

# The (Increasingly Difficult) Equity Implications of Getting Residential Electricity Prices ‘Right’

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# **The (Increasingly Difficult) Equity Implications of Getting Residential Electricity Prices ‘Right’**

**OR**

## **The Increasing Economic Inefficiencies of Trying to Getting Equity ‘Right’**

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# In the “Good” Old Days...

- A regulator’s choices on tariff design were primarily about equity: who shoulders the costs?
  - Cost per unit of consumption varied by time and location, but regulators didn’t have information or political inclination to tie prices to that variation
  - Dumb electricity, gas and water meters begat dumb pricing
  - Common focus on pursuing equity goals
  - “sloppy rate making”: unconnected to costs
- BUT “luckily” customers had few choices, so demand was fairly inelastic, resulting in little economic loss from sloppy rate making, rates with little connection to cost

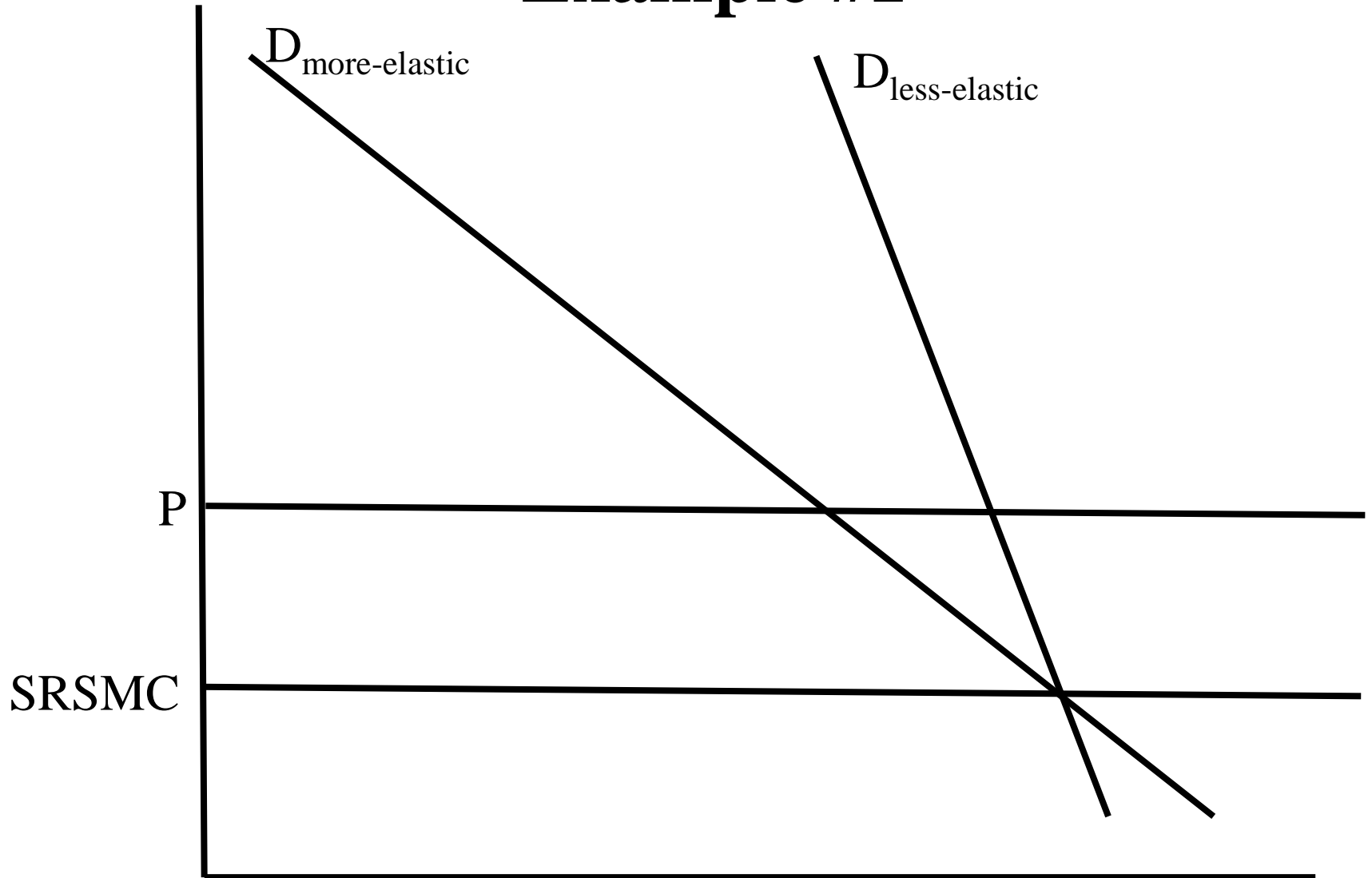
# But Technology is Changing All That

- Regulators have much more information about customer consumption patterns, and so do customers
- And customer have much more technology to optimize consumption against whatever tariff the regulators offer
- Result: Two possible pathways
  - Efficient pricing: technology use optimizes deployment to maximize benefits for society
    - » Two-way communications
    - » Massively distributed responses to scarcity
  - Increased “regulatory arbitrage”: customers use technology to take advantage of mis-pricing in the system
    - » Example: “managing electricity demand charges”

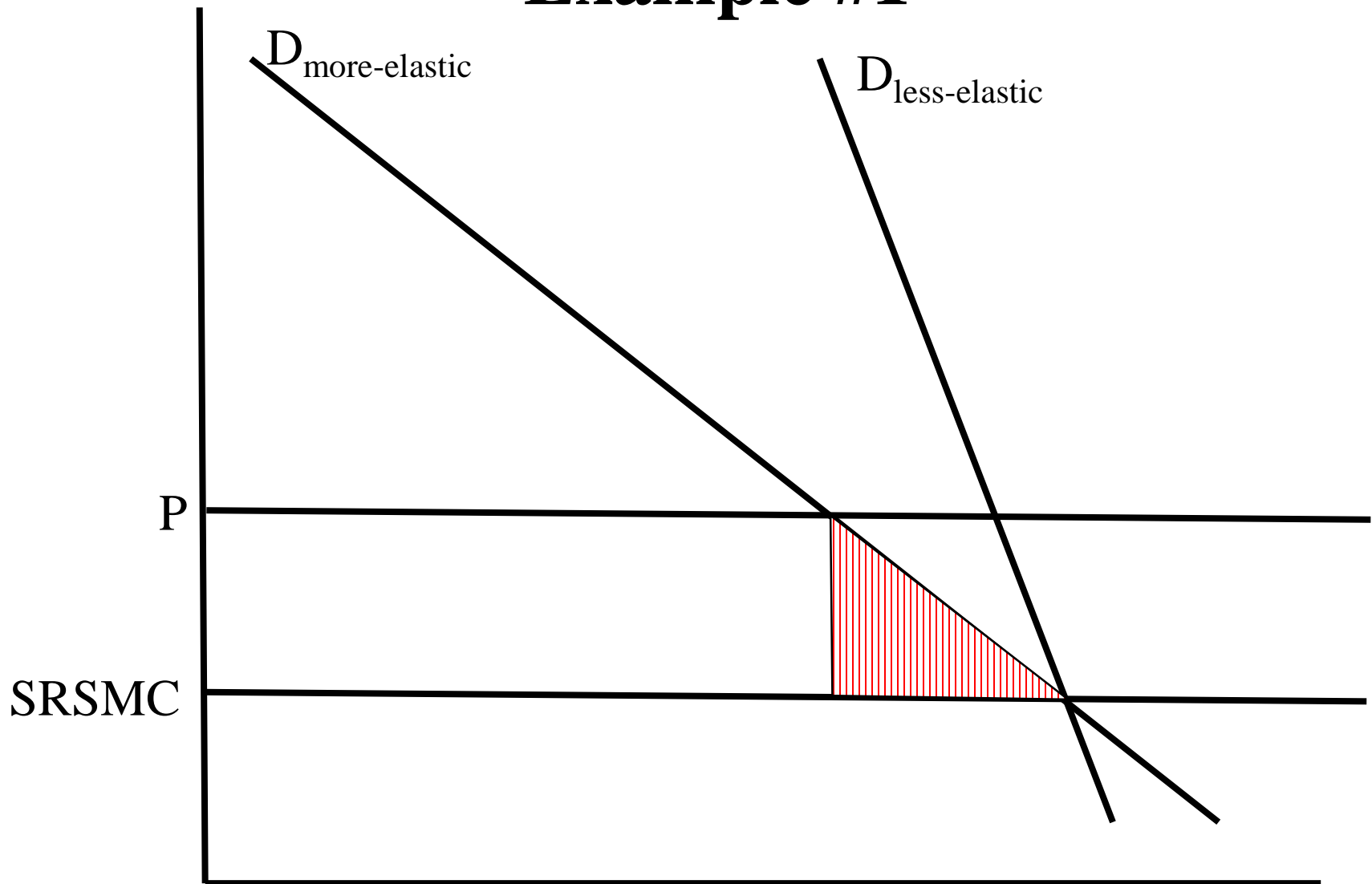
# To explain why this really matters, a trip back to microeconomic theory

- At any moment, the most efficient price for a good is short-run societal marginal cost (SRSMC)
  - Marginal: the incremental cost of supply
  - Societal: including pollution and other externalities
  - Short-run: at the moment of consumption
- Departures from SRSMC can have little effect on efficiency if customers respond little to the departures
- But departures can be very costly if customers behave very differently in response to them
  - Companies move, inefficient energy investments, etc.

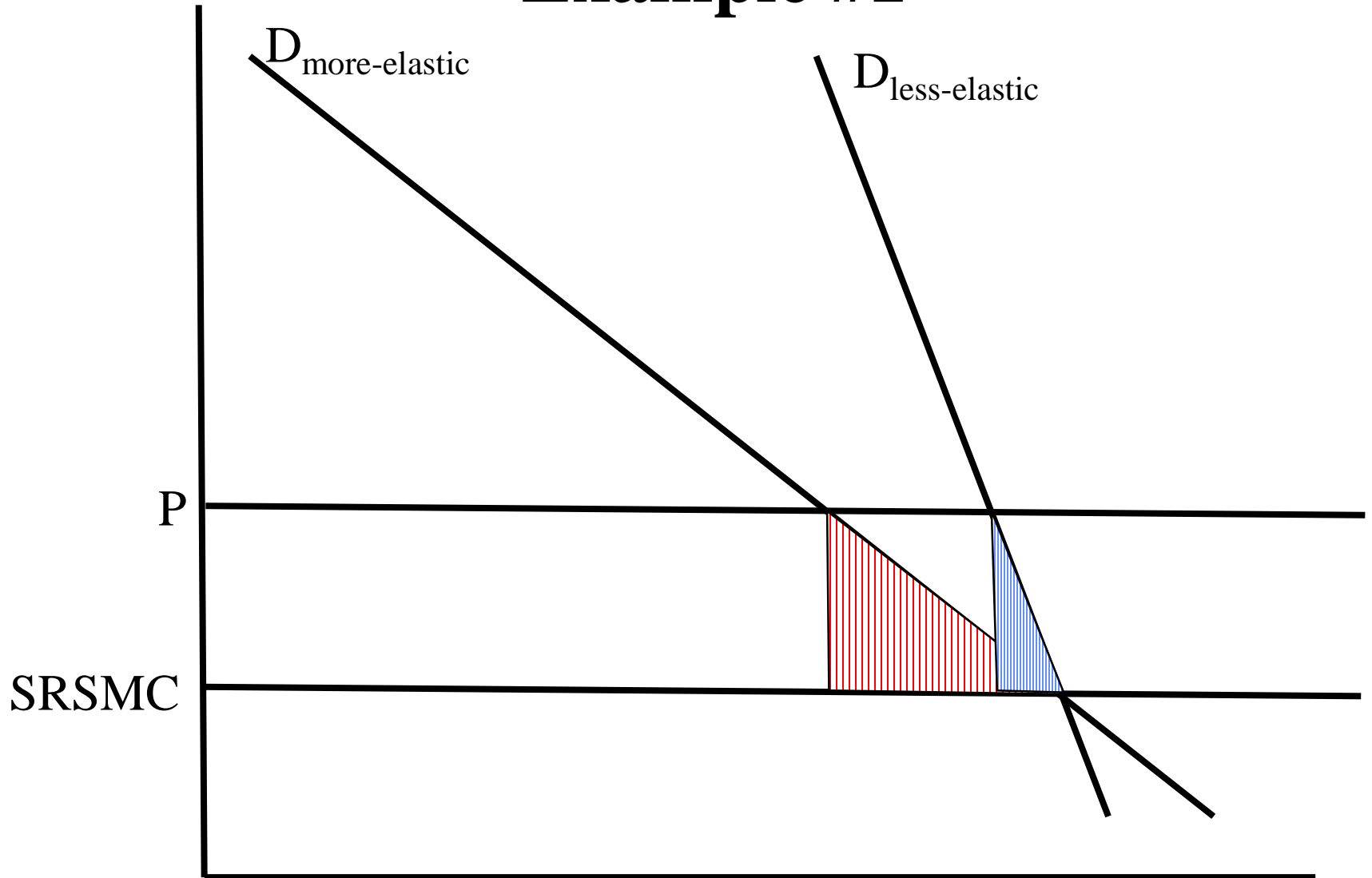
# Example #1



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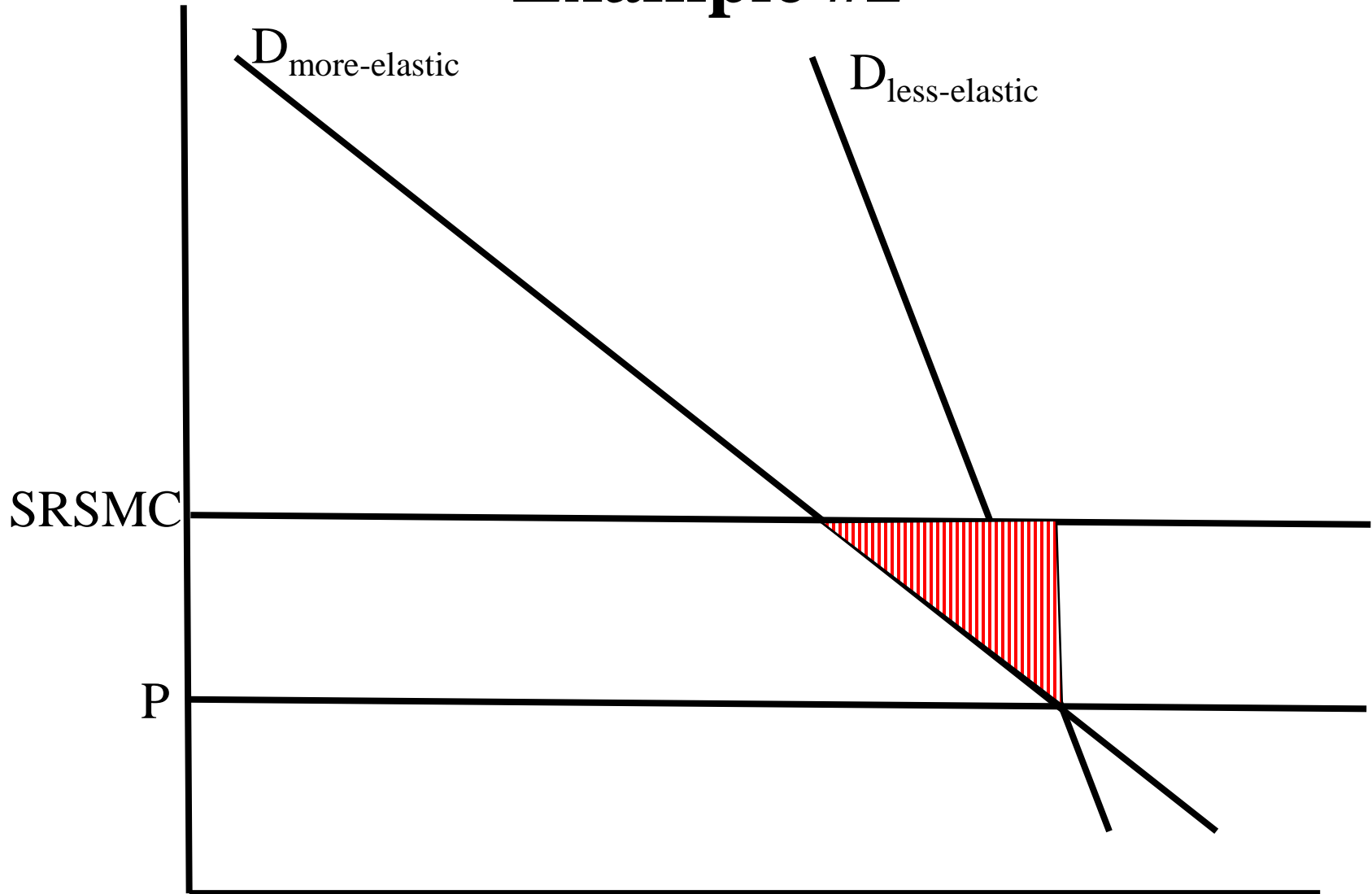


# Example #1

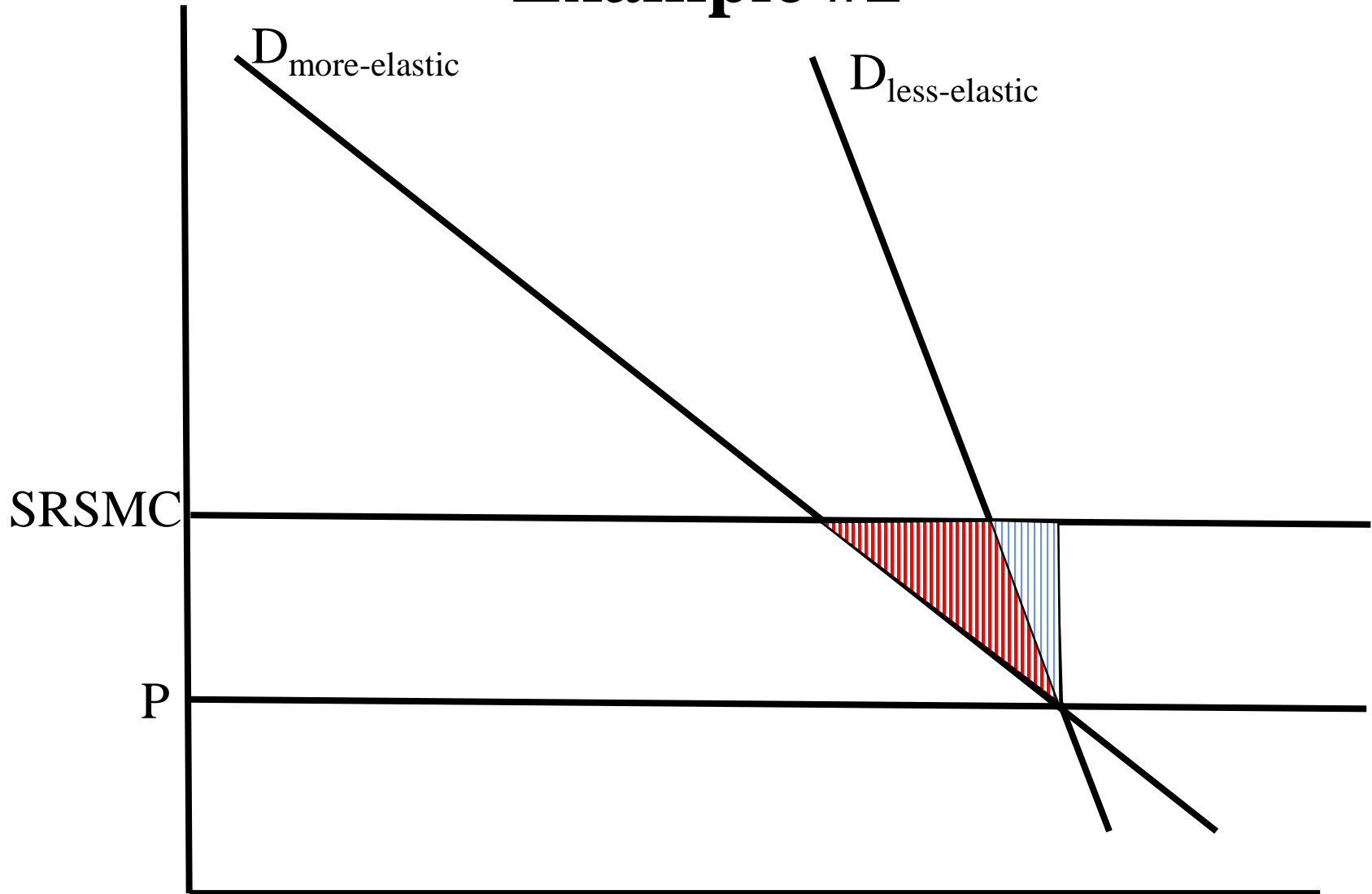




# Example #2



# Example #2



# Why Don't Prices Today Reflect SRSMC More Closely?

- SRSMC=>more price variation than customers want
  - Costs of bill volatility and cognitive response
  - But could still offer *optional* flat rate
- Not worth the administrative cost if no elasticity
  - New technology is raising potential elasticity, but still have chicken/egg problem of technology adoption and usage
- Equity concerns for low-income customers
- Equity concerns over time (and spatial) variation
  - Different fairness issue than serving the needy
- Revenue Recovery – when SRSMC doesn't cover costs

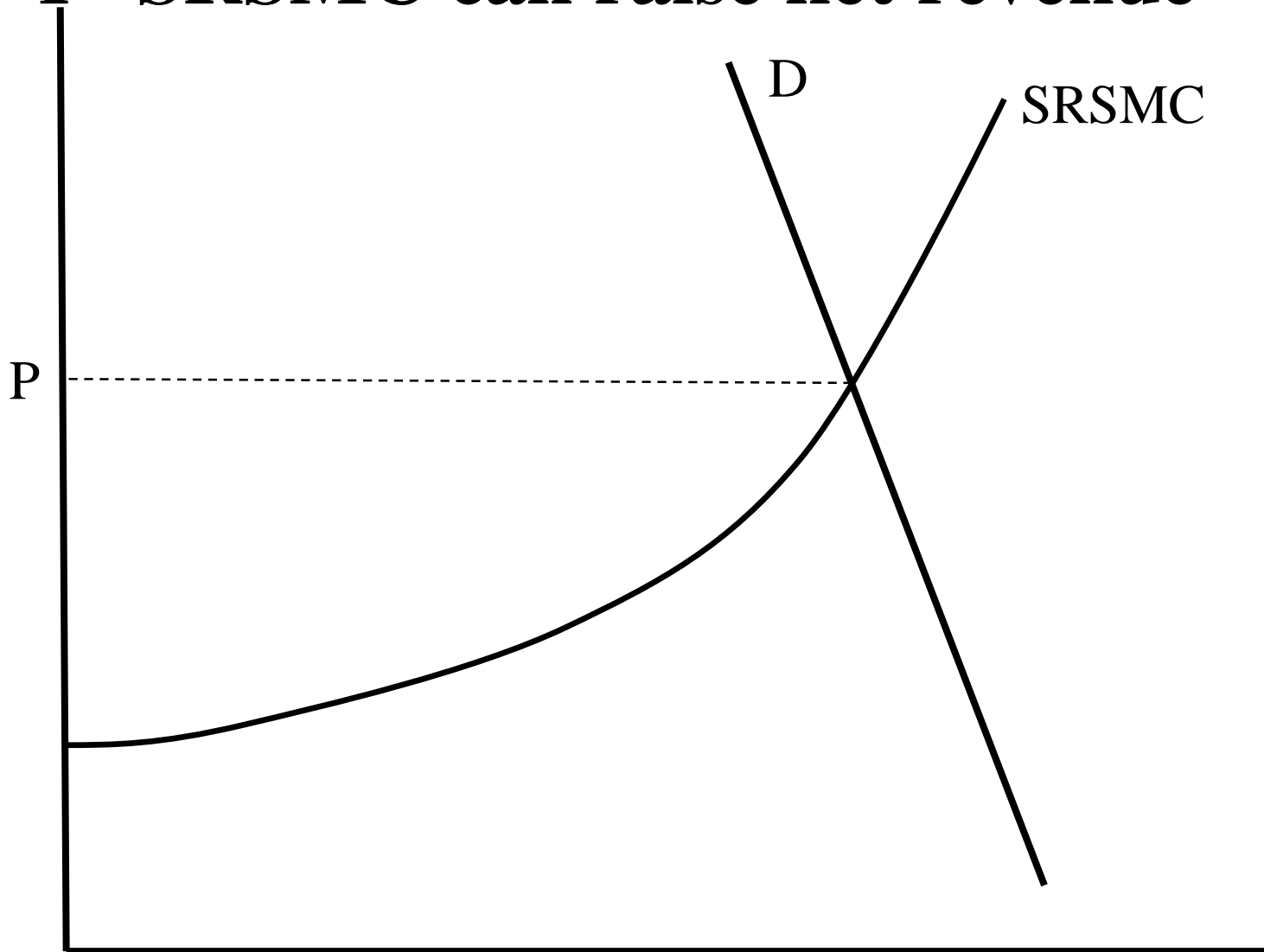
# Efficient versus Equitable responses when $P=SRSMC$ creates revenue shortfall

- Impractical economic ideal:  $P=SRSMC$  and subsidize with non-distortionary alternative tax source
  - In real world, utility must cover costs
- Leads to question: What price to raise?
  - Increase volumetric or non-volumetric charges?
- Standing charges (fixed monthly charges) are often seen as the easy solution for residential customers, but that ignores both economic and equity issues

# An Economic View of Utility Costs

- Over any time frame, costs can be decomposed into
  - Variable Costs, vary with quantity sold – fuel, some labor
  - Customer-Specific Fixed Costs, vary with number of customers – billing, customer support,
  - System Fixed Costs, do not vary with quantity or number of customers – system infrastructure, management
- Economic efficiency is clear on marginal cost (which generally generates revenue above variable cost)
- Economic efficiency is also clear on customer-specific fixed costs
- Economic efficiency has less to say about any remaining revenue shortfall

# $P = SRSMC$ can raise net revenue



# Facts and Fallacies about Standing Charges

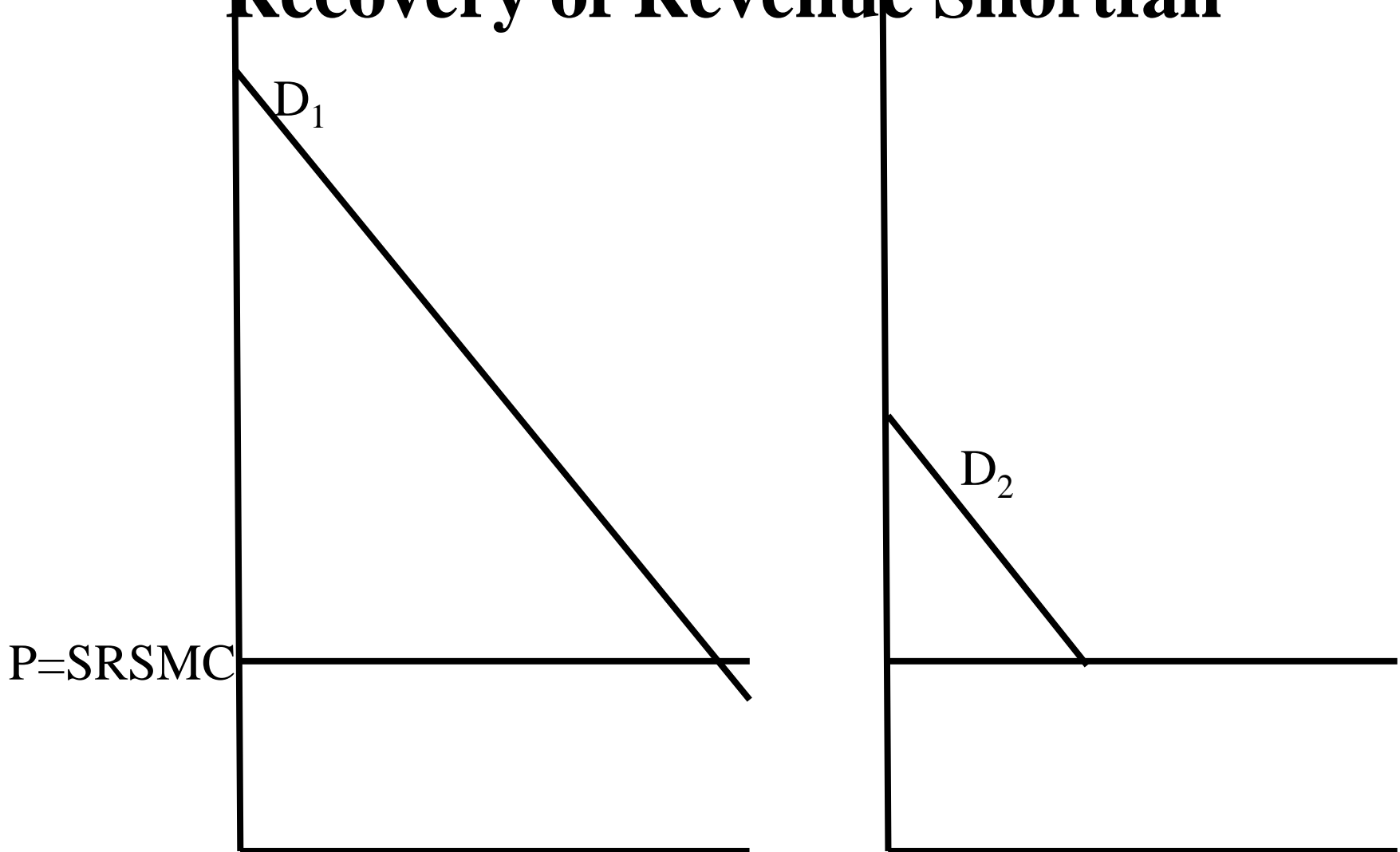
- System fixed costs do not justify or imply the need for standing charges
- Standing charges reduce economic efficiency if
  - a. they exceed customer-specific fixed costs, and
  - b. they cause some customers to drop out of the market
- Standing charges (above customer-specific fixed costs) may be a least-bad option for covering costs, but they are not an easy or obvious choice
  - They may cause some customers to inefficiently drop out
  - They fail most people's view of equitable cost allocation

# Fixed versus Volumetric Cost Recovery

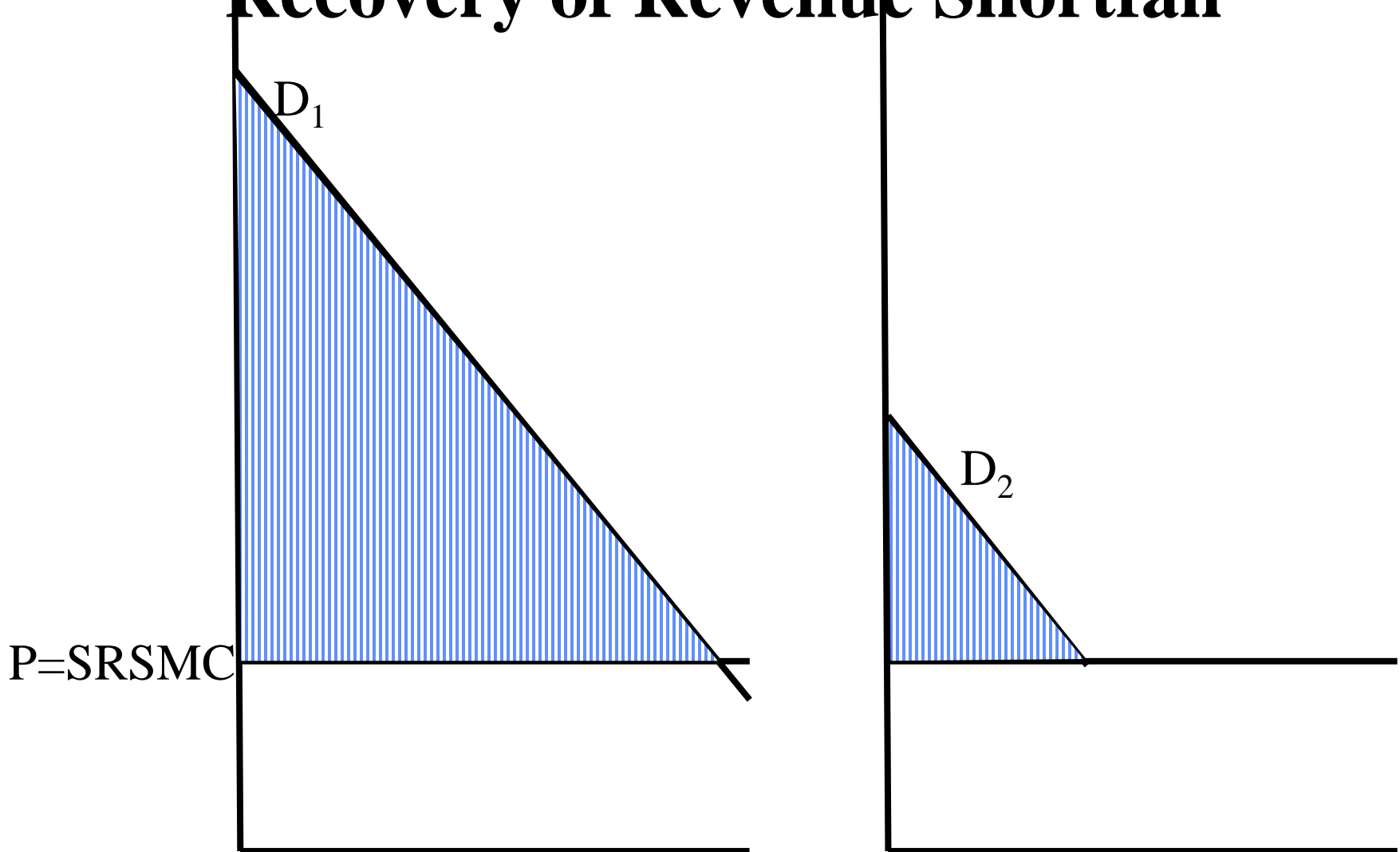
- A standing charge imposes the same additional cost burden on each customer regardless of consumption
- “Average Cost” volumetric pricing imposes additional cost burden on customers in proportion to consumption
- Volumetric cost recovery seems more equitable, possibly because it more closely resembles the most economically efficient (and possibly most equitable) theoretical ideal: a proportional consumer surplus tax



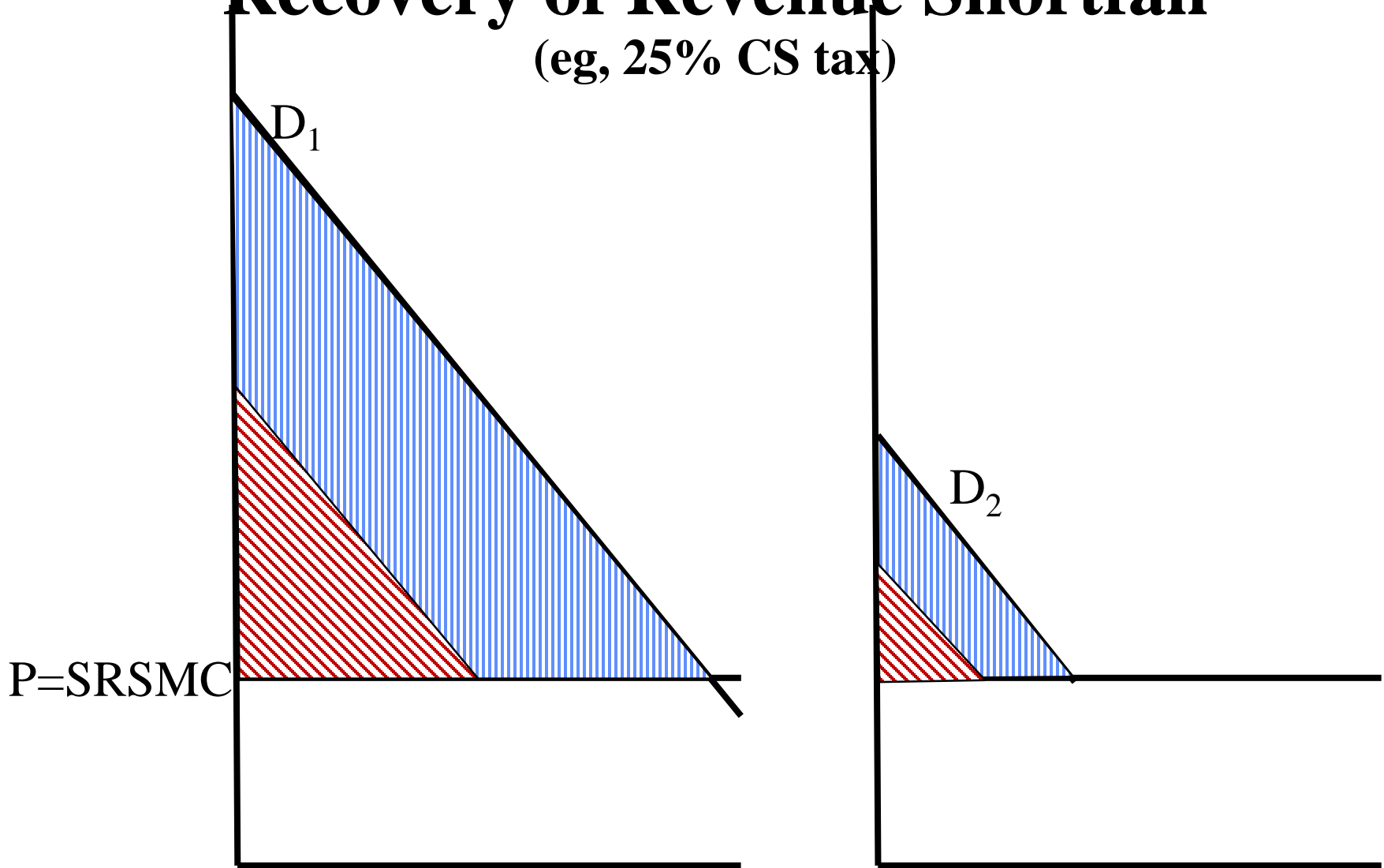
# Illustration of Ideal Utility Recovery of Revenue Shortfall



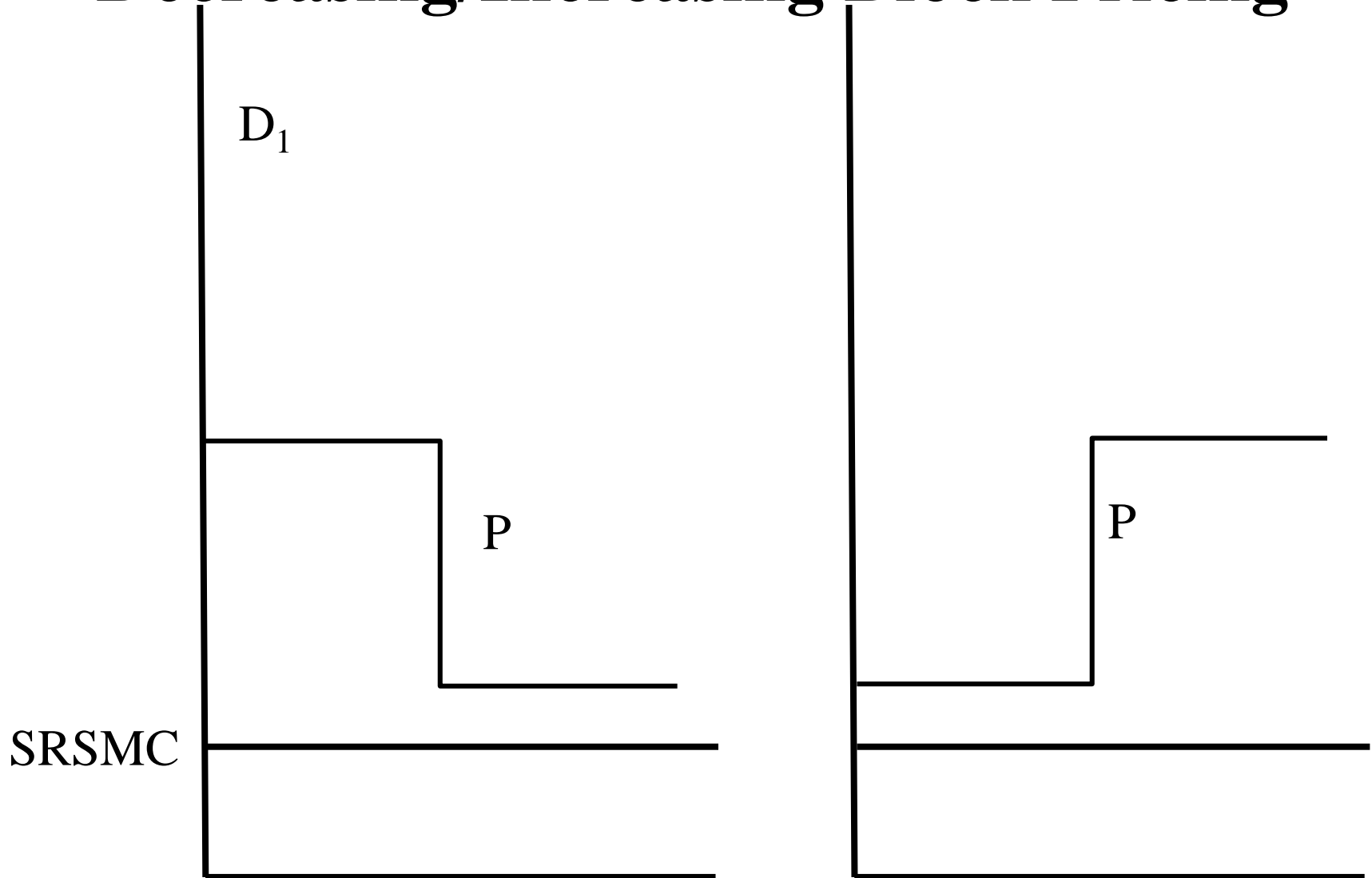
# Illustration of Ideal Utility Recovery of Revenue Shortfall



# Illustration of Ideal Utility Recovery of Revenue Shortfall (eg, 25% CS tax)



# Decreasing/Increasing Block Pricing



# Increasing/Decreasing Block Pricing

- Improving on standing charges and volumetric recovery of revenue shortfall?
- Declining block pricing is a compromise between standing charges and flat volumetric pricing to recover revenue shortfall
  - Larger consumers pay more of shortfall but not proportionally more
- Increasing block pricing is a step beyond flat volumetric pricing
  - Larger consumers pay more of than proportional share of shortfall
  - Justification: consumption is correlated with wealth

# Using Correlates of Wealth/Income: Vertical versus Horizontal Equity

- Vertical equity: tax wealthier proportionally more
  - Higher tax rate on wealthier, on average
- Horizontal equity: tax similarly situated individuals similarly
  - Minimizes variance around the average (or minimizes errors)
- Increasing block pricing does cause wealthier to pay larger share of revenue shortfall *on average*.
  - But correlation is fairly weak
  - Horizontal inequity is a huge problem
  - General problem of using correlates of wealth/income
- Tradeoff of using correlates versus direct income audit

# Conclusions

- Economic cost of using utility price regulation to help the needy has increased as ability to respond has improved
- But still a role for equity considerations in recovering utility revenue shortfall from efficient pricing
- Fixed charges are not a silver bullet for efficiency and somewhat extreme choice on equity grounds
- Volume-based recovery of shortfall is likely to be more distortionary, but more attractive on equity
- Using quantity or other correlates of wealth to pursue equity goals trades off vertical and horizontal equity
  - But direct income/wealth audits are costly and imperfect

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# Thank You!

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