# Market Economics:
# Supply, Demand, Elasticity, and Welfare Analysis

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**Abstract**

This report presents a computational analysis of market models. We examine supply and demand curves, compute market equilibrium, analyze price elasticity, measure consumer and producer surplus, and evaluate the welfare effects of taxes and price controls.

# Contents

# Chapter 1

# Introduction

Market equilibrium occurs where supply equals demand:

$$Q_d(P) = Q_s(P) \tag{1.1}$$

## 1.1 Linear Supply and Demand

$$Q_d = a - bP \quad \text{(Demand)} \tag{1.2}$$
$$Q_s = c + dP \quad \text{(Supply)} \tag{1.3}$$

Equilibrium: $P^* = \frac{a-c}{b+d}$, $Q^* = \frac{ad+bc}{b+d}$

# Chapter 2

# Market Equilibrium

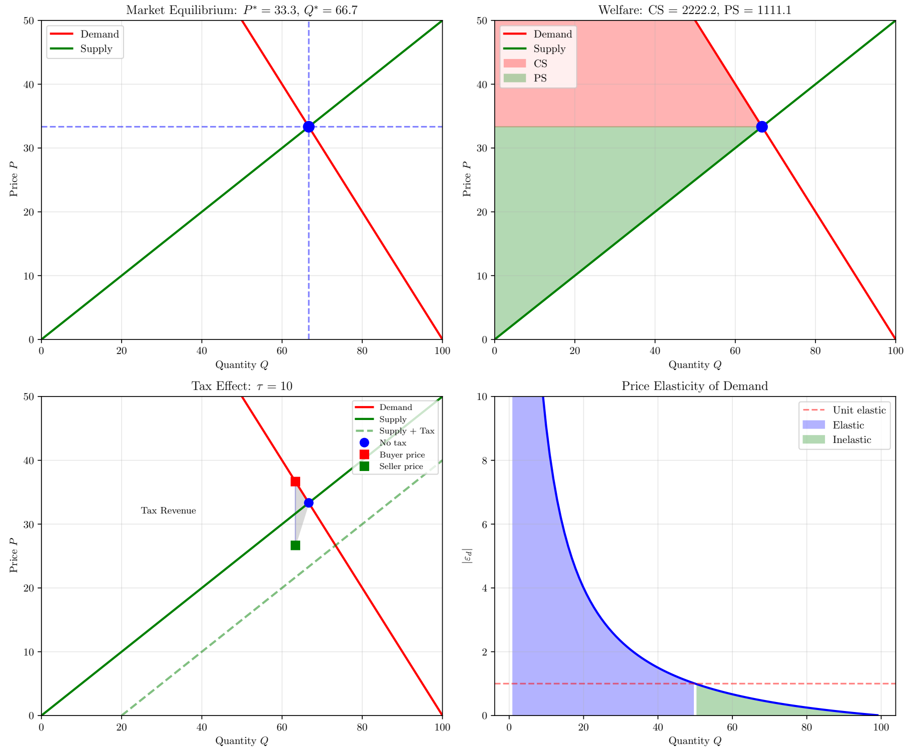


Figure 2.1: Market analysis: (a) equilibrium, (b) welfare surplus, (c) tax effects, (d) elasticity.

# Chapter 3

# Price Elasticity

## 3.1 Definition

Price elasticity of demand:

$$\varepsilon_d = \frac{\partial Q_d}{\partial P} \cdot \frac{P}{Q_d} \tag{3.1}$$

- $|\varepsilon_d| > 1$: Elastic (revenue increases with price decrease)
- $|\varepsilon_d| < 1$: Inelastic (revenue decreases with price decrease)
- $|\varepsilon_d| = 1$: Unit elastic

# Chapter 4

# Welfare Analysis

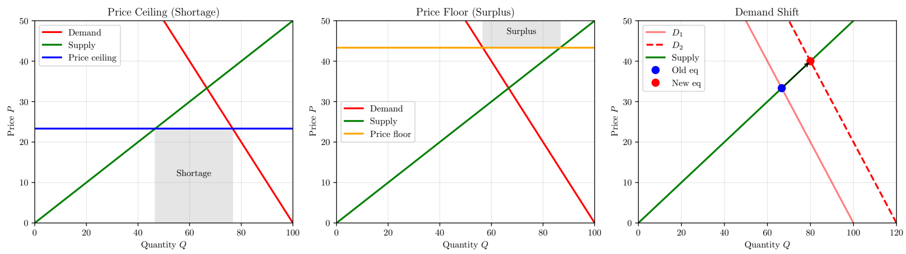


Figure 4.1: Market interventions: price ceiling creates shortage, price floor creates surplus, demand shift moves equilibrium.

# Chapter 5

# Numerical Results

Table 5.1: Market equilibrium results

| Variable | Value | Units |
|---|---|---|
| Equilibrium price | 33.33 | dollars |
| Equilibrium quantity | 66.67 | units |
| Consumer surplus | 2222.22 | dollars |
| Producer surplus | 1111.11 | dollars |
| Total welfare | 3333.33 | dollars |
| Elasticity at equilibrium | 0.50 | |
| Tax revenue | 633.33 | dollars |
| Deadweight loss | 16.67 | dollars |

# Chapter 6

# Conclusions

1. Market equilibrium maximizes total welfare (CS + PS)
2. Taxes create deadweight loss proportional to elasticities
3. Price controls create shortages or surpluses
4. Elasticity determines tax incidence between buyers and sellers
5. Welfare analysis quantifies policy effects