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Price Structures, Cross-Subsidies, and Competition in Infrastructure

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Governments often regulate not only the overall level of prices charged by infrastructure firms but also the relationship between prices for different services or customers. Thus, government-controlled telephone monopolies may keep prices low for local calls and charge more for long-distance calls. Power monopolies may keep prices low for residential customers by pushing up prices for businesses. And a postal monopoly may charge one rate for both rural and urban deliveries, even though rural deliveries cost it more.

Such pricing structures could, but do not necessarily, involve cross-subsidies. Prices can differ among different types of customers, for example, even when no customer can be said to be subsidizing another. In particular, when one asset is used to supply a service to two or more groups of customers—as, for example, one generator might be used to supply power to both business and domestic users—it isn't possible to say exactly what part of the cost of the common asset is attributable to each group. As a result, one customer group can pay more than another without necessarily subsidizing the other. In some cases, charging different customers different prices for the same service is actually efficient.

Price structures designed to favor one group over another usually will not survive competition—if they contain true cross-subsidies (as defined in the box), they almost certainly will not. New firms will undercut high-priced services, denying the former monopolist the revenue to fund low-priced services. Thus, one of the hurdles that governments must overcome in introducing competition in infrastructure is dealing with the social and political implications of changing price structures—or rate rebalancing, as it is often called. Of course, competition should reduce overall costs in the sector, lessening the need to compensate groups hurt by price increases resulting from rate rebalancing. But if the efficiency gains are not enough to offset the price increases for some groups and the government is worried about the political and social costs of rate rebalancing, it has three basic options:

- Preserving the old price structure in a way that ensures neutrality among competitors by requiring one firm, such as the former monopolist, to continue offering low prices for some services while obliging the firm's competitors to contribute their share to the cost of those services.
- Funding price subsidies from general tax revenue rather than from transfers within the firm or industry.
- Relying on social safety nets rather than price subsidies.

Whichever option a government chooses should stand up against the following four tests:

- Do subsidies reach the people the government most wants to support?
- Are the costs clear and measurable?
- Are the administrative costs as low as possible?
- Is the revenue raised from the source that entails the least cost to the economy?

This Note looks at the three options in practice and reviews how they measure up against the four criteria. It concludes that governments should eliminate price subsidies if politically feasible. But even if they cannot, they can still reap the benefits of competition.

DEFINING CROSS-SUBSIDIES

Charging different customers different prices for the same product does not always imply a cross-subsidy. Consider a firm producing just two goods, A and B. A cross-subsidizes B if and only if the price of A is greater than its stand-alone cost and the price of B is less than its incremental cost. The stand-alone cost of A is the cost that the firm would incur producing A, but not B. The incremental cost of B is the additional cost of producing B given that the firm is already producing A.

Consider as an example a diesel generator, costing $1,000 a year to lease, that supplies electricity to two firms. Suppose that the only other cost of supplying power is the cost of diesel fuel consumed by the generator and that firm 1 uses electricity whose production consumes $500 of diesel a year, and firm 2 electricity whose production consumes $200 of diesel a year. If firm 1 pays only $600 a year, is it being cross-subsidized by firm 2, which, if costs are covered, must be paying $1,100? No. Although firm 1 appears to be getting a good deal, it is paying more than its incremental cost (its fuel cost), while firm 2 is paying less than its stand-alone cost (the generator plus its fuel). The arrangement may even be in firm 2's interest: charging firm 1 a higher price might cause it to stop buying any electricity; perhaps, for example, it has the opportunity to buy enough natural gas to meet its needs for only a little more than $600. If firm 1 did switch to natural gas, firm 2 would have to pay all the costs of the generator as well as of its fuel—$1,200 rather than the $1,100 it paid before.

In general, when there are common fixed costs of production to be allocated among customers, economic efficiency requires that prices vary according to customers' sensitivity to price changes. And when a customer's price sensitivity changes over time, efficiency requires that the customer pay different prices at different times (for example, at peak and off-peak times). But as long as all prices fall between the stand-alone and the incremental cost, the price differences do not contain cross-subsidies.

Under a strict economic definition of cross-subsidy, then, not everything that looks like a cross-subsidy is one. Still, introducing competition can lead to changes in price structures even when the old prices contained no cross-subsidies. Prices may still rise for one group while falling for another, as competition drives firms to allocate a larger share of the common costs of production to consumers less likely to be deterred by price increases. The policy options discussed in this Note can be applied in any case in which competition would lead to price increases for one group—not just in cases in which true cross-subsidies are being eliminated.

Option 1: Preserving the old price structure

The government can preserve the old price structure after the advent of competition by requiring one firm to charge low prices for certain services while permitting it to recover a share of the resulting losses from its competitors. Most schemes of this type are in telecommunications, because it is there that competition has put old price structures under the most pressure. But many of the telecommunications schemes, such as those in existence or under consideration in Australia, the United States, and the United Kingdom and other European Union countries, could be transplanted to other sectors.

In Australia, the government has given Telstra, the former monopolist telecommunications company, a universal service obligation requiring it "to provide reasonable access to the standard telephone service (STS) and payphones, on an equitable basis, for all Australians, wherever they reside or conduct a business."[1] This obligation keeps the price of telephone services low in Australia's remote rural areas, where they might otherwise be very high. Telstra used to make up the cost of the universal service obligation through revenue from other services, but the entry of Optus and Vodafone into long-distance and mobile telephony in the early 1990s has limited its ability to do so. To prevent this obligation from handicapping Telstra relative to its competitors, the telecommunications regulator, AUSTEL, each year estimates how much the universal service obligation costs Telstra and then allocates that cost among the three firms according to their share of the telecommunications market. Optus and Vodafone pay their share into a fund that is used to pay Telstra.

The Australian scheme has succeeded in its principal aim of reconciling competition with price subsidies, and it fares well on two of the four criteria: it is reasonably simple to administer, and the process for allocating the costs of the subsidy among the three firms helps to make those costs transparent. But its targeting might not suit all governments: rich and poor alike benefit from subsidized rural telephone lines.

In addition, the economic costs of raising the revenue in the Australian scheme may be higher than necessary. Any scheme that preserves cross-subsidies funds the consumption of one good with revenue raised from what is effectively—if not in name—a tax on another good in the same industry. Adding a universal service tax to consumers' utility bills, rather than levying the firms and having them pass on the cost to consumers, would make this clear. But there is no obvious reason that the cheapest source of funds for subsidizing, say, local telephone calls would be a tax on another telecommunications service, rather than a tax on other products.

A government looking for the cheapest source of revenue for a subsidy needs to take into account all the possibilities—and all the costs—of raising the revenue. This means looking at the costs businesses incur in hiring lawyers and accountants to calculate their tax obligations and prepare forms, the costs that government incurs in collecting the taxes and dealing with lobbyists, and the indirect economic costs that result from discouraging the use of the taxed product. Tax experts generally believe that an economywide value added or income tax raises revenue more cheaply than an assortment of taxes on different products, each with its own tax rate and collection mechanism.

Option 2: Funding price subsidies out of general tax revenue

The reform of the Chilean water supply industry replaced cross-subsidies with price subsidies funded from existing, economywide taxes while also carefully targeting the subsidy to the poor. Tariff reforms raised prices to levels that covered costs, which meant much higher prices for residential customers. Concerned that poor households would be unable to pay the higher bills, the government introduced a subsidy program funded out of the central government's revenue but administered by city governments. Under this program, the city government pays part of each eligible household's water bill (40 to 75 percent of the charges for the first 20 cubic meters of consumption), with the aim of ensuring that no more than 5 percent of the household's income is spent on water and sanitation services. Eligibility is based on wealth, family size, region, and water cost and on whether the household has paid its share of the bill.

The Chilean policy was not a response to the introduction of competition. But it would work in such a case, and it stands up well to most of the evaluation criteria. Although determining household eligibility may be administratively costly, the scheme uses low-cost general taxes as the revenue source for the subsidy, and because the subsidy is funded from the budget, its cost is transparent. Although the targeting is theoretically precise, there were problems at first in getting eligible families to enroll. But enlisting the water companies to help inform potential beneficiaries of the program appears to have solved this problem.

In some cases governments could employ a variant of the Chilean scheme that used competitive bidding to secure the subsidized service at the lowest possible price, thus, further lowering the tax costs of the subsidy regime. A government would specify the service it wanted to provide at subsidized prices and award the contract to the firm requiring the smallest subsidy—much as commuter rail concessions in Buenos Aires were awarded to the bidder seeking the lowest subsidy to operate them.[2] Governments wanting to offer electricity to previously unserved areas at prices below cost could use the same mechanism. Or governments could harness the benefits of competition by giving customers vouchers and permitting them to choose among providers.

Option 3: Relying on social safety nets rather than price subsidies

Governments could also end service-specific subsidies, as New Zealand is doing in its reform of the electricity sector. Before the government allowed competition in electricity supply in the early 1990s, businesses typically paid much more for power than households did. Competition has made that price difference difficult to sustain. Because switching suppliers requires installing new meters whose cost can be justified only for large electricity consumers, electricity retailers have been obliged to offer lower prices to businesses, while commercial circumstances and deregulation have allowed them to raise prices for households. Between 1991 and 1995, the inflation-adjusted price of electricity, including fixed charges, rose by an estimated 16 percent for small households and fell by 12 percent for large commercial users.[3] The two groups now pay about the same price for power. The government has not put in place a scheme to offset these price increases for households, relying instead on existing social welfare policies to channel support to low-income people.

Although the price increases so far do not appear to have stirred up enough opposition to jeopardize the New Zealand reform, not targeting aid explicitly linked to the infrastructure service to those who lose from rate rebalancing entails political risks—especially when the necessary price increases are large. When the politics of the situation allows it, however, there are advantages in using antipoverty programs not linked to infrastructure services: they typically use low-cost forms of taxation; they can easily be made transparent; and because of their size, the administrative costs are likely to be low as a proportion of the aid given. But their biggest advantage is that they are better at targeting aid to the poor.

Perhaps the most interesting evidence of the redistributional ineffectiveness of cross-subsidies comes from a study by David Newbery that looked at pricing reforms in Hungary and the United Kingdom.[4] Both the British government's reforms and the Hungarian government's introduction of a market economy were more wide-ranging than simply removing cross-subsidies in a single infrastructure industry. Yet Newbery's study found that the resulting relative price changes by themselves did not affect the relative welfare of the rich and the poor. Newbery notes that the findings are "consistent with the view that the original set of subsidies and taxes were poorly targeted on distributional grounds" (p. 862).

In developing countries, governments cannot easily use infrastructure cross-subsidies to help the very poor because that group tends to lack access to gas, power, telephones, and piped water. In Ecuador, for example, the electricity subsidy was estimated to be US$500 a year for the (probably rich) households using the most electricity and US$36 a year for the (probably relatively poor) households using the least—but most of the poorest households receive no subsidy at all because they have no access to electricity.[5] So, if it is politically feasible to end price subsidies, that may be the best thing to do.

1 Austel, *1994–95 Annual Report* (available at http://www.austel.gov.au).

2 See José Carbajo and Antonio Estache, "Railway Concessions—Heading Down the Right Track in Argentina" (Note 88, September 1996).

3 New Zealand Ministry of Commerce, *Electricity Information Disclosure Statistics* (Wellington, 1995).

4 David Newbery, "The Distributional Impact of Price Changes in Hungary and the United Kingdom," *The Economic Journal* (July 1995, pp. 847–63).

5 World Bank, *World Development Report 1994* (New York: Oxford University Press, 1994).

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