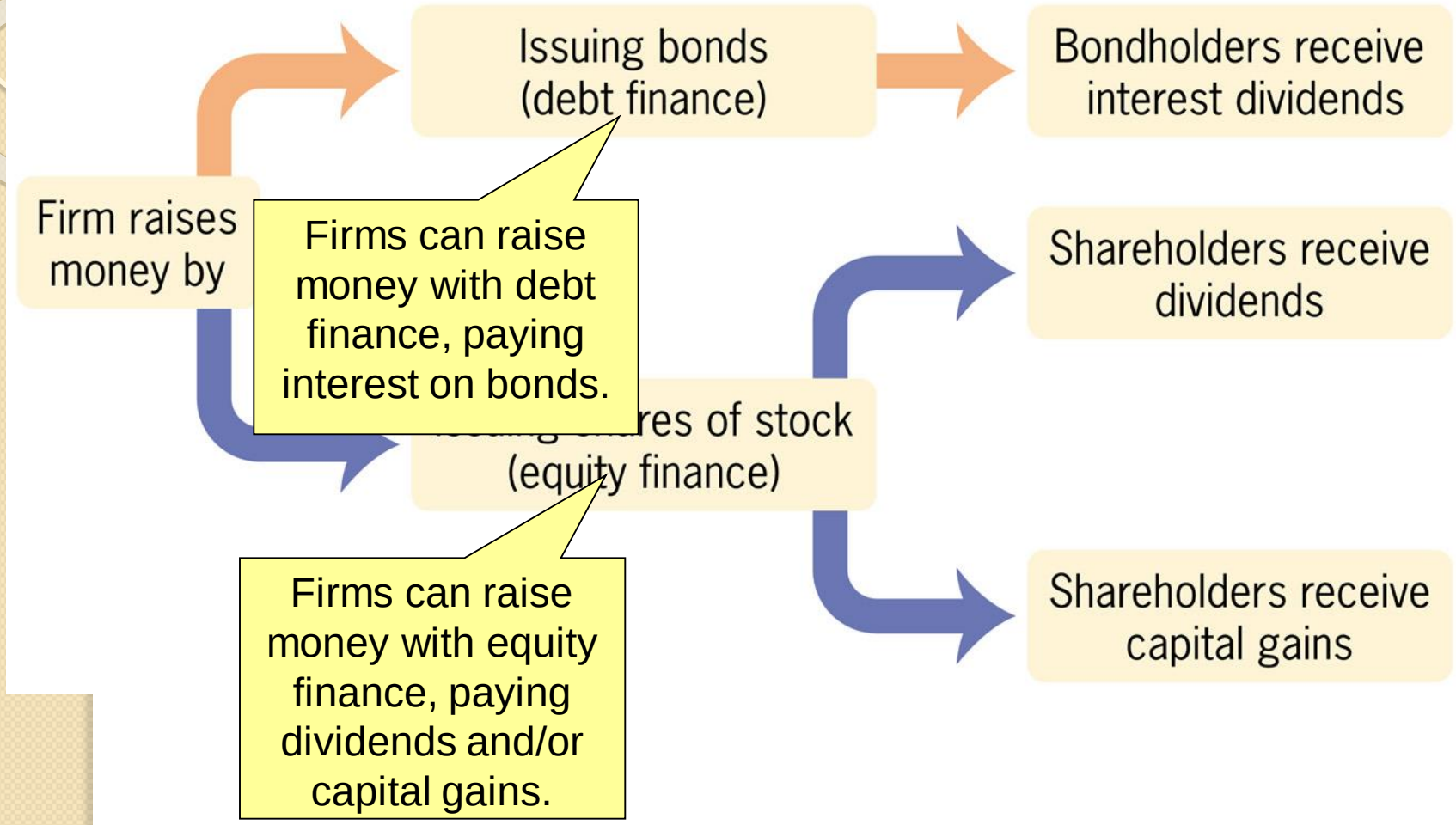
- A firm must determine how to finance the firm's operations and whether to distribute or retain profits.
- The firm has basically 2 options to raise money:
  - Debt finance
  - Equity finance

The effects of taxes on financial decisions

- *Debt finance*: The firm can borrow money (issue debt). The firm must pay interest on its debt, and inability to meet the interest payments or repay the principal may have serious consequences.
- The firm can borrow money from some financial institutes such as bank, etc. or issue corporate bonds.
- A bond is a debt investment in which an investor loans money to a corporate which borrows the funds for a defined period of time at a variable or fixed interest rate. Bonds are used by corporations to raise money and finance a variety of projects and activities. Owners of bonds are debtholders, or creditors, of the issuer.

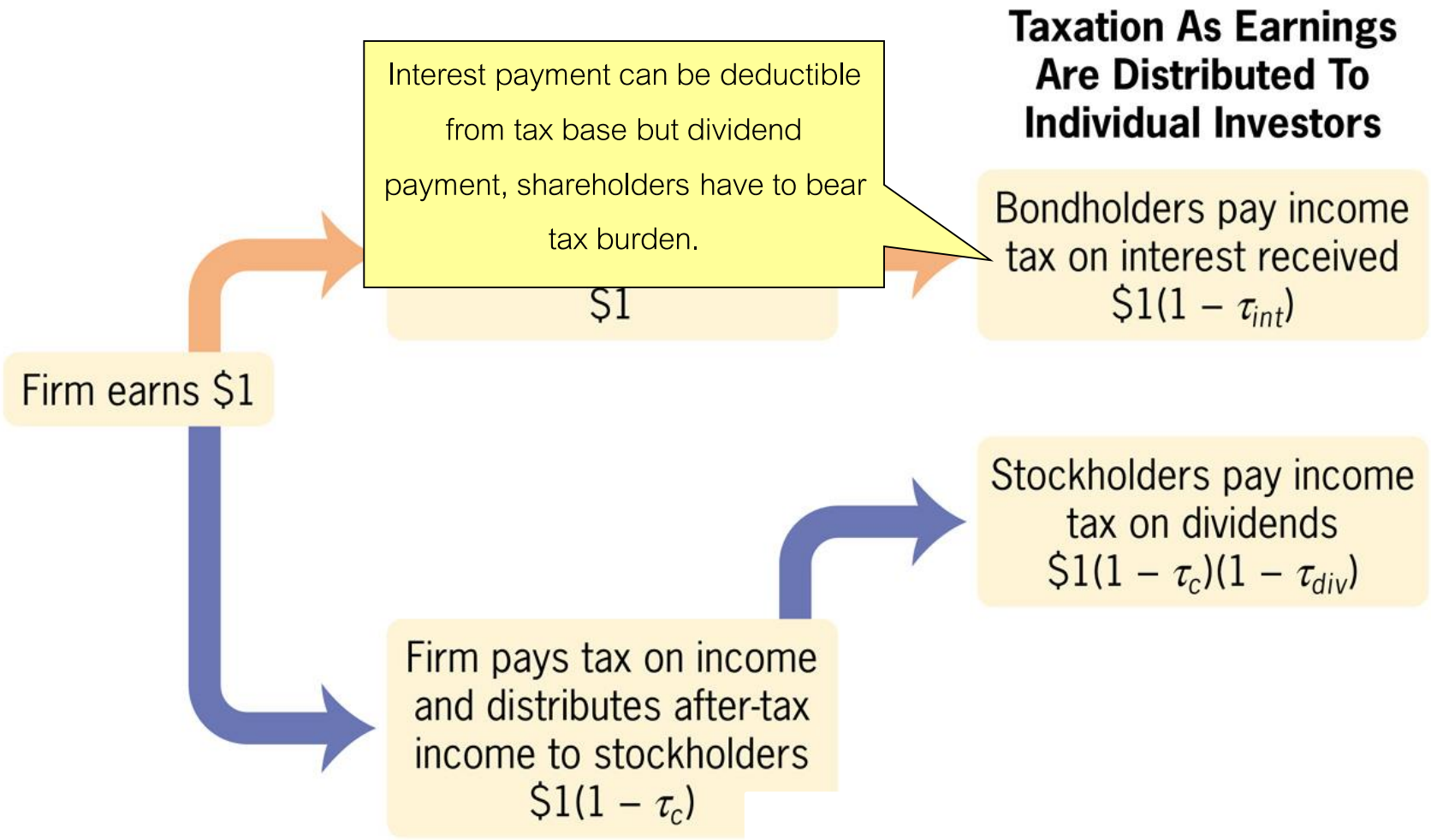
The effects of taxes on financial decisions

- *Equity finance:* A firm can issue shares of stock (equity), and stockholders may receive dividends on their shares.
- The stockholders get their returns in the form of dividends and capital gains.


Issuing bonds
(debt finance)
Bondholders receive
interest dividends
Firm raises
money by
Firms can raise
money with debt
finance, paying
interest on bonds.
Shareholders receive
dividends
res of stock
(equity finance)
Firms can raise
money with equity
finance, paying
dividends and/or
capital gains.
Shareholders receive
capital gains

The effects of taxes on financial decisions

- Suppose that the firm needs to invest 10 baht which will get 1 baht in return each year.
- There are 2 choices to finance:
  - Debt finance
  - Equity finance


Taxation As Earnings Are Distributed To Individual Investors
Interest payment can be deductible from tax base but dividend payment, shareholders have to bear tax burden.
Bondholders pay income tax on interest received
$1(1 – τint)
$1
Firm earns $1
Stockholders pay income tax on dividends
$1(1 – τc)(1 – τdiv)
Firm pays tax on income and distributes after-tax income to stockholders
$1(1 – τc)

The effects of taxes on financial decisions

- When firms pay interest to creditors, firms do not have to pay taxes for that amount of income (interest paid to creditors) which will be counted as corporate expenses.
- Creditors bear the tax burden on returns that they receive at the rate of $1 \times (1-t_i)$.

The effects of taxes on financial decisions

- If the firm finances by selling stocks, the firm cannot get benefits from expense deductibles.
- The firm will be faced with a corporate tax rate at $1x(1-t_C)$ which will fall on every stockholder.
- Every stockholder gets a net return = $1(1-t_C) \times (1-t_{DIV})$

The effects of taxes on financial decisions

- The tax law builds in a bias toward debt financing.
- We might wonder why firms do not use debt financing exclusively.
  - The uncertainty that firms face. ⟶ possibility of a very bad outcome and bankruptcy. The more a firm borrows, the higher its debt payments, and the greater the probability of bankruptcy, other things being the same.
- Some argue that by encouraging the use of debt, the tax system has the undesirable effect of increasing the probability of bankruptcies above levels that would otherwise prevail.