CHAPTER 20: Tax Inefficiencies and Optimal Taxation

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CHAPTER 20: Tax Inefficiencies and Optimal Taxation

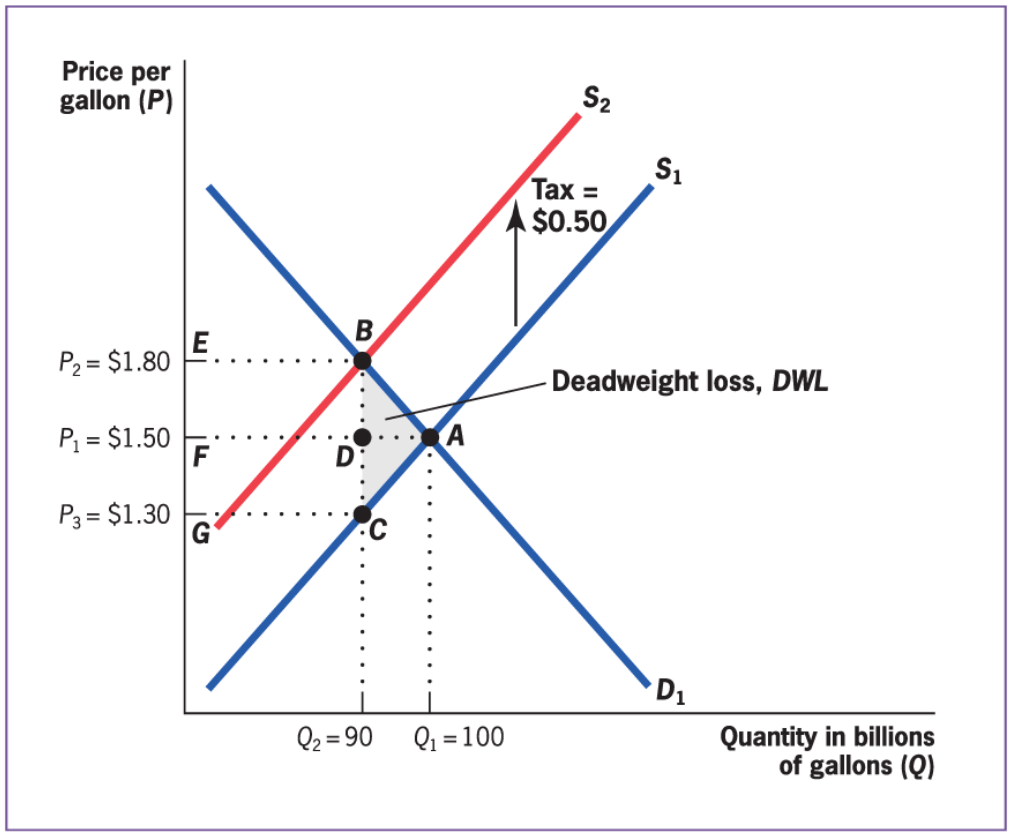
Outline

- 20.1 Taxation and Economic Efficiency
- 20.2 Optimal Commodity Taxation
- 20.3 Optimal Income Taxes
- 20.4 Tax-Benefit Linkages and the Financing of Social Insurance Programs
- 20.5 Conclusion

Taxation and Economic Efficiency

- Usually, the market produces efficient outcomes.
- Taxes interfere in the market and reduce efficiency.
- People substitute away from the taxed product, using less efficient alternatives.
    - Eight-person motorcycles in Indonesia
- Some taxes have much larger efficiency costs than others.

Taxation and Economic Efficiency: Graphical Approach



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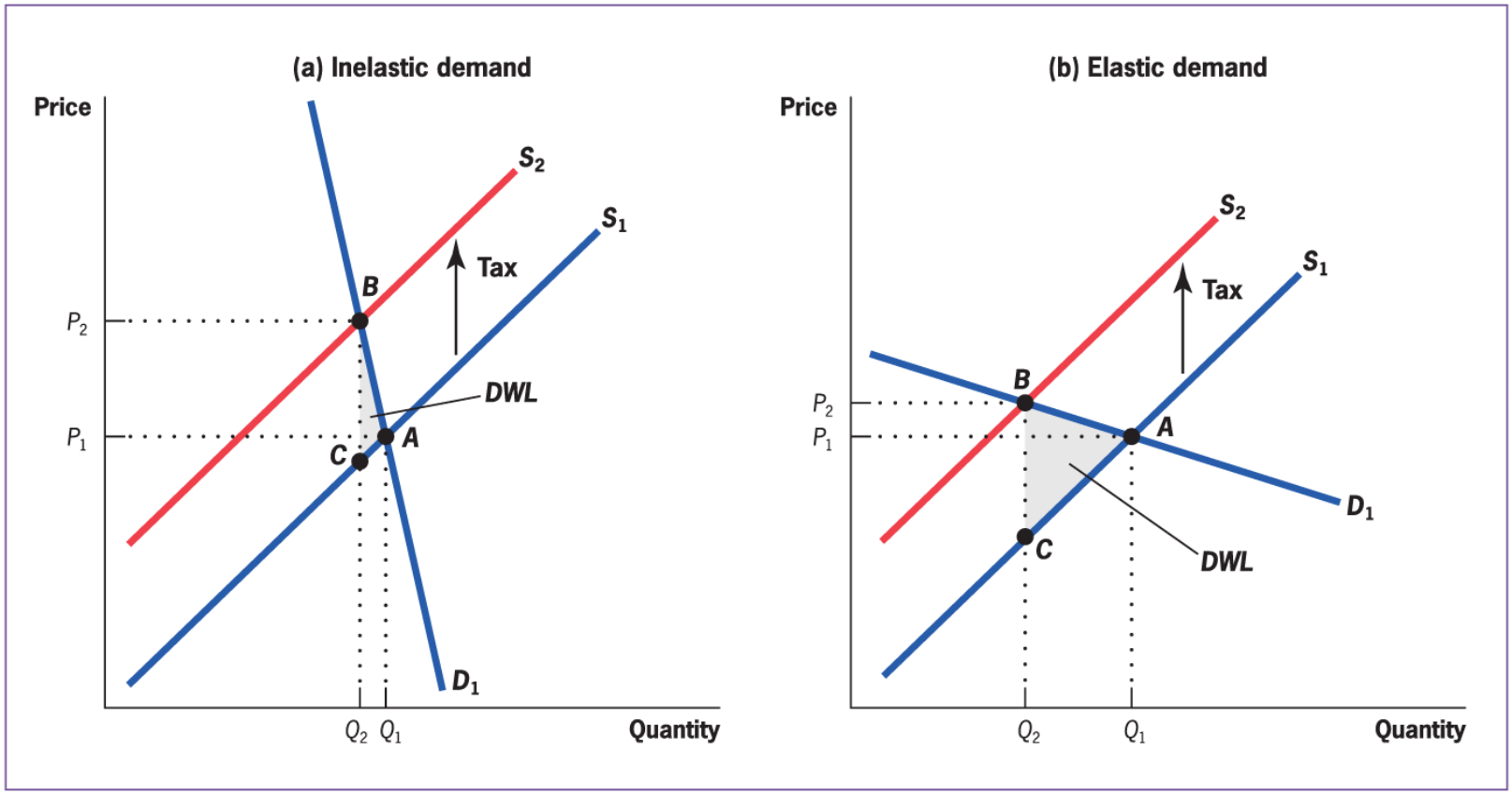
- A tax is imposed, and supply shifts from S_1 to S_2 . Deadweight loss occurs- triangle BAC .

Taxation and Economic Efficiency

- Absent taxes:
  - price = social marginal benefit = social marginal cost
- The tax drives a wedge between *SMB* and *SMC* , preventing mutually beneficial trades from occurring.
- The units between 90 and 100 would have generated a consumer and producer surplus.
- The forgone surplus from taxation is called the deadweight loss (*DWL*).
- The size of the *DWL* depends on elasticities .

Elasticities Determine Tax Inefficiency



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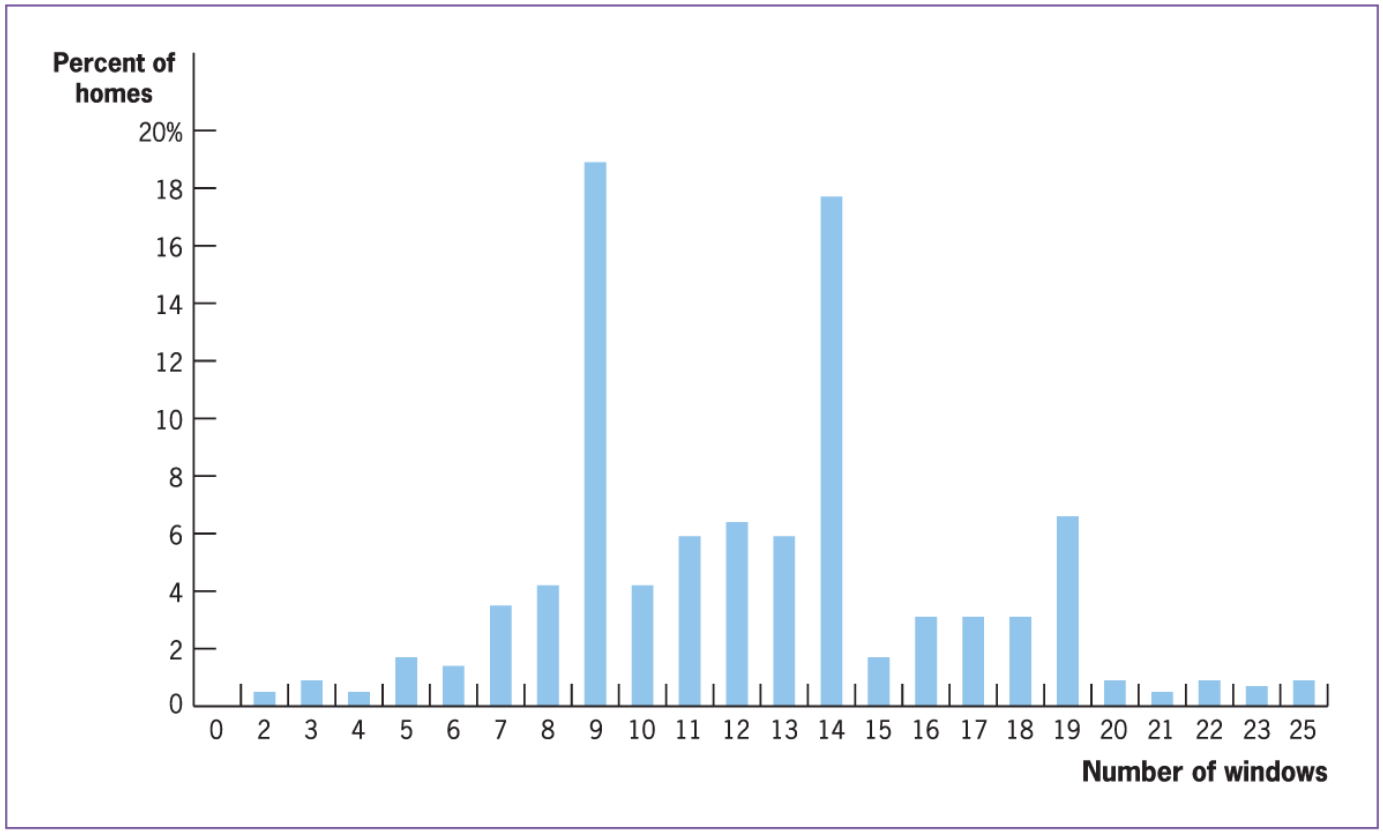
- The deadweight loss of a given tax is smaller when the demand curve is less elastic than when it is more elastic .

Elasticities Determine Tax Inefficiency

- Deadweight loss is caused by individuals and firms making inefficient consumption and production choices in order to avoid taxation.
- The inefficiency of any tax is determined by the extent to which consumers and producers change their behavior to avoid the tax.
- The more elastic is demand or supply, the larger the *DWL*.

Empirical Evidence: Effect of The Window Tax in England



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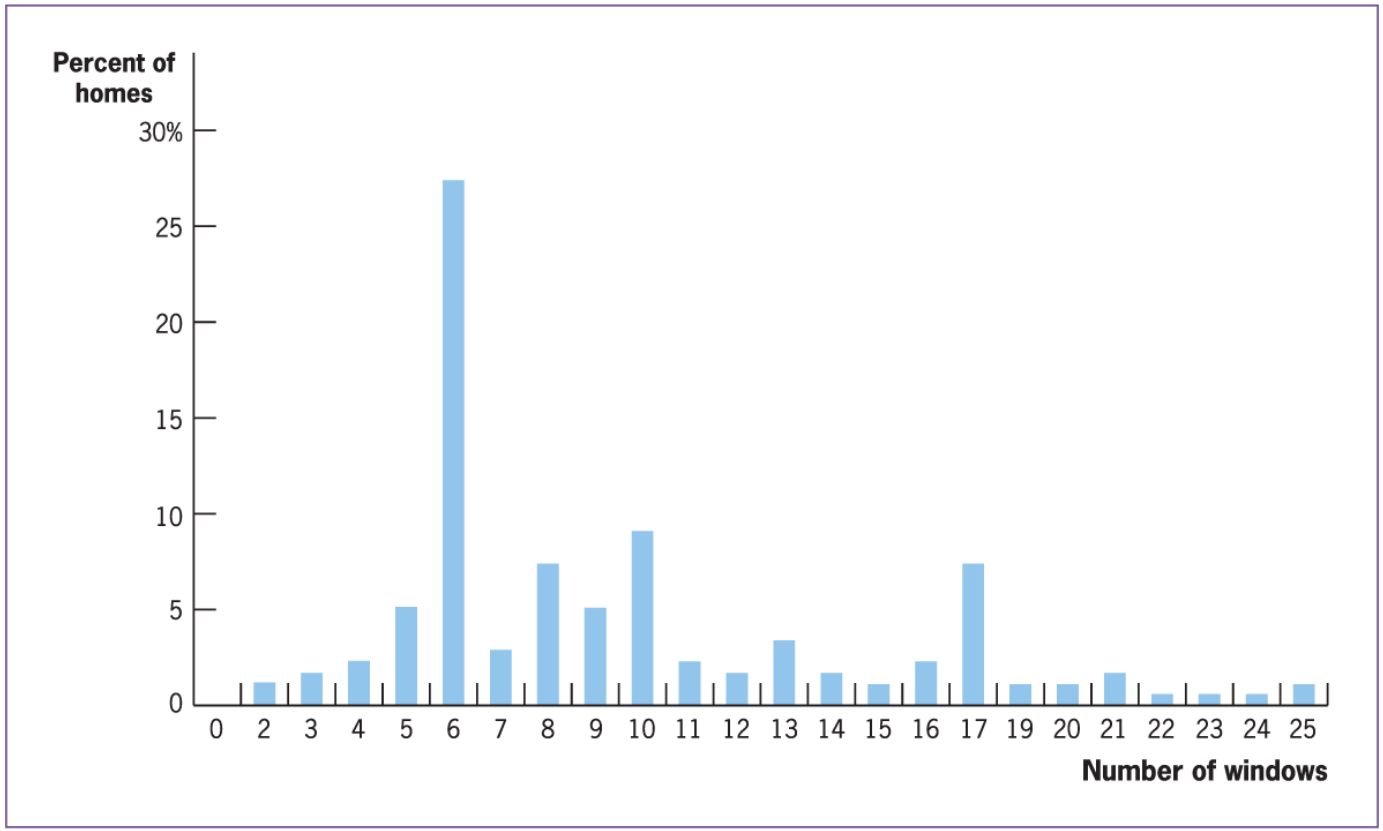
- There are obvious spikes at 9, 14, and 19 windows, exactly what we would predict from the effects of this tax.

Empirical Evidence: The Window Tax

- One could argue that perhaps there was some British custom or some other reason for having 9, 14, or 19 windows in a house.
- Oates and Schwab address this point by using the fact that in 1761, the government added a provision that houses with 8 or 9 windows would pay 1 shilling per window.
- This means that after 1761, there was suddenly an incentive to keep the number of windows to 7 or fewer. This is exactly what happened .

Empirical Evidence: The Window Tax



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APPLICATION: Tax Avoidance in Practice

Keynes: **The avoidance of taxes is the only pursuit that still carries any reward.**

Some examples of avoidance:

1. The Papal States taxed salt heavily, so Tuscan bakers stopped using it. Even today, Tuscan bread is saltless.
2. In the early 1980s, Cyprus's building tax applied to *finished* structures. Homeowners put steel bars jutting out from their roofs to avoid the tax.
3. Thailand taxes business signs on the outside, with higher taxes for English-only signs. So, many signs have a bit of Thai writing in the corner or are hung on curtains inside the shop .

Determinants of Deadweight Loss

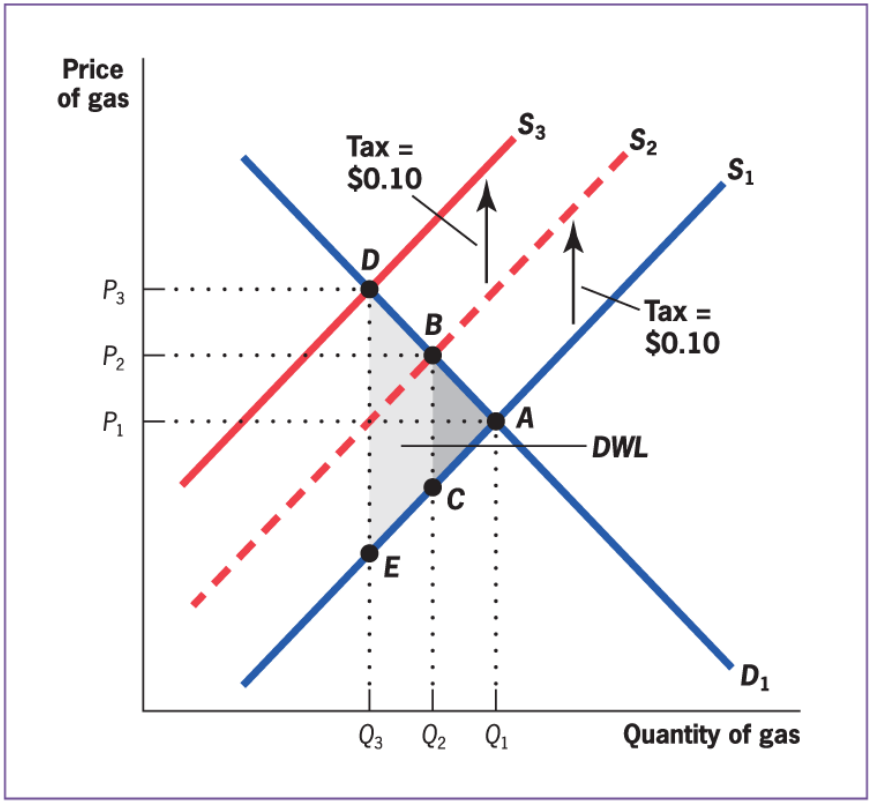
- The formula for *DWL* is:

$$DWL = -\frac{\eta_s \eta_d}{2(\eta_s - \eta_d)} \tau^2 \frac{Q}{P}$$

  where η_s and η_d are the elasticity of supply and demand is the tax rate, and Q and P are the quantity and price.

- *DWL* rises with the *square* of the tax, so marginal *DWL* rises with the tax rate.
  - **Marginal deadweight loss:** The increase in deadweight loss per unit increase in the tax.

Determinants of Deadweight Loss



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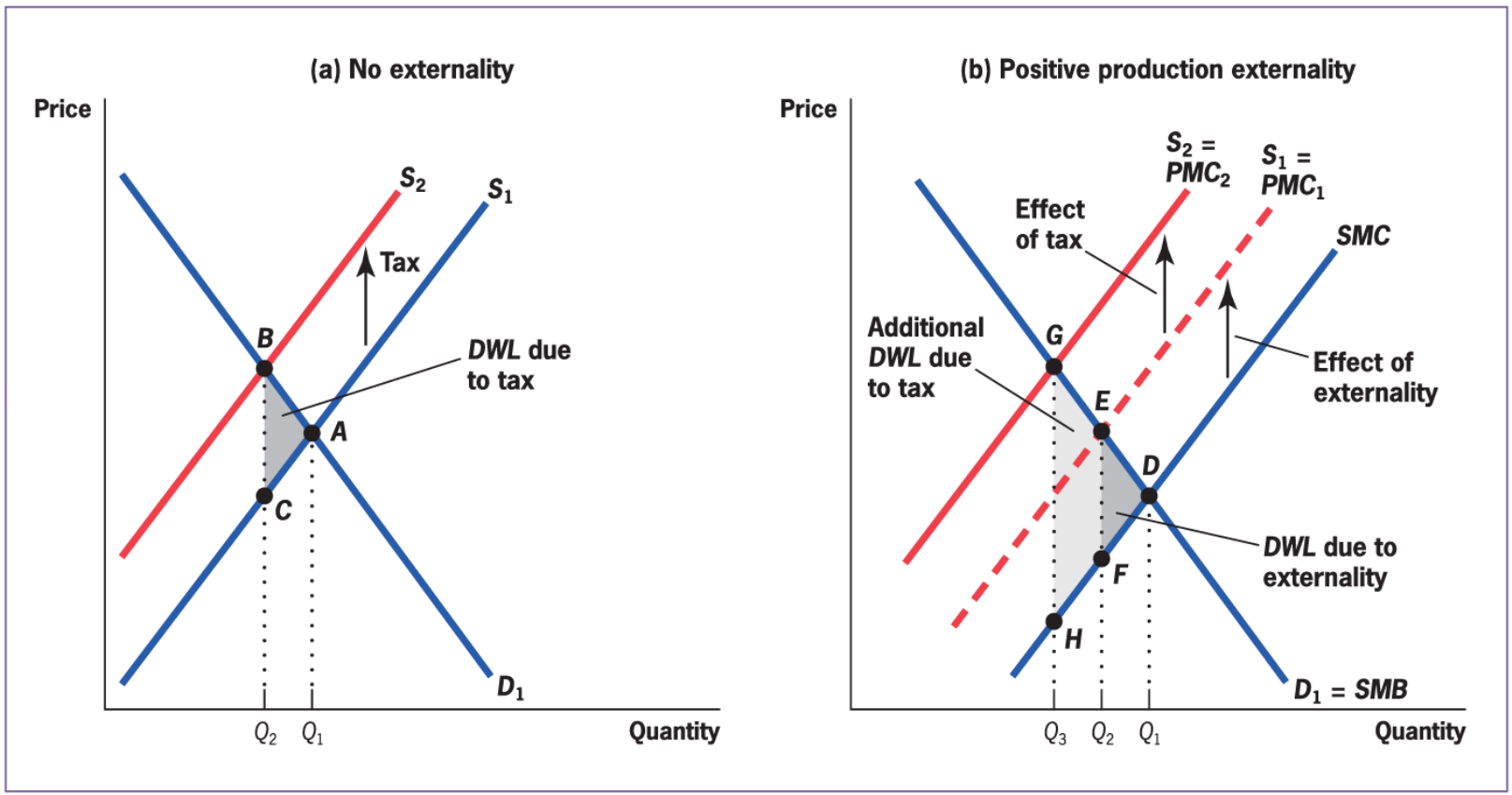
- The marginal deadweight loss rises disproportionately with the tax rate.

A Tax System's Efficiency Is Affected by a Market's Preexisting Distortions

- Since marginal *DWL* rises with the tax rate, preexisting distortions affect the efficiency of a new tax.
    - **Preexisting distortions:** Market failures, such as externalities or imperfect competition, that are in place before any government intervention.

A Tax System's Efficiency Is Affected by a Market's Preexisting Distortions



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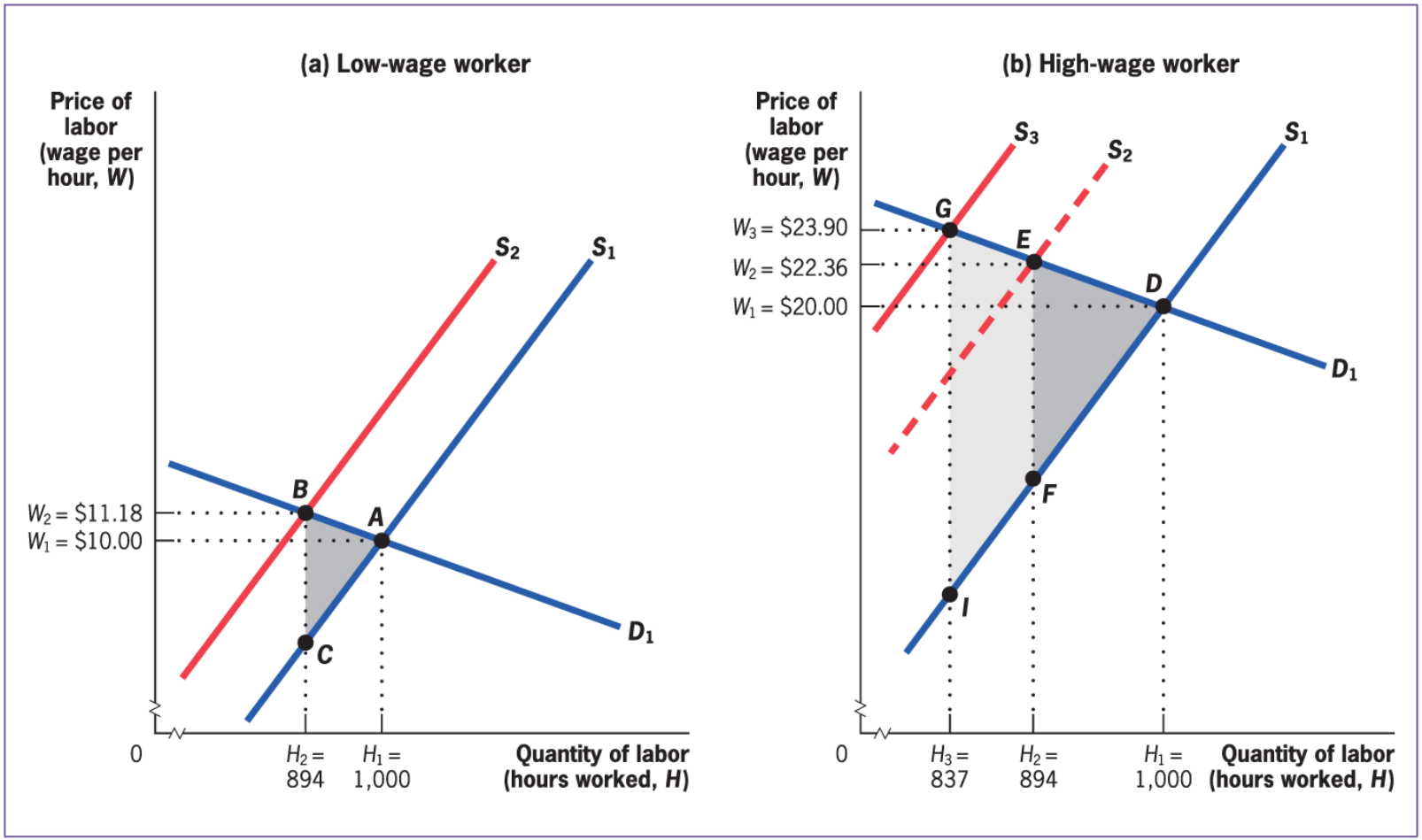
Progressive Tax Systems Can Be Less Efficient

- Because the *DWL* rises with , progressive tax systems can be less efficient than proportional ones.
- Example:
  - Suppose there are two people, one with a wage of \$10 per hour and one with a wage of \$20 per hour.
  - For both, a 10% rise in wages leads them to supply 10% more labor (elasticity of labor supply $= 1$).
  - Elasticity of labor demand is also 1.

Progressive Tax Systems Can Be Less Efficient

- Why is the deadweight loss larger for the higher-wage worker despite the same reduction in hours worked?
- In a competitive labor market, wage equals the marginal product of labor, so the high-wage worker has a higher marginal product of labor.
- Society loses twice (in this specific example) as much when the high-wage worker reduces her hours than when the low-wage worker reduces her hours.

Progressive Tax Systems Can Be Less Efficient: Graphical Approach



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Progressive Tax Systems Can Be Less Efficient

			Low-Wage Worker (panel a)		High-Wage Worker (panel b)		
	Tax Rate Below $10,000	Tax Rate Above $10,000	Hours of Labor Supply	Deadweight Loss from Taxation	Hours of Labor Supply	Deadweight Loss from Taxation	Total Deadweight Loss
No tax	0	0	1,000 (H_1)	0	1,000 (H_1)	0	0
Proportional tax	20%	20%	894 (H_2)	$115.71 (area *BAC*)	894 (H_2)	$231.42 (area *EDF*)	$347.13 (*BAC* + *EDF*)
Progressive tax	0%	60%	1,000 (H_1)	0	837 (H_3)	$566.75 (area *GDI*)	$566.75 (*EDF* + *GEFI*)

- The deadweight loss is larger for the higher-wage worker despite the same reduction in hours worked.

Governments Should **Smooth** Tax Rates over Time

- Government efficiency in taxation over time is maximized by *tax smoothing* , by having a relatively constant tax rate over time rather than high taxes in some periods and low taxes in others.
- High and then low tax rates produce a larger *DWL* than steady medium tax rates .

APPLICATION: The Deadweight Loss of Taxing Wireless Communications

- Hausman (2000): The *DWL* from taxes on wireless communications equals 53% of revenue.
- This figure is high for three reasons:
  - High price sensitivity (elastic demand).
  - Large preexisting distortions from imperfect competition.
  - High taxes- 25% in some states, and in those states, the *DWL* is even higher .

Ramsey Taxation: The Theory of Optimal Commodity Taxation

- **Optimal commodity taxation:** Choosing the tax rates across goods to minimize deadweight loss for a given government revenue requirement.
- **Ramsey Rule:** To minimize the deadweight loss of a tax system while raising a fixed amount of revenue, taxes should be set across commodities so that the ratio of the marginal deadweight loss to marginal revenue raised is equal across commodities, that is,

$$\frac{MDWL_i}{MR_i} = \lambda$$

- **Value of additional government revenues:** The value of having another dollar in the government's hands relative to its next best use in the private sector .

Example 1: Ramsey Optimal Taxation

In Jimma, the demand for coke is given by $D_c = 120 - 6P_c$ and the supply is given by $S_c = 40 + 5P_c$. The demand for pepsi is given by $D_p = 10 - 5P_p$ and the supply of pepsi is given by $S_p = 100 + 4P_p$. Both goods are currently untaxed, but the government of Jimma needs to raise \$150 (to finance a new project) by taxing both goods. What per unit tax rate should it levy on each of the two goods?

Ans: $T_c = 1.556$ and $T_p = 1$

Inverse Elasticity Rule

- If supply is infinitely elastic, the Ramsey Rule becomes:

$$\tau_i^* = -\frac{1}{\eta_i} \cdot \lambda$$

  where τ_i^i is the optimal tax, η_i is the elasticity of demand, and λ is some constant.

- Optimal taxation therefore balances two rules:
  - **Elasticity rule:** Lower taxes on goods with more elastic demand.
  - **Broad base rule:** Better to tax a wide variety of goods moderately than few goods heavily .

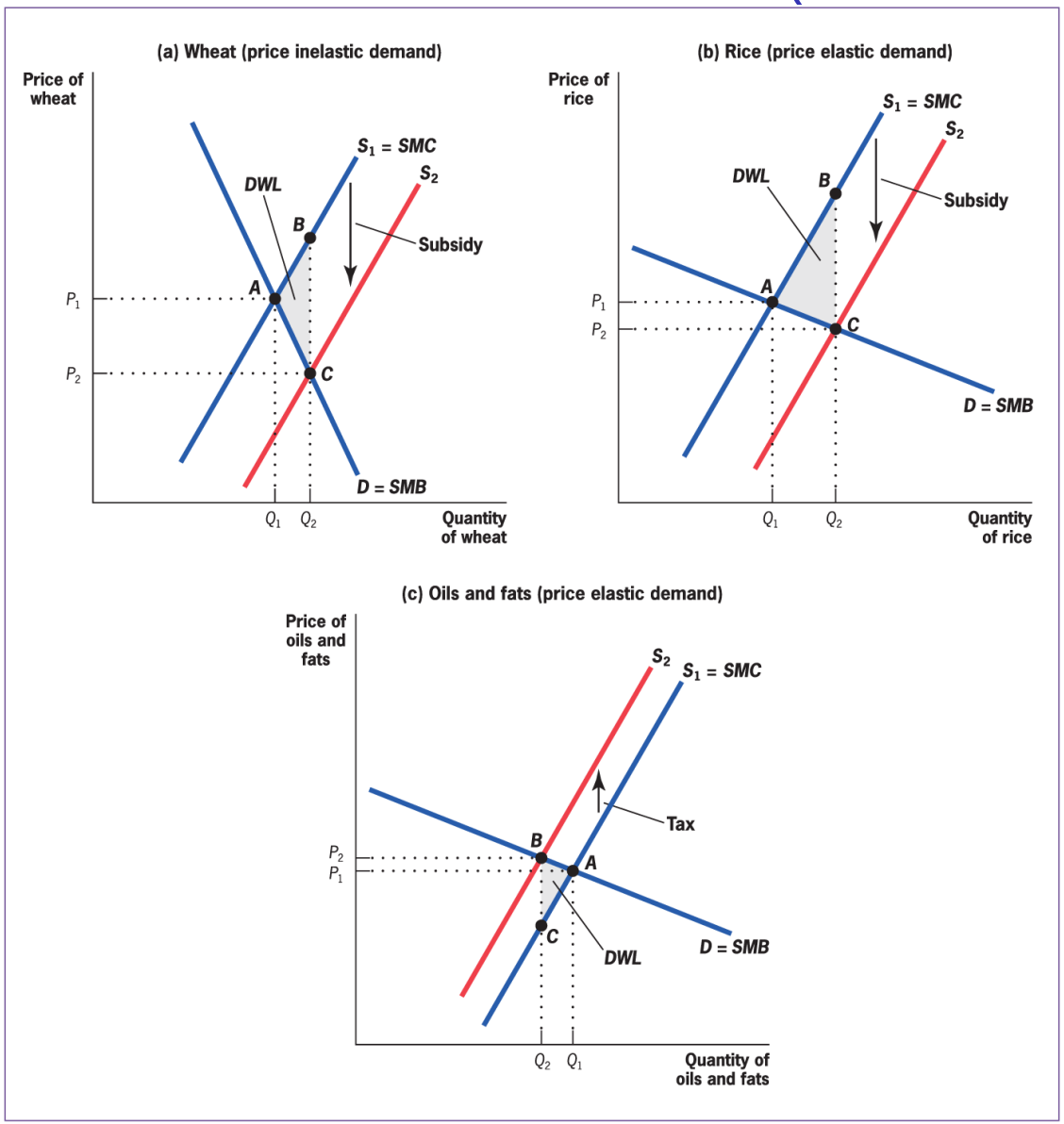
Equity Implications of the Ramsey Model

- Imagine that the government had only two goods it could tax: cereal and caviar:
- Elasticity of demand for caviar is much higher than that for cereal.
- The inverse elasticity rule would suggest that the government tax cereal much more highly than caviar.
- This means taxing more heavily the good consumed by poor people.
- This might hurt vertical equality .

APPLICATION: Price Reform in Pakistan

Good	Subsidy	Price Elasticity	Policy Change	Welfare Gain	Include Distribution Concerns
Wheat	40%	−0.64	Reduce subsidy	Small	Don't reduce subsidy
Rice	40%	−2.08	Reduce subsidy	Large	Reduce subsidy
Oil/fat	−5%	−2.33	Reduce tax	Large	Reduce tax further

APPLICATION: Efficiency Consequences of Taxes and Subsidies in Pakistan: Wheat (Inelastic Demand)



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Learn by Doing: Practice Question 1

Which of these are TRUE concerning taxation?

I The inefficiency of a tax is determined by the elasticities of supply and demand.

II Taxing a good that has a negative externality generates deadweight loss.

III Progressive tax systems tend to be less efficient than proportional tax systems.

a. I and II only

b. I and III only

c. II and III only

d. I, II, and III

Optimal Income Taxes

- Most tax revenue in the United States and other developed countries is from income taxes.
- **Optimal income taxation:** Choosing the tax rates across income groups to maximize social welfare subject to a government revenue requirement.
- Social welfare function guides the trade-off between progressivity and efficiency .

A Simple Example

1. Everyone in society has the same utility functions:

   $U_1 = U_2 = \ldots$

2. These utility functions exhibit diminishing **MU** of income.

3. Total income in society is fixed, not determined by individual choices that might respond to tax rates.

4. Society has an equally weighted utilitarian social welfare function:

   $V = U_1 + U_2 + \ldots$

A Simple Example

Under these assumptions:

- The optimal income tax system is one that leaves everyone with the **same level of post-tax income**.
- People with income below average would receive a transfer to increase their incomes to average.
- The marginal tax rate under this system is 100%.
- If income responds to taxes, the optimal marginal tax rate is **lower** .

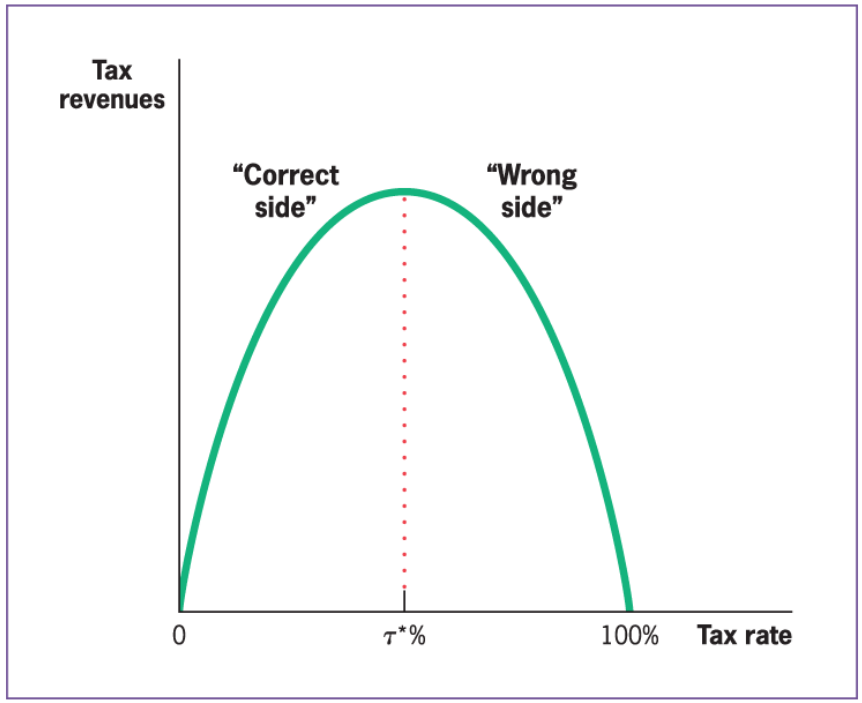
General Model with Behavioral Effects 1

- With behavioral effects, taxes reduce hours worked.
- At high tax rates, tax revenue falls with the tax rate; no one works under a 100% tax rate.
- The optimal tax system trades off the efficiency cost of taxation against the benefits of redistribution.
- The rule is to set the income for group such that

$$\frac{MU_i}{MR_i} = \lambda$$

- MU_i is **MU** for group i, MR_i is the marginal revenue, and λ is the value of government revenue .

The Laffer Curve



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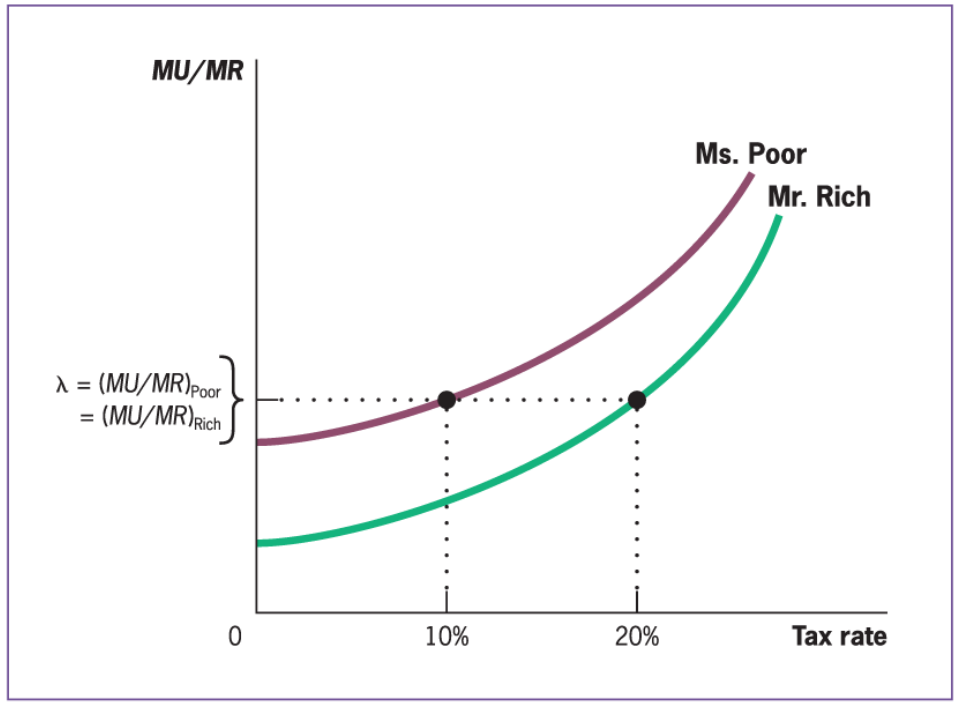
General Model with Behavioral Effects 2

Optimal income taxation balances:

- **Vertical equity:** Social welfare is maximized when those who have a high level of consumption and thus a low marginal utility are taxed more heavily and when those who have a low level of consumption and thus a high marginal utility are taxed less heavily.
- **Behavioral responses:** As taxes rise on any one group, individuals in that group may respond by earning less income .

An Example: Optimal Income Taxes with Two Types



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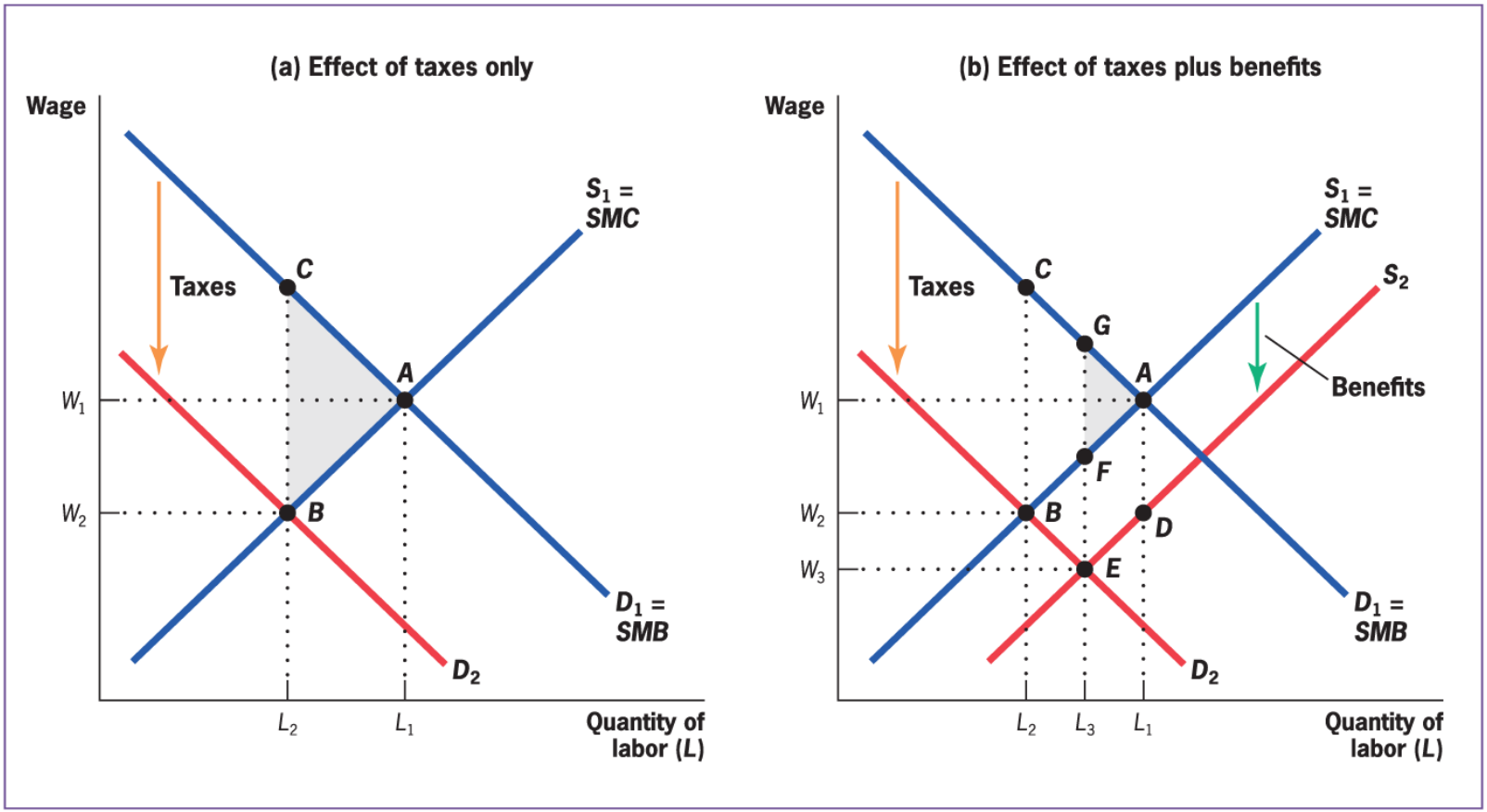
Tax-Benefit Linkages and the Financing of Social Insurance Programs

- So far, we have ignored tax-benefit linkages.
- **Tax-benefit linkages:** Direct ties between taxes paid and benefits received.
- Introducing these linkages changes the story since many payroll taxes are directly linked to benefits .

Tax-Benefit Linkages: Graphical Representation



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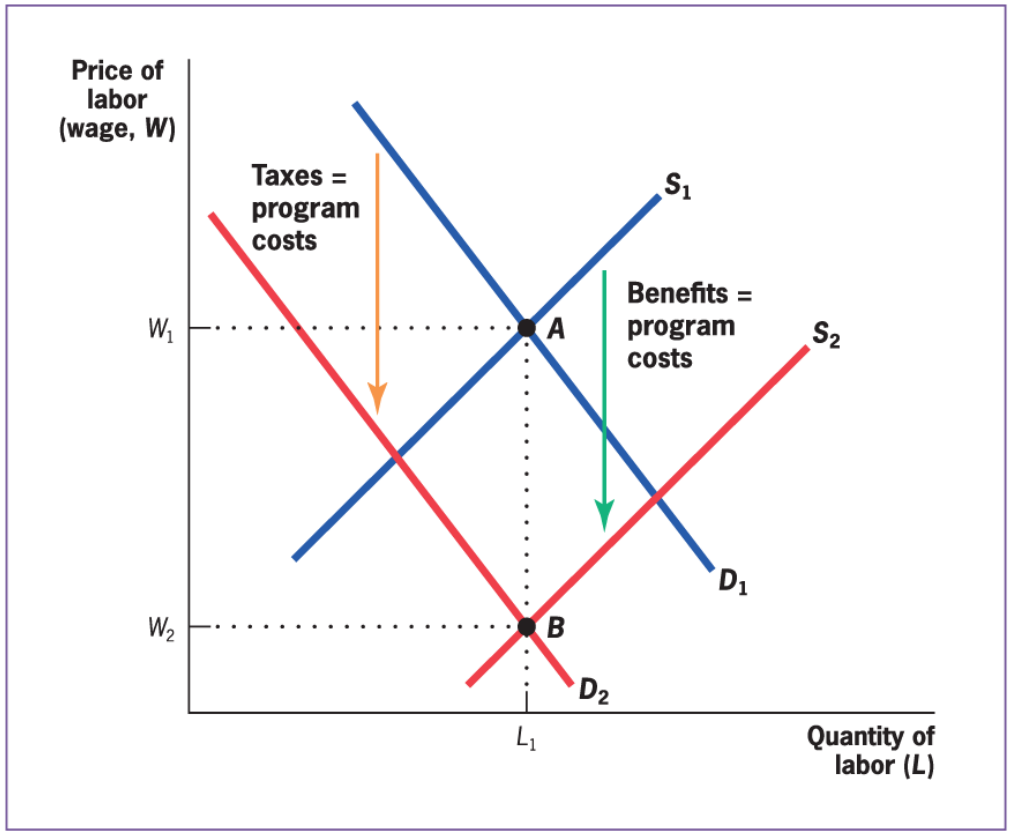
Perfect Linkage Eliminates the DWL



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Issues Raised by Tax-Benefit Linkage Analysis

- Why doesn't the private sector provide these benefits?
  - Market failures may plague the market.
- When are there tax-benefit linkages?
  - The tax-benefit linkage is strongest when taxes paid are linked directly to a benefit for workers.
- What is the evidence on tax-benefit linkages?
  - Financing is borne by workers in the form of lower wages and not lower employment .

EVIDENCE: A Group-Specific Employer Mandate

- In the mid-1970s, states began to mandate insurance benefits for pregnant women.
- These laws raise the cost of insuring and hence employing certain groups.
- Compared to other groups in the same states or the same groups in states without mandated benefits:
  - Wages fell.
  - Labor supply did not.
- This suggests that benefit linkage is near complete .

Learn by Doing: Practice Question 2

Which of these are TRUE concerning taxation?

I) Raising taxes raises tax revenues.
II) Optimal income taxation equalizes the ratio of marginal utility to marginal revenue for all individuals.
III) When tax-benefit linkage exists, deadweight loss is reduced.

a. I and II only

b. I and III only

c. II and III only

d. I, II, and III

Conclusion

- The fundamental issue in designing tax policy is the equity-efficiency trade-off.
- Tax efficiency comes down to two key principles:
  - The more elastically supplied or demanded the good, the larger the deadweight loss from the tax.
  - The higher the tax rate, the larger the incremental deadweight loss of taxation.