

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

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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

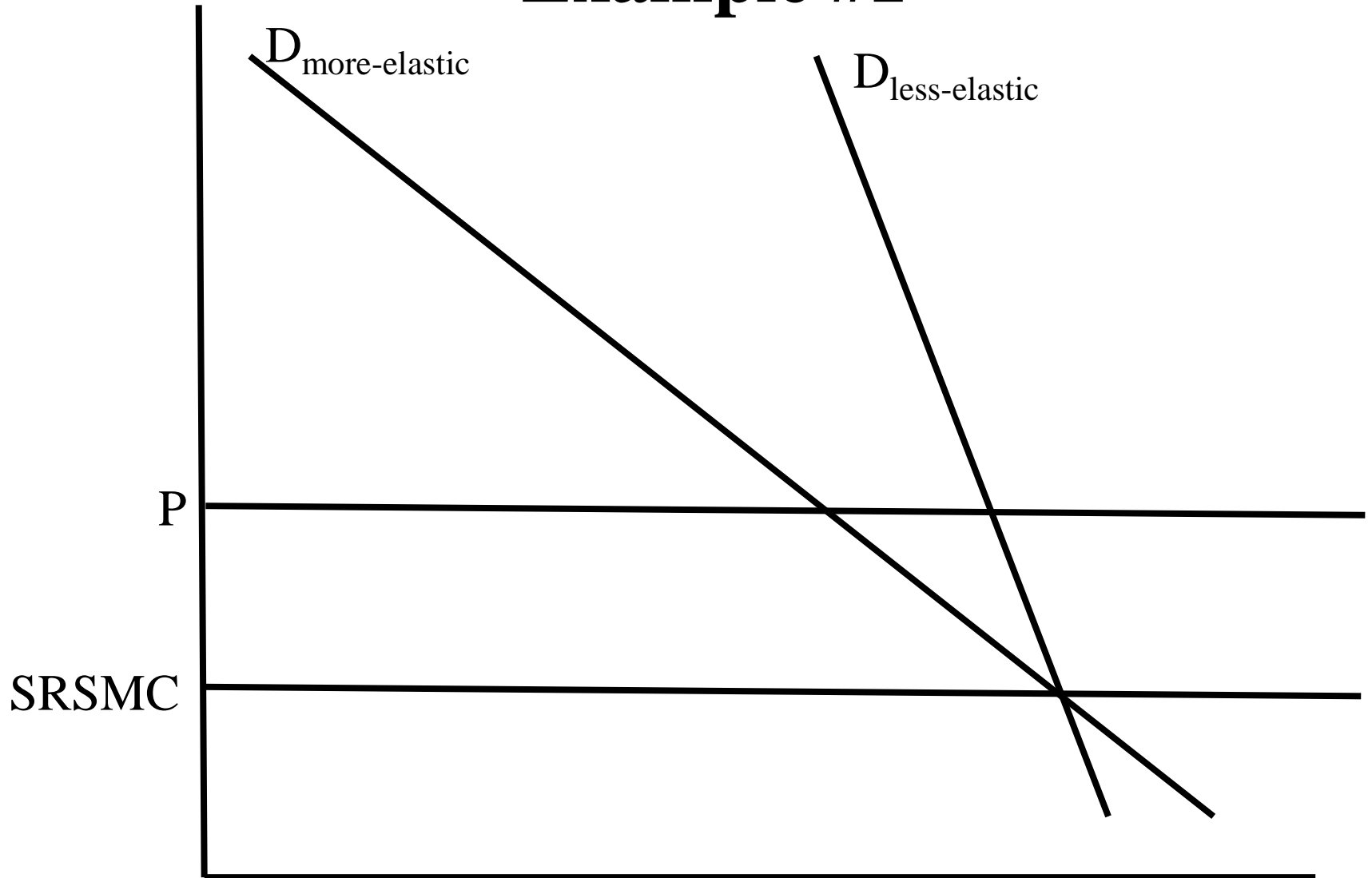
But Technology is Changing All That

- 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”

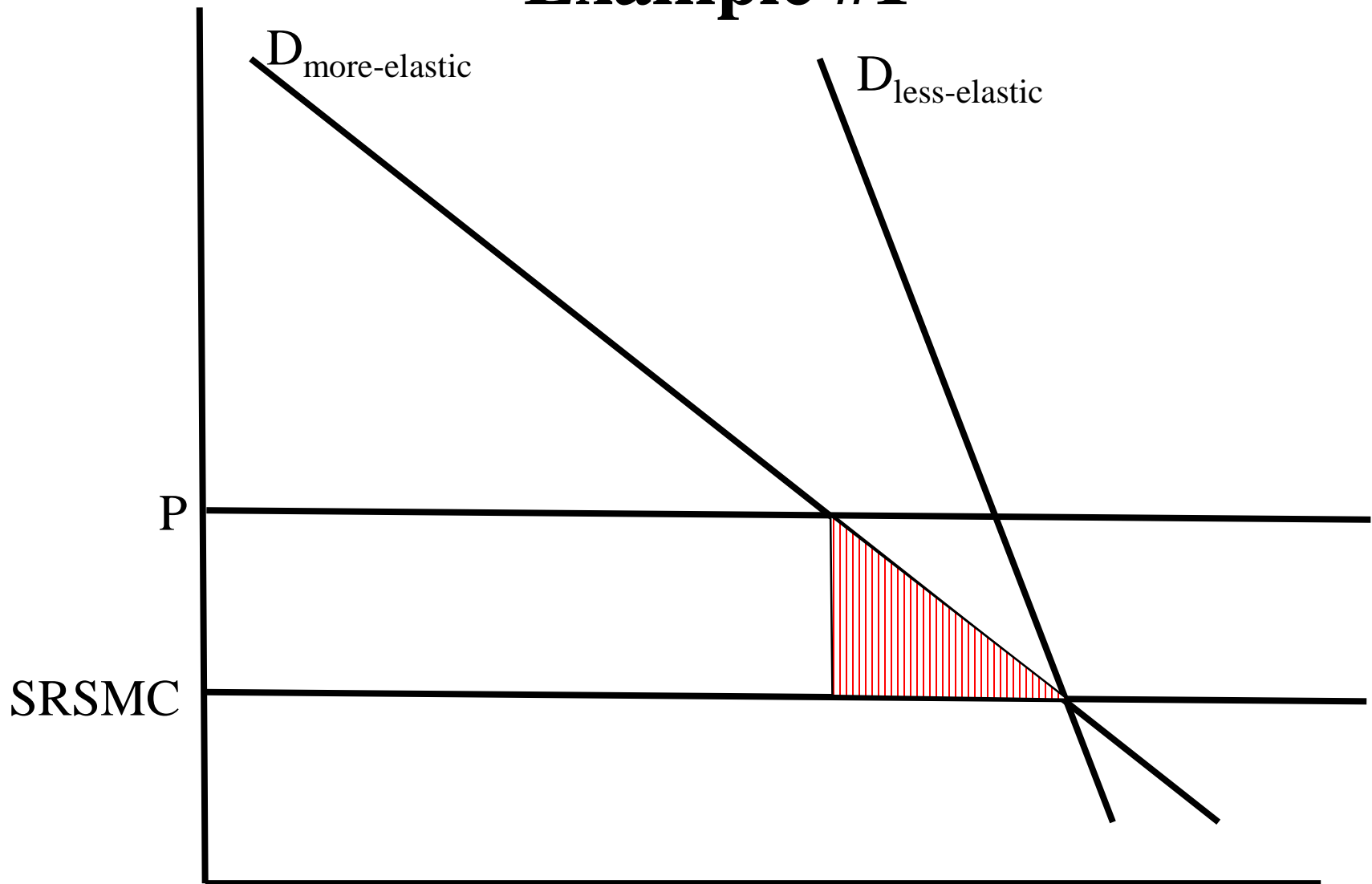
To explain why this really matters, a trip back to microeconomic theory

- 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.

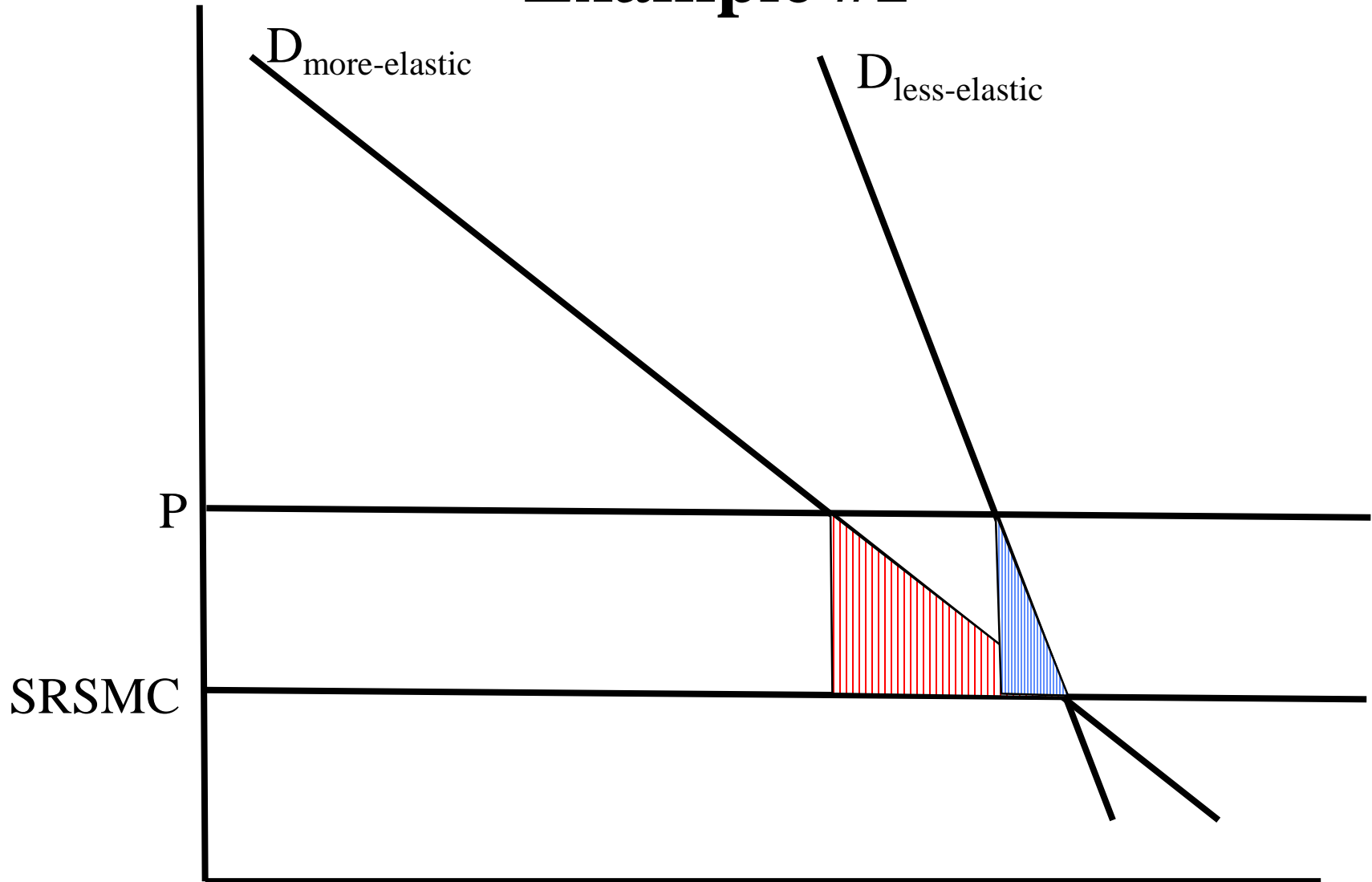
Example #1



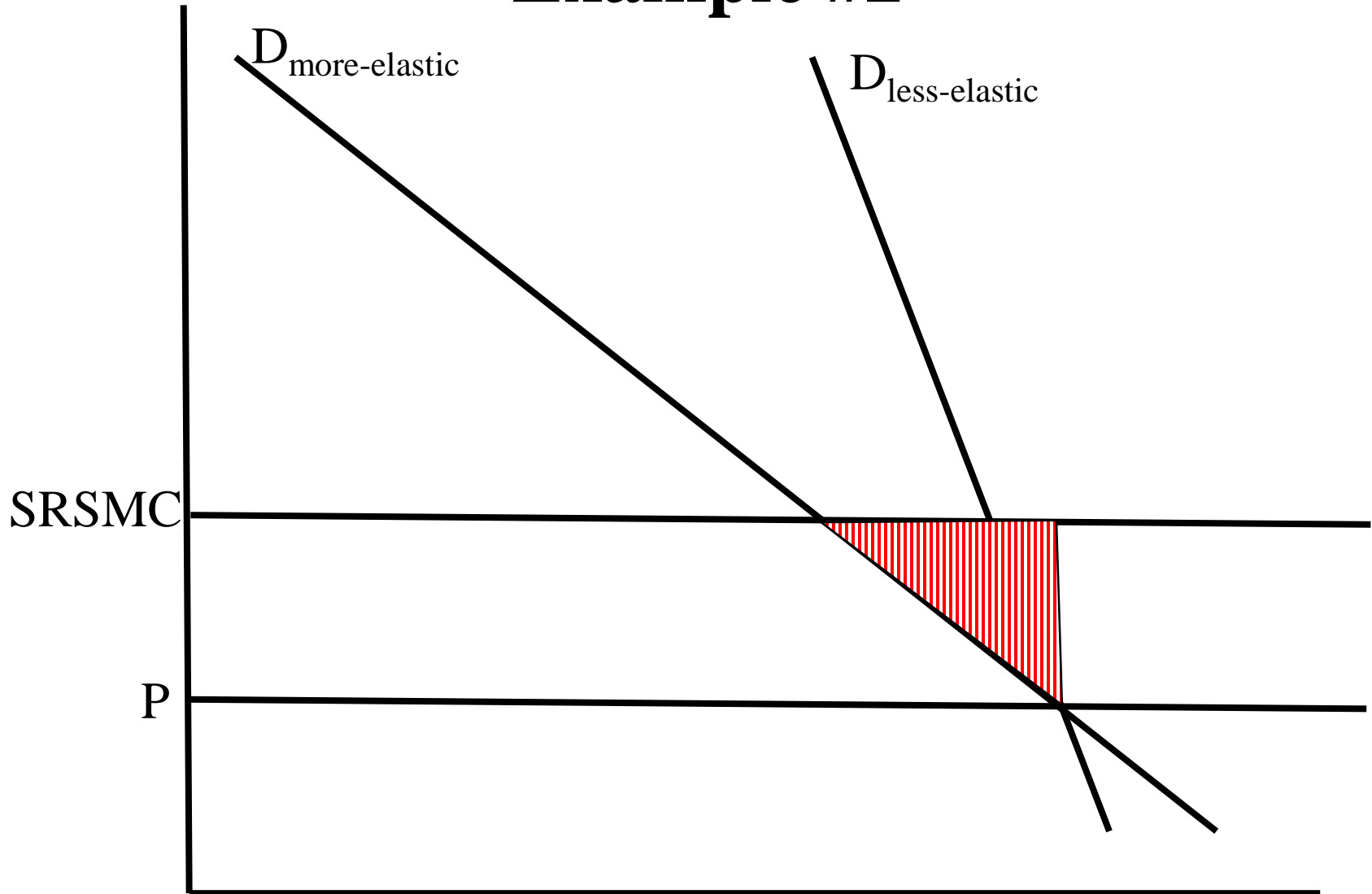
Example #1



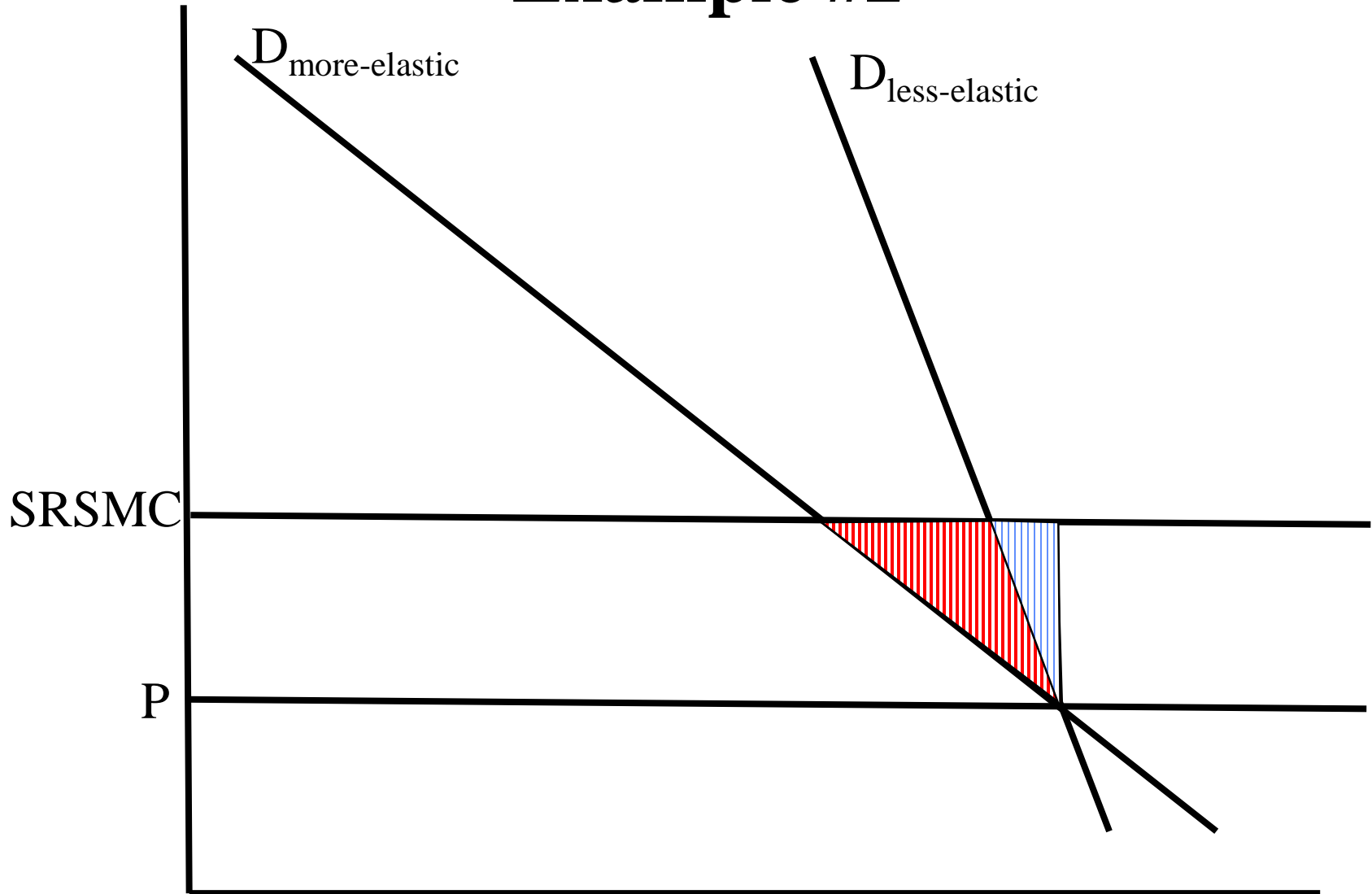
Example #1



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

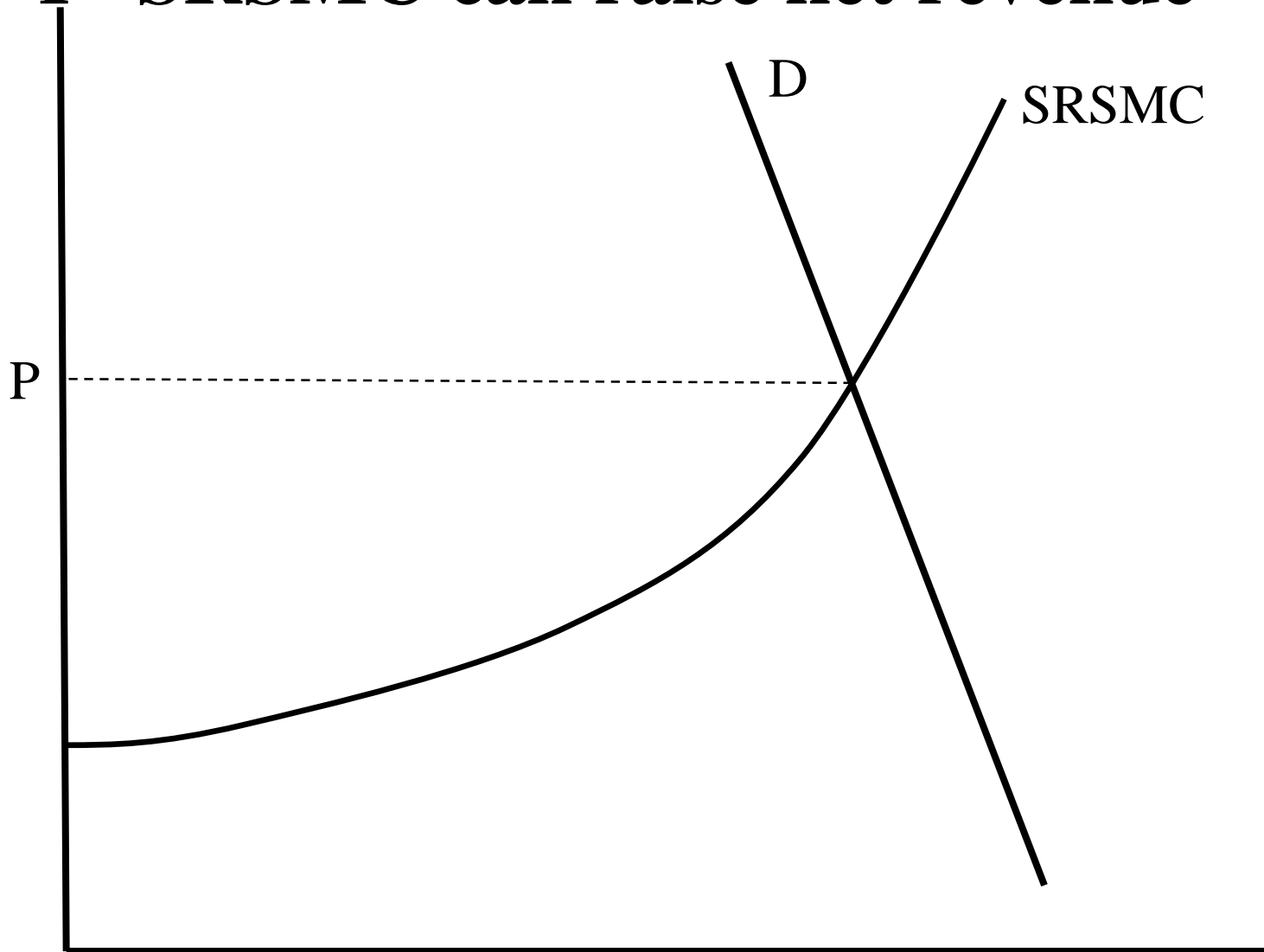
Efficient versus Equitable responses when $P=SRSMC$ creates revenue shortfall

- 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

$P = \text{SRSMC}$ 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

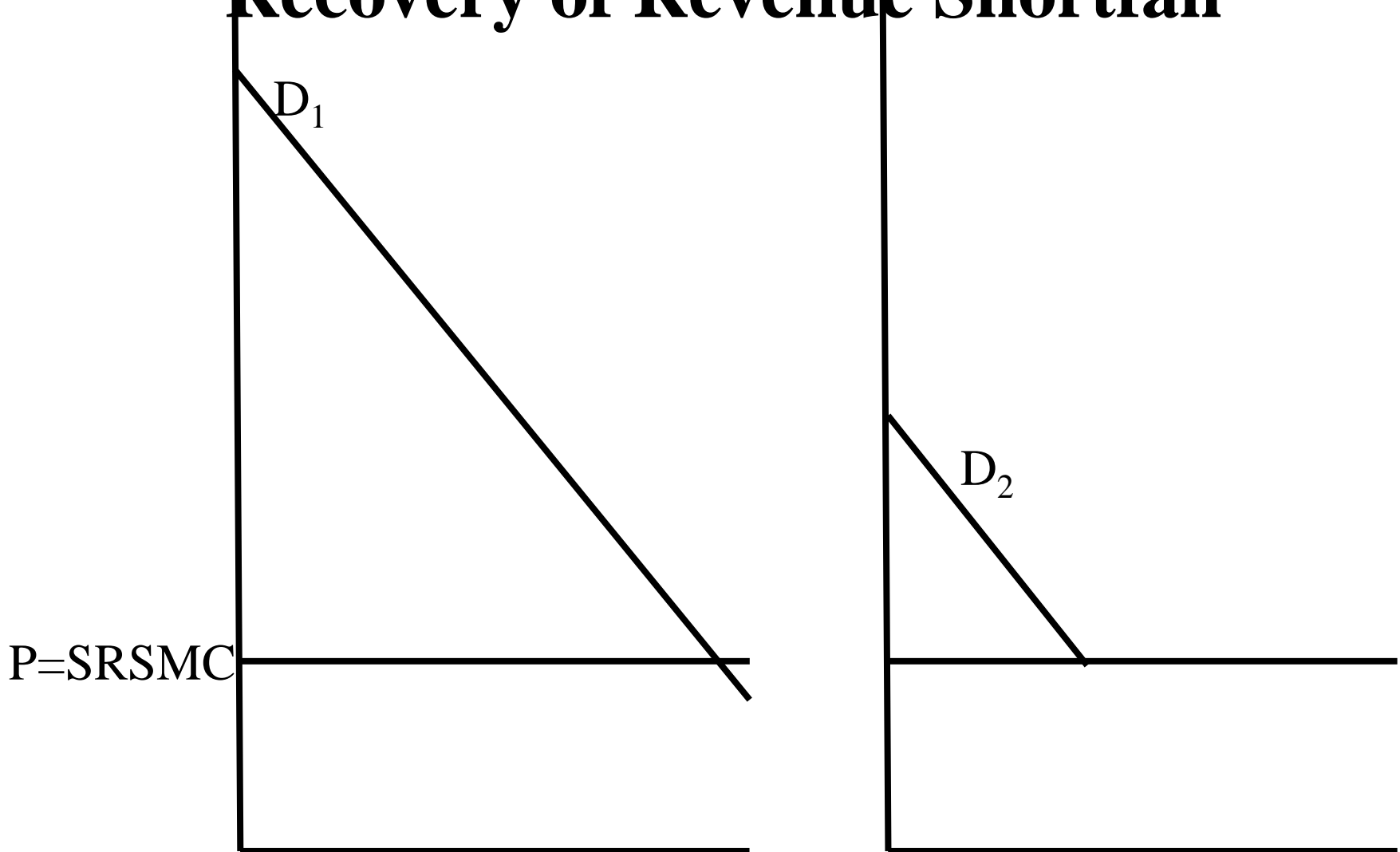


Illustration of Ideal Utility Recovery of Revenue Shortfall

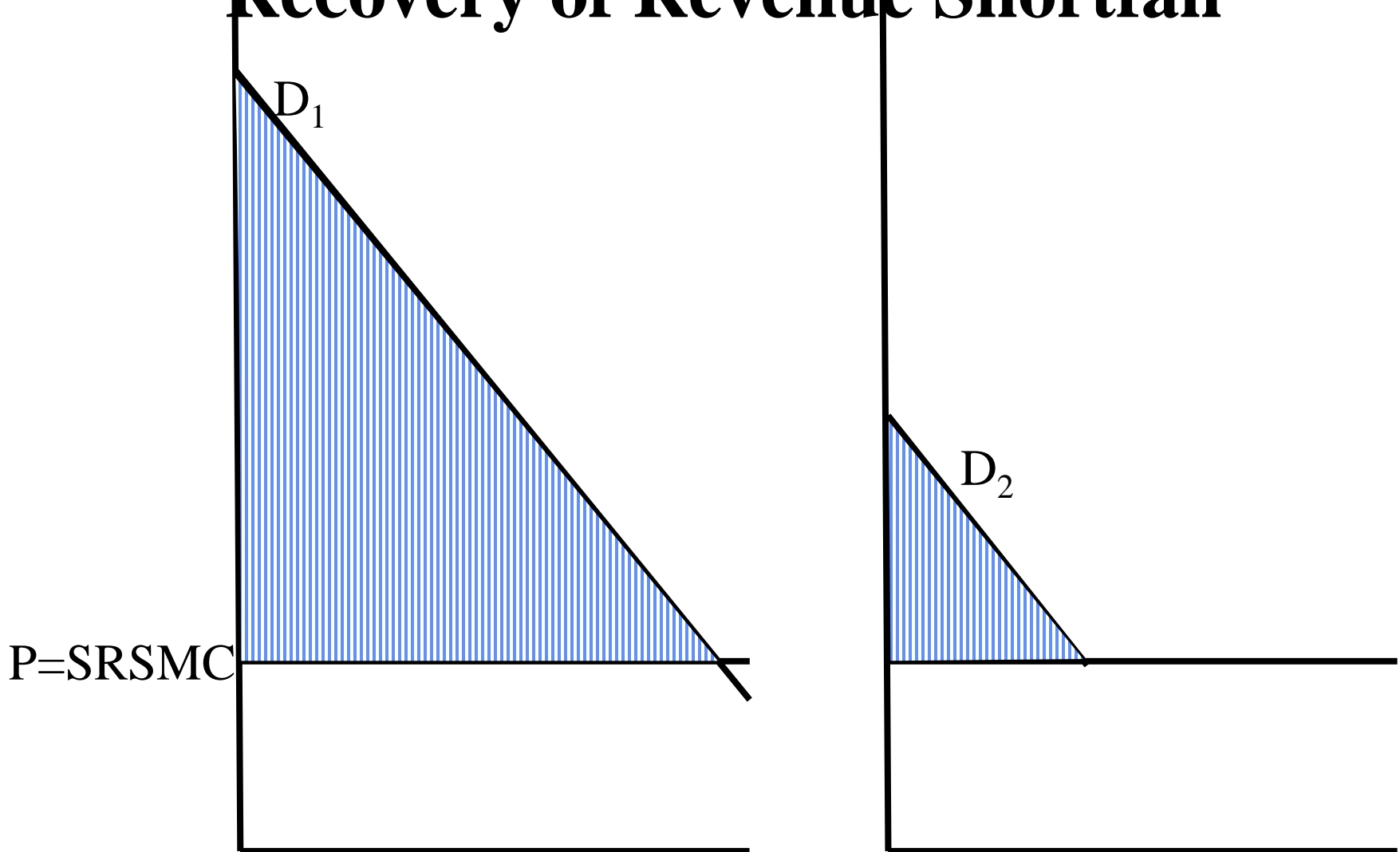
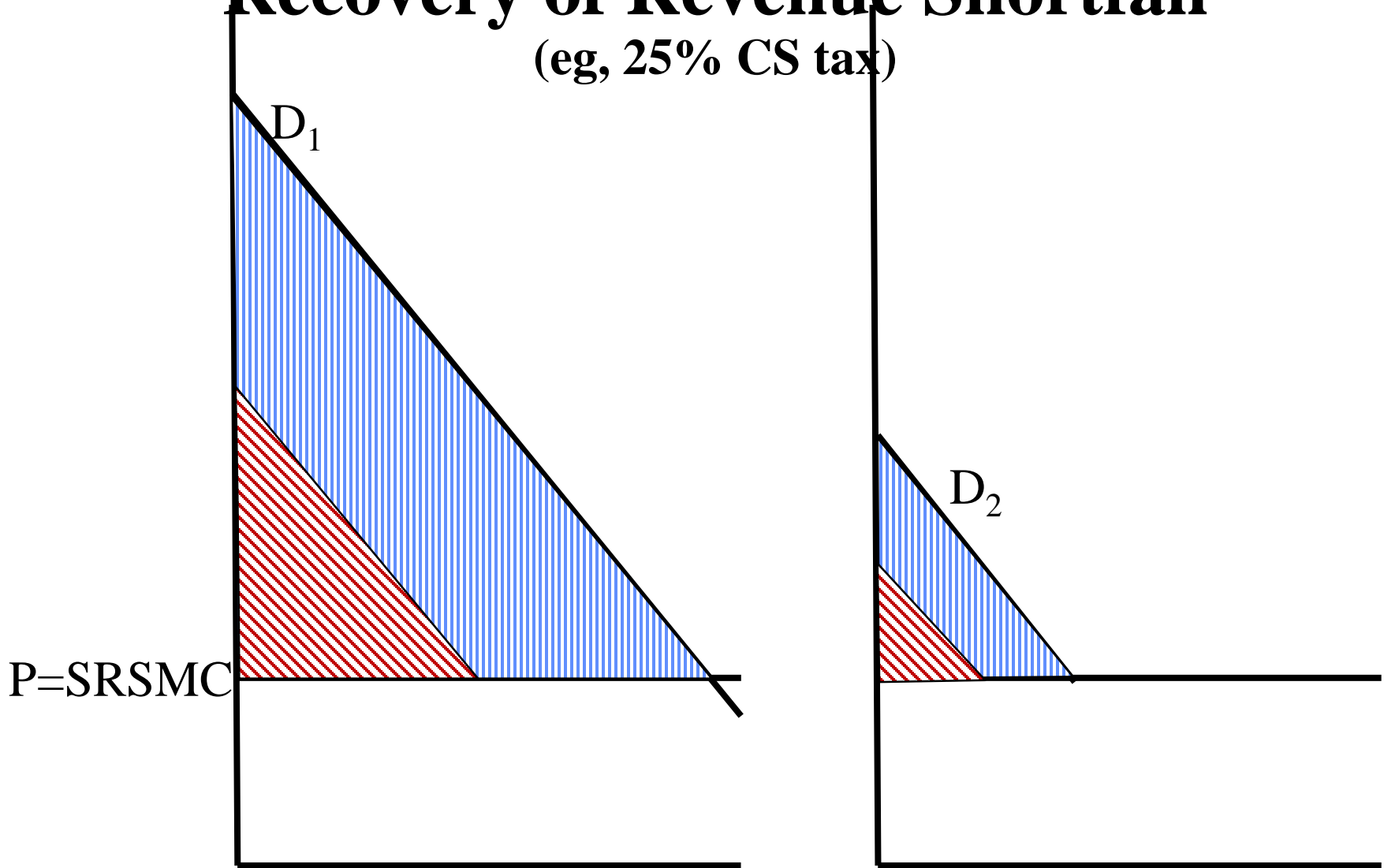
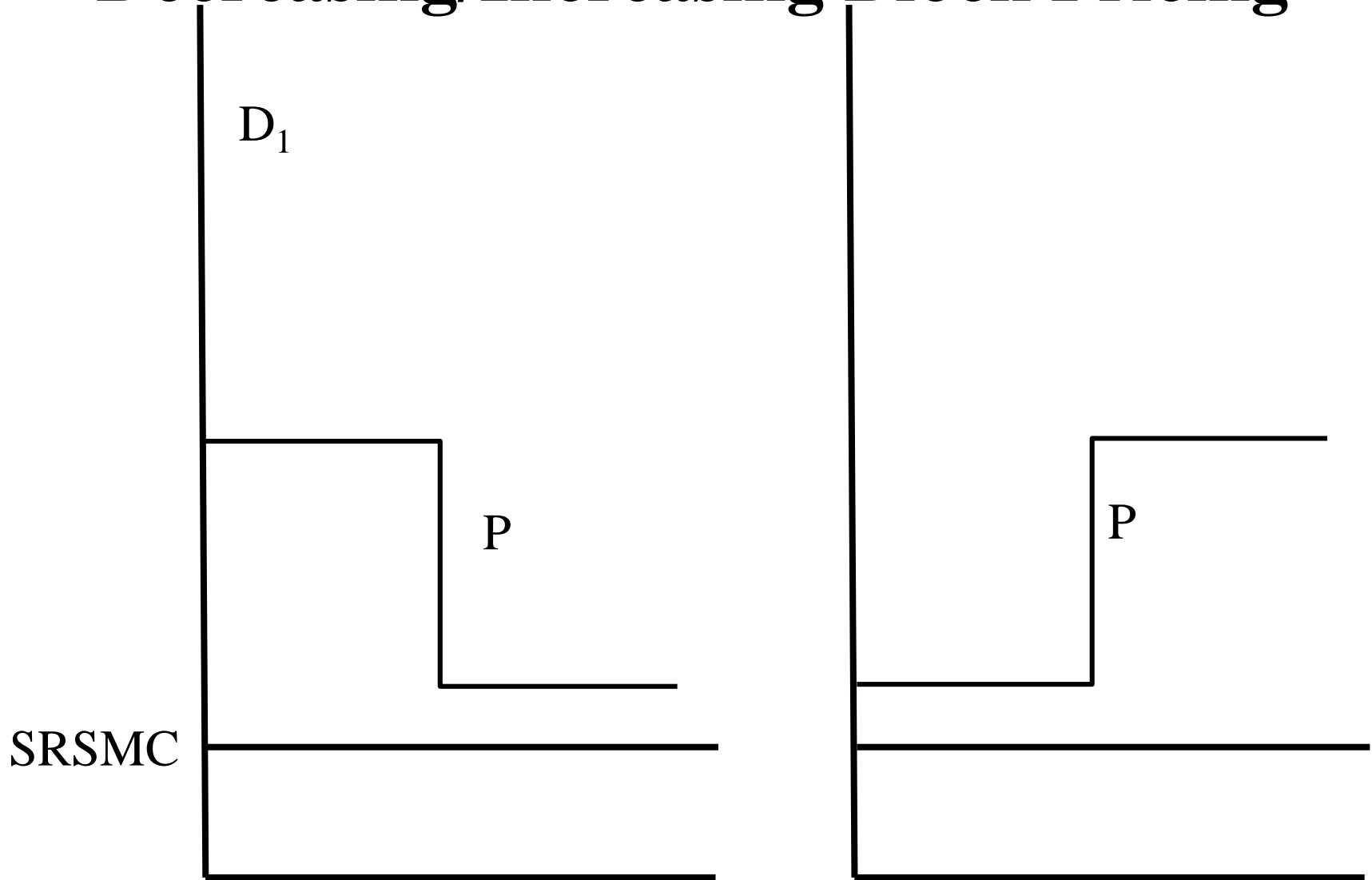


Illustration of Ideal Utility Recovery of Revenue Shortfall (eg, 25% CS tax)



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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