

Cross-Subsidies That Minimize Electricity Consumption Distortions

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The Problem

- Traditionally, electricity rates have been set on a per kWh basis, and ideally based upon average costs.
- Given the structure of electricity production, most of the costs are fixed in generation, transmission, and distribution facilities.
- Consequently, multi-part pricing makes sense and can be efficient when compared to per kWh charges.
 - Charges=monthly fixed charge + per kWh charge based on variable costs

The Problem

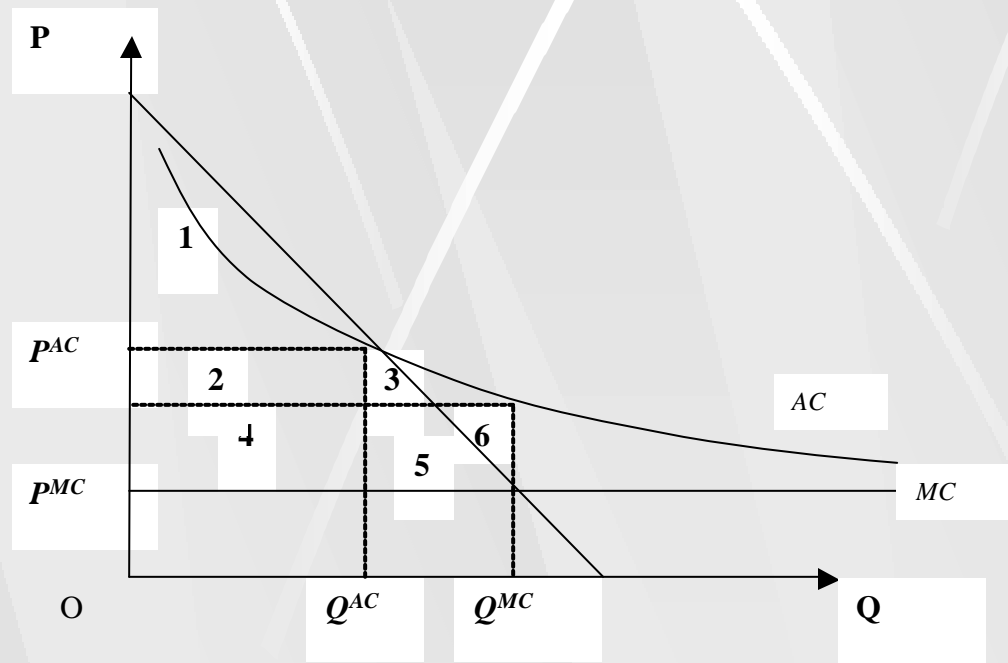
- It is also the case that many countries wish to subsidize certain groups to advance social goals such as equity universal access.
- Given that governments are budget constrained, this means cross-subsidies must be used to achieve these social objectives.
- Without cross-subsidies, on a per kWh basis, the cost of service to smaller residential customers is usually more than larger commercial and industrial customers.

Idea

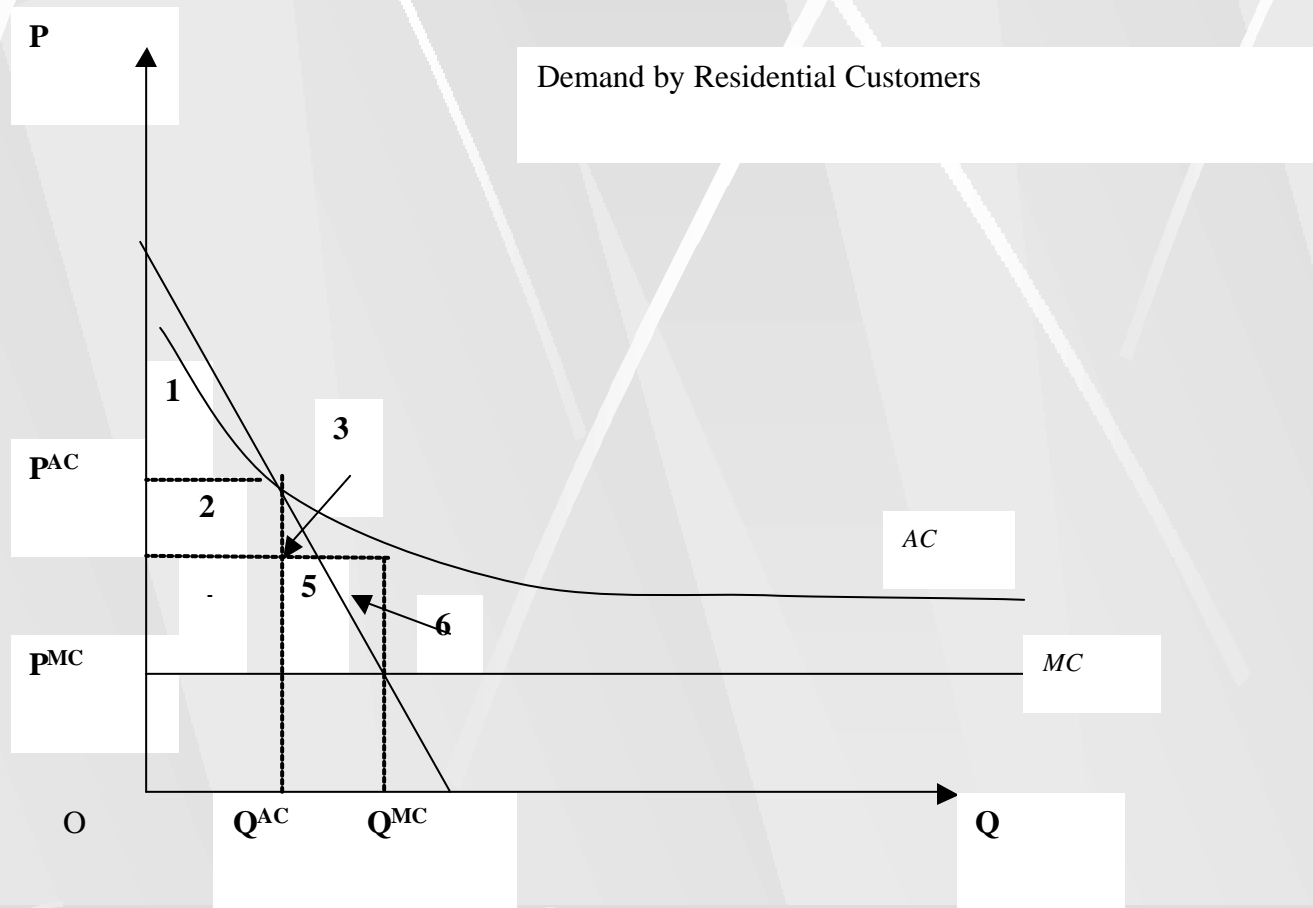
- Implement efficient multi-part pricing as a baseline, and cross-subsidize small, poorer customers through fixed charges which are non-distortionary.
- The per kWh charge would be based on the marginal cost of producing power.
- The fixed charge would have a link to the fixed cost of service to each customer type.

Average Cost Pricing vs. Multi-part Pricing

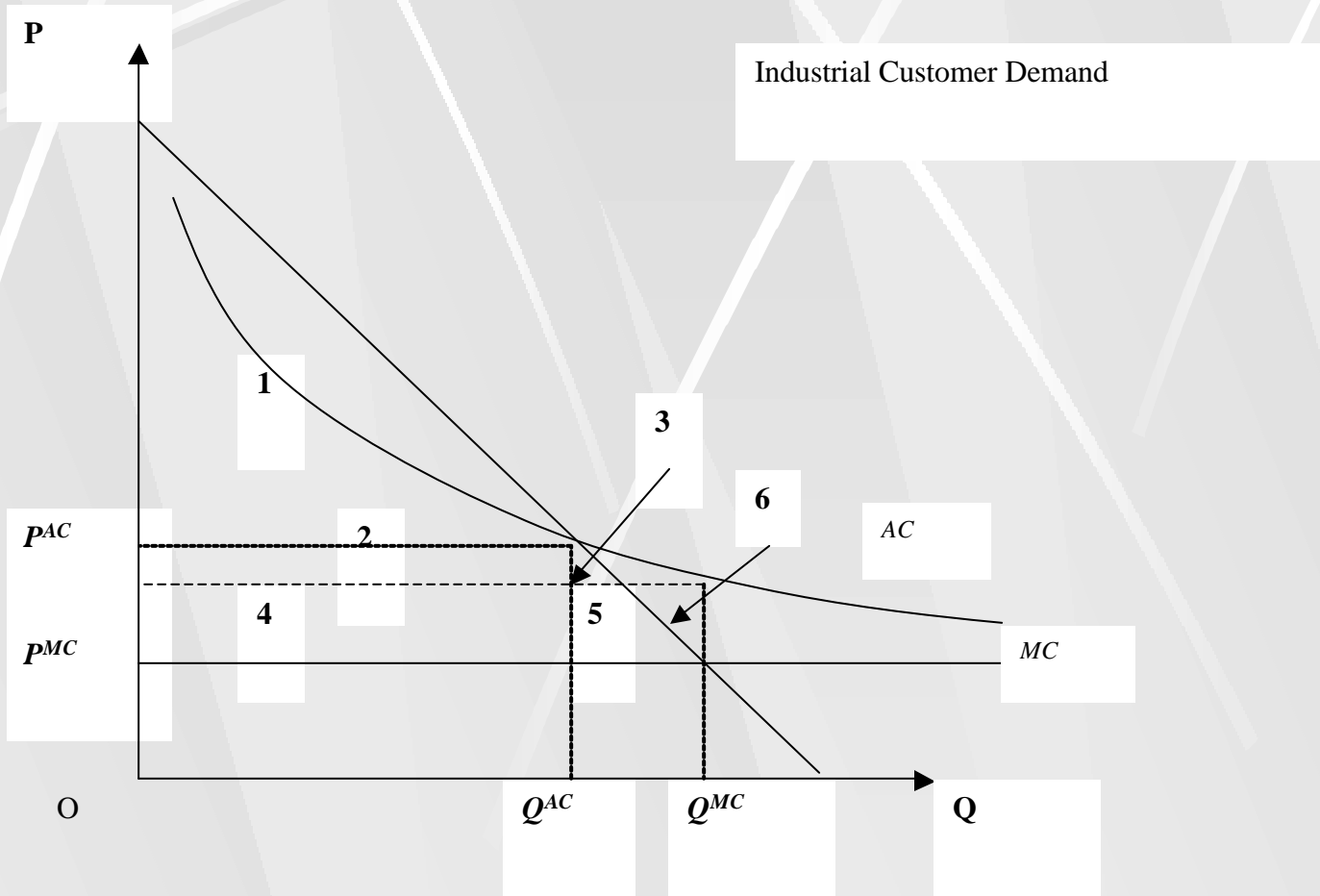
- Average cost pricing leads to a loss in welfare of 3+5.
- Multi-part pricing captures that lost welfare for consumers. Utility gets area 2+4.



Residential Customers



Industrial Customers



The Cross-Subsidy

Table 1

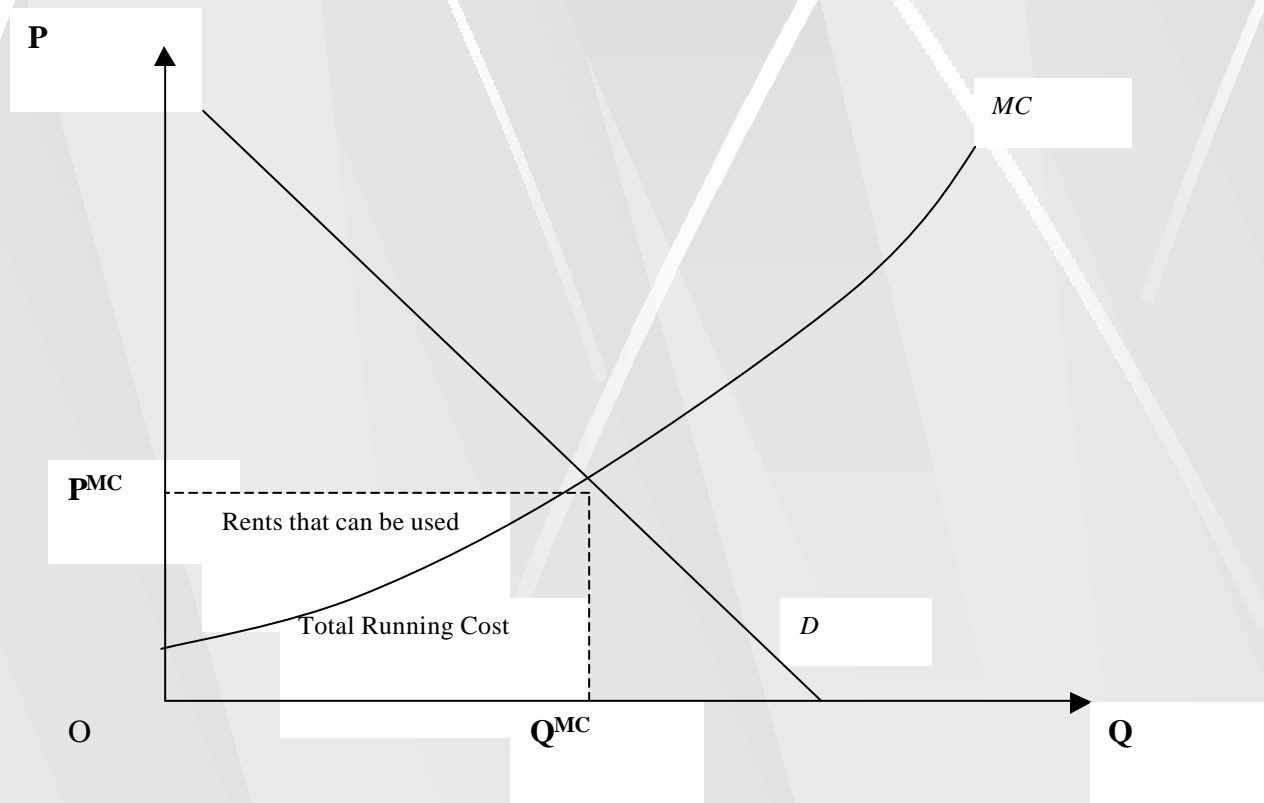
	Multi-Part Prices, No Cross Subsidy			Multi-Part Prices, Cross Subsidy		
Customer Class	Price and Quantity	Consumer Surplus	Fixed Charge	Price and Quantity	Consumer Surplus	Fixed Charge
Residential	P^{MC}, Q^{MC}	1+3+5	2+4	P^{MC}, Q^{MC}	1+3+5+(3 and 5 from Industrial)	2+4-(3 and 5 from industrial)
Industrial	P^{MC}, Q^{MC}	1+3+5	2+4	P^{MC}, Q^{MC}	1	2+3+4+5

Table 2

	Average Cost Pricing			Multi-Part Prices, Cross Subsidy		
Customer Class	Price and Quantity	Consumer Surplus	Producer Surplus	Price and Quantity	Consumer Surplus	Fixed Charge
Residential	P^{AC}, Q^{AC}	1	2+4 (3+5 is the deadweight loss)	P^{MC}, Q^{MC}	1+3+5+(3 and 5 from Industrial)	2+4-(3 and 5 from industrial)
Industrial	P^{AC}, Q^{AC}	1	2+4 (3+5 is the deadweight loss)	P^{MC}, Q^{MC}	1	2+3+4+5

Other Potential Funds

- The rents from charging marginal cost can also be used to implement the cross-subsidy.



Implementation Considerations

- Estimates of Demand
 - Without good estimates of demand by customer class, it will be difficult to implement the scheme.
- Cost of Service Studies
 - The cost of service study will provide the baseline cost reflective rates by which the cross-subsidy is implemented.
- Regulatory Mechanism
 - A mechanism that will fix revenue, based on fixed costs would be most appropriate...a revenue cap.
- Uneconomic Bypass
 - This could still be a problem if the cross-subsidy goes too far, but as proposed here this should not be a problem.

Implementation Considerations

- Customer Base Configurations
 - It is assumed that large customers have more wealth, though this may not always be the case.
 - Moreover, some smaller customers may be quite wealthy and perhaps could receive a subsidy even though they may not need it.
- Industry Configuration
 - This can be applied to a vertically integrated monopoly or to an unbundled competitive environment as long as fixed and variable costs are separated out.

Concluding Thoughts

- The proposed cross-subsidy uses optimal multi-part pricing as its basis.
- The cross-subsidy is non-distortionary to consumption decisions.
- The cross-subsidy proposed does not leave any customer class worse off in terms of welfare compared to average cost pricing.
- Implementing this scheme may be quite difficult and time consuming and must be done with care.