Chapter 19
The Equity Implications of Taxation: Tax Incidence

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Introduction

A central question of tax incidence is who bears the burden of a tax? 

- **Tax incidence** is assessing which party (consumers or producers) bear the true burden of a tax.
- When New Jersey raised the corporate income tax, companies claimed that the tax would just hurt their employees, while the governor claimed the tax would affect the wealth owners of the company.

Introduction

Although the legal incidence of a tax is pretty obvious, markets do respond to taxes, so that the ultimate burden is not nearly so clear.

- As Figure 1 illustrates, the share of taxes paid by corporations has fallen by roughly two-thirds.

Introduction

Although this change in the share of taxes paid by corporations may be viewed as unfair, it is important to recall that corporate taxes are paid by the individuals who own, work for, and buy from corporations.

Introduction

The goal of this lesson is to examine the equity implications of taxation.
- Three rules of tax incidence
- General equilibrium tax incidence
- Empirical evidence

THE THREE RULES OF TAX INCIDENCE

There are three basic rules for figuring out who ultimately bears the burden of paying a tax.
- The statutory burden of a tax does not describe who really bears the tax.
- The side of the market on which the tax is imposed is irrelevant to the distribution of tax burdens.
- Parties with inelastic supply or demand bear the burden of a tax.
The three rules of tax incidence: The statutory burden does not describe who really bears the tax

- **Statutory incidence** is the burden of the tax borne by the party that sends the check to the government.
- For example, the government could impose a 50¢ per gallon tax on suppliers of gasoline.
- **Economic incidence** is the burden of taxation measured by the change in resources available to any economic agent as a result of taxation.
- If gas stations raise gasoline prices by 25¢ per gallon as a result, then consumers are bearing half of the tax.

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- If gas stations raise gasoline prices by 25¢ per gallon as a result, then consumers are bearing half of the tax.

\[
\text{Producer tax burden} = (\text{pretax price} - \text{posttax price}) + \text{tax payments of producers}
\]

\[
\text{Consumer tax burden} = (\text{posttax price} - \text{pretax price}) + \text{tax payments of consumers}
\]

Figure 2

Initially, equilibrium entails a price of $1.50 and a quantity of 100 units.

A 50 cent tax shifts the effective supply curve.

The gasoline tax has two effects:
- It changes the market price
- Producers must now pay a tax to the government

Recall that
- Consumer tax burden = (posttax price – pretax price) + tax payments of consumers
- Consumer tax burden = ($1.80 - $1.50) + 0 = 30¢
- Producer tax burden = (pretax price – posttax price) + tax payments of producers
- Producer tax burden = ($1.50 - $1.80) + $0.50 = 20¢

This analysis reveals that the true burden on producers is not 50¢, but some smaller number, because part of the burden is borne by consumers in the form of a higher price.

The **tax wedge** is the difference between what consumers pay and what producers receive from a transaction.

The wedge in this case is the difference between the $1.80 consumers pay and the $1.30 producers receive.
The three rules of tax incidence: The statutory burden does not describe who really bears the tax

- The second question to examine is whether imposing the tax on the consumers, rather than producers, will change the analysis.
- Figure 3 illustrates the impact of a 50¢ per gallon tax on demanders of gasoline.

The initial market equilibrium is 100 billion gallons sold at $1.50 per gallon.
Although the overall willingness to pay for a unit of gasoline is unchanged, the 50¢ tax lowers the consumers’ willingness to pay producers by 50¢ (since consumers must pay the government). Thus, the demand curve shifts to \( D_2 \).
At the original market price, there is now excess supply of gasoline; producers lower their price until $1.30, where there is neither a shortage nor a surplus.

The quantity is identical to the case when the tax was imposed on the supplier.

The economic burden of the tax is identical to the previous case.
Imagine imposing the tax on demanders rather than suppliers.
The new equilibrium price is $1.30, and the quantity is 90.

The three rules of tax incidence: The side of the market on which the tax is imposed is irrelevant

- Note that these tax burdens are identical to the burdens when the tax was levied on producers.
- This illustrates an important lesson – the side on which the tax is imposed is irrelevant for the distribution of tax burdens.

As before, the new gasoline tax has two effects:
- It changes the market price
- Consumers must now pay a tax to the government

Consumer tax burden = (posttax price – pretax price) + tax payments of consumers
Consumer tax burden = ($1.30 - $1.50) + $0.50 = 30¢

Producer tax burden = (pretax price – posttax price) + tax payments of producers
Producer tax burden = ($1.50 - $1.30) + 0 = 20¢

While there is only one market price when a tax is imposed, there are two different prices that economists track.
- The gross price is the price in the market.
- The after-tax price is the gross price minus the amount of the tax (if producers pay the tax) or plus the amount of the tax (if consumers pay the tax).
The three rules of tax incidence: Inelastic versus elastic supply and demand

- The third question to examine is how the tax burden varies with the elasticities of supply and demand.
- In all cases, elastic parties avoid taxes and inelastic parties bear them.
- Consider Figure 4, with perfectly inelastic demand for gasoline.

![Figure 4](image)

<table>
<thead>
<tr>
<th>Price per gallon ($P_1$)</th>
<th>$P_1 = $2.00$</th>
<th>$P_2 = $1.50$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consumer burden</td>
<td></td>
<td></td>
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<tr>
<td>Producer burden</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$Q_1 = 100$</td>
<td></td>
<td></td>
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<tr>
<td>Quantity in billions of gallons ($Q$)</td>
<td></td>
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</tbody>
</table>

With perfectly inelastic demand, consumers bear the full burden.

The three rules of tax incidence: Inelastic versus elastic supply and demand

- The new equilibrium market price is $2.00, a full 50¢ higher than the original price.
- Consumer tax burden = (posttax price – pretax price) + tax payments of consumers
  - Consumer tax burden = ($2.00 - $1.50) + 0 = 50¢
- Producer tax burden = (pretax price – posttax price) + tax payments of producers
  - Producer tax burden = ($1.50 - $2.00) + 50¢ = 0

Full shifting is when one party in a transaction bears all of the tax burden. Full shifting is when one party in a transaction bears all of the tax burden. With perfectly inelastic demand, consumers bear all of the tax burden.

Now consider Figure 5, with perfectly elastic demand for gasoline.

![Figure 5](image)

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With perfectly elastic demand, producers bear the full burden.

The three rules of tax incidence: Inelastic versus elastic supply and demand

- Note that even though the tax was legally imposed on the producer, the full burden of the tax is borne by the consumer.
- Full shifting is when one party in a transaction bears all of the tax burden.
- With perfectly inelastic demand, consumers bear all of the tax burden.
- Now consider Figure 5, with perfectly elastic demand for gasoline.

The new equilibrium market price is $1.50, the same as the original price.
- Consumer tax burden = (posttax price – pretax price) + tax payments of consumers
  - Consumer tax burden = ($1.50 - $1.50) + 0 = 0
- Producer tax burden = (pretax price – posttax price) + tax payments of producers
  - Producer tax burden = ($1.50 - $1.50) + 50¢ = 50¢
The three rules of tax incidence: Inelastic versus elastic supply and demand

- In this case, the producer bears the full burden of the tax, because consumers will simply stop purchasing the product if prices are raised.
- These extreme cases illustrate a general point:
  - Parties with inelastic supply or demand bear taxes; parties with elastic supply or demand avoid them.
  - Demand is more elastic when there are many good substitutes (for example, fast food at restaurants). Demand is less elastic when there are few substitutes (for example, insulin medication).
  - Supply is more elastic when suppliers have more alternative uses to which their resources can be put.

Figure 6 illustrates these cases – holding demand constant, more inelastic supply leads to a greater tax burden on producers.

More inelastic supply, smaller consumer burden.
More elastic supply, larger consumer burden.

(a) Tax on steel producer
(b) Tax on street vendor

As illustrated in Figure 6a, when a tax is levied on an inelastic supplier – the steel firm that is committed to a level of production by its fixed capital investment – the consumer pays very little of the tax, and the producer almost all of it.

In the second panel, with elastic supply, the consumer bears almost all of the tax.

The three rules of tax incidence: Tax incidence is about prices, not quantities

- Finally, it is important to note that even though quantities change dramatically with perfectly elastic demand, the focus of tax incidence is on prices, not quantities.
- We ignore quantities because at both the old and new equilibria, consumers are indifferent between buying the taxed good and spending the money elsewhere.

TAX INCIDENCE EXTENSIONS

- We extend the analysis by examining:
  - Factors of production
  - Imperfectly competitive markets
  - Accounting for the expenditure side
Tax incidence extensions

**Tax incidence in factor markets**

- Many taxes are levied on the factors of production, such as labor.
- Consider the labor market illustrated in Figure 7a, before and after a tax on workers (the suppliers of labor) is imposed.

![Figure 7a](image)

A tax on workers (the “suppliers” of labor), lowers wages.

- The $1 per hour tax lowers the return to work at every amount of labor.
- Thus, individuals require a $1 rise in their wages to supply any amount of labor, and the supply curve shifts upward.
- With labor demand unchanged, the new equilibrium wage is $5.65. In this case, the tax is borne equally by workers and firms.
- Now consider the labor market illustrated in Figure 7b, where a tax on firms (the demanders of labor) is imposed.

![Figure 7b](image)

A tax on firms (the “demanders” of labor), also lowers wages.

- With the tax on firms, the demand curve shifts downward to $D_2$, and market wages fall to $4.65$.
- The firm pays workers 50¢ less than the original $5.15$, but must send $1$ to the government. In effect, they are paying a wage of $5.65$.
- As in output markets, the tax incidence of a payroll tax shows that it makes no difference on which side of the market it is levied, and the economic burden can differ from the statutory burden.

This analysis will not be correct if there are impediments to wage adjustments, however.

- The minimum wage is a legally mandated minimum amount that workers must be paid for each hour of work.
- The current federal minimum wage is $5.15 per hour.
- With a minimum wage, wages cannot fully adjust, so the incidence will be different.
- Consider, first, Figure 8a, which imposes the tax on workers.
Tax incidence extensions

Tax incidence in factor markets

- With a tax on workers, the labor supply curve shifts upward as before. Workers are paid $5.65 per hour, but are forced to pay $1 of that to the government for taxes.
- The incidence is borne in the same manner as when there was no minimum wage.
- Now consider, Figure 8b, which imposes the tax on firms.

Tax incidence extensions

Tax incidence in factor markets

- With a tax on firms, the labor demand curve shifts downward. Without wage impediments, the market wage would fall from $5.15 to $4.65, and the firm would also pay $1 to the government. Hours of work would be $H_2$.
- With the minimum wage, wages cannot adjust downward, so the firm instead demands $H_3< H_2$ hours of labor, pays $5.15 per hour, and also pays $1 to the government. The economic burden of the tax falls on the firm.

Tax incidence extensions

Tax incidence in imperfectly competitive markets

- The analysis has so far focused on competitive markets.
- **Monopoly markets** are markets in which there is only one supplier of a good.
- Monopolists are price makers, not price takers.
- Figure 9a shows the determination of equilibrium in monopoly markets.
Figure 9a Monopolist

Monopolist sets MR=MC, chooses quantity Q₁.

Tax incidence extensions
Tax incidence in imperfectly competitive markets

- Unlike a perfect competitor, the monopolist faces a downward sloping marginal revenue curve, because it must lower its price on all units to sell another unit.
- The marginal revenue curve, MR₁, is therefore everywhere below the demand curve. Setting MR₁=MC, the quantity Q₁ initially maximizes profits.
- Now consider a tax on consumers, illustrated in Figure 9b.

Figure 9b Tax on consumers

With a tax, both D and MR change, as does the quantity.

Tax incidence extensions
Tax incidence in imperfectly competitive markets

- The tax on consumers shifts the demand curve downward to D₂, and the associated marginal revenue curve to MR₂.
- Setting MR₂=MC, the quantity Q₂ now maximizes profits.
- The monopolist’s price falls from P₁ to P₂, so it bears some of the tax, just as a competitive firm does.
- The three rules of tax incidence continue to apply for a monopolist.

Tax incidence extensions

Most markets fall somewhere between perfect competition and monopoly.

Oligopoly markets are markets in which firms have some market power in setting prices, but not as much as a monopolist.
- There is less consensus on how to model these markets.
- Economists tend to assume the tax incidence results apply in these markets as well.

Tax incidence extensions
Balanced budget tax incidence

- One final extension asks how the money that is raised will be spent.
- Balanced budget incidence is tax incidence analysis that account for both the tax and the benefits it brings.
- It is inconvenient, however, to worry about both the taxation and expenditure side at the same time.
GENERAL EQUILIBRIUM TAX INCIDENCE

- Our models so far have focused on partial equilibrium.
- Partial equilibrium tax incidence is analysis that considers the impact of a tax on a market in isolation.
- To study the effects on related markets, we use general equilibrium analysis.
- General equilibrium tax incidence is analysis that considers the effects on related markets of a tax imposed on one market.

General equilibrium tax incidence
Effects of a restaurant tax: A GE example

- Consider the demand for restaurant meals in a single town, as illustrated in Figure 10.
- The demand for such meals is likely to be highly elastic.

**Figure 10**

In this case demand for meals is perfectly elastic. A $1 tax on firms shifts the supply curve, and the firm bears the full burden of the tax.

But in reality, firms are not self-functioning entities, but are a technology for combining capital and labor to produce an output.

With a restaurant, capital is best viewed as financial capital – the money that buys physical capital inputs like the building, the ovens, tables, etc.

General equilibrium tax incidence
Effects of a restaurant tax: A GE example

- The $1 tax on meals is borne by the firm, meaning that it is borne by the factors of production (labor and capital).
- We move back to the input market in Figure 11.

**Figure 11**

The incidence is “shifted backward” to labor and capital.

Labor therefore does not bear any of the tax burden.

Capital bears the tax.
**General equilibrium tax incidence**

**Issues to consider in GE incidence analysis**

- As illustrated, the supply of labor (restaurant workers) is perfectly elastic, because those workers can easily find a job in another locality.
- The tax on output, restaurant meals, would reduce the firm’s demand for labor, reducing the number of workers hired, but not their wage rate.
- On the other hand, in the short-run, the supply of capital is likely to be fixed. The firm’s demand for capital shifts in, lowering the rate of return on capital.
- In the short run, the owners of capital bear the tax in the form of a lower return on their investment.

**General equilibrium tax incidence**

**Issues to consider in GE incidence analysis**

- In the longer-run, the supply of capital is not inelastic.
- Investors can close or sell the restaurant, take their money, and invest it elsewhere.
- In the long-run, capital is likely to be perfectly elastic as there are many good substitutes for investing in a particular restaurant in a particular town.

**General equilibrium tax incidence**

**Issues to consider in GE incidence analysis**

- If both labor and capital are highly elastic in the long run, who bears the tax?
- The one additional inelastic factor in the restaurant production process is land.
- The supply is clearly fixed.
- When both labor and capital can avoid the tax, the only way restaurants can stay open is if they pay a lower rent on their land.

**General equilibrium tax incidence**

**Issues to consider in GE incidence analysis**

- The scope of a tax matters for tax incidence as well. Consider imposing a restaurant tax on the entire state rather than just a city.
- Demand in the output market is less elastic; consumers bear some of the burden.
- Labor supply is less elastic as well.
- The scope of the tax matters to incidence analysis because it determines which elasticities are relevant to the analysis: taxes that are broader based are harder to avoid than taxes that are narrower, so the response of producers and consumers to the tax will be smaller and more inelastic.

**General equilibrium tax incidence**

**Issues to consider in GE incidence analysis**

- There are also potentially spillovers into other output markets from the restaurant tax, not just input markets.
- Consider the statewide restaurant tax that raises the price of meals:
  - It has an income effect for consumers.
  - It increases consumption of goods that are substitutes for restaurant meals, such as meals at home.
  - It decreases consumption of goods that are complements for restaurant meals, such as valets.
- A complete general equilibrium analysis must account for the effects in these other markets.

**THE INCIDENCE OF TAXATION IN THE UNITED STATES**

**CBO incidence assumptions**

- The Congressional Budget Office (CBO) has examined the incidence of taxation in the U.S.
- The CBO assumes:
  - Income taxes are fully borne by the households that pay them.
  - Payroll taxes are fully borne by workers, regardless of the statutory incidence.
  - Excise taxes are fully shifted forward to prices.
  - Corporate taxes are fully shifted forward to the owners of capital.
The incidence of taxation in the United States

CBO incidence assumptions

- These assumptions are generally consistent with empirical evidence.
- For example, Poterba (1996) shows full shifting to prices from increases in the sales tax.
- The most questionable assumption relates to the corporate income tax. It is likely that consumers and workers bear some of the tax. The corporate tax will be discussed in detail in Chapter 24.
- Table 1 shows the effective tax rates over time, by income quintile.
- The effective tax rate is taxes paid relative to total income.

| Table 1 |
| Effective Tax Rates (in percent) |
| All households | | | | |
| Bottom quintile | | | | |
| Top quintile | | | | |
| Effective tax rates for the rich have risen since 1980. |
| Effective Income Tax Rate |
| All households | 6.9 | 7.8 | 6.4 | 6.5 | 6.4 |
| Bottom quintile | 5.3 | 6.4 | 7.3 | 7.6 | 7.7 |
| Top quintile | 8.4 | 8.5 | 6.8 | 7.2 | 7.1 |
| Effective Corporate Tax Rate |
| All households | 3.6 | 3.9 | 3.2 | 3.3 | 3.0 |
| Bottom quintile | 3.1 | 3.8 | 3.6 | 3.7 | 3.9 |
| Top quintile | 3.7 | 4.2 | 3.3 | 4.6 | 4.0 |
| Effective Excise Tax Rate |
| All households | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| Bottom quintile | 1.4 | 2.2 | 2.0 | 2.4 | 2.4 |
| Top quintile | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 |

The incidence of taxation in the United States

Results of CBO incidence analysis

- The table shows that effective tax rates for the poor have fallen since 1985, while the effective rate for the rich have risen.
- The distribution of various components of the tax system varies, however.
- The payroll tax, for example, is regressive.
- Effective corporate tax rates are small relative to income and payroll tax rates, and have fallen at both the top and bottom of the income distribution.
- Table 2 shows the top and bottom quintile’s share of income and tax liabilities.

| Table 2 |
| Top and Bottom Quintile’s Share of Income and Tax Liabilities (in percent) |
| Top Quintile | | | | |
| Share of income | 45.5 | 48.6 | 49.5 | 50.2 | 52.4 |
| Share of tax liabilities | 56.4 | 55.8 | 57.9 | 61.9 | 65.3 |
| Bottom Quintile | | | | |
| Share of income | 5.8 | 4.8 | 4.6 | 4.6 | 4.2 |
| Share of tax liabilities | 2.1 | 2.3 | 1.9 | 1.3 | 1.1 |

The incidence of taxation in the United States

Current versus lifetime income incidence

- Tax incidence can be based on current or lifetime income, and the results can differ greatly for some types of taxes.
- Current tax incidence is the incidence of a tax in relation to an individual’s current resources.
- Lifetime tax incidence is the incidence of a tax in relation to an individual’s lifetime resources.
- Recent estimates show that 60% of Americans change income quintiles within a decade.
The incidence of taxation in the United States
Current versus lifetime income incidence

- This income mobility, and the use of lifetime incidence, has a number of implications for tax policy.
- Imagine that there was a tax on college textbooks. On the surface, this seems extremely regressive using current income, since college students have very low incomes.
- On a lifetime basis, however, college graduates have income twice as those who did not attend college. On a lifetime basis, the tax incidence is progressive.