

RECOVERING NETWORK SUBSIDIES
WITHOUT DISTORTION

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1. Introduction

Since the Federal Communications Commission's Above 890 decision, American regulators have permitted greater competition in the provision of telephone service and equipment that has driven many prices to levels more consistent with underlying marginal costs. While beneficial to many customers, the process has nonetheless reduced the ability of the public network to finance subsidies for universal service and to recover its costs of undepreciated capital. As competition in local provision continues to evolve in the next decade, this competitive pressure will increase yet more. The public network may increasingly resemble the economists' underfinanced public good; it will continue to serve as the channel of last resort to interconnect users who do not share alternative means of interconnection, but groups of related users may nonetheless have individual incentives to interconnect over private networks that provide no financial support for the public

¹Opinions are personal and not those of the U. S. Dept. of Justice.

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good.

Reform could follow two avenues. First, regulators may attempt to prescribe (or implement rules that would generate) more efficient service prices for public network use. Alternatively, all public and private network services, and equipment purchased for use thereon, can be taxed in some fashion to recover necessary subsidy amounts. We shall now compare the various options.

2. Price Reform for Cost Recovery

Under current regulatory procedures, local company capital costs and service subsidies are recovered partially from flat-rate and usage-sensitive customer charges and partially from interconnection charges that are assigned to each long-distance carrier based on its respective switched access minutes-of-use; interconnecting providers in turn recover these costs from their calling customers. Because fixed costs are now recovered on a per minute basis, prices for toll calls on the public network now exceed the local company's actual marginal usage cost. To avoid these charges, long-distance carriers, alternative access providers, and end-users now have incentives to route traffic around local company switches -- often inefficiently.³ As a result, bypass technologies and private networks attract more

³To avoid using public network services, customers may contract with alternative service providers or install equipment that can directly substitute with, or reduce the use of, public network facilities to some degree. Examples of substitutes include PBX and Centrex, private data networks and public virtual alternatives (e.g., SDN), and remote and network-based processors, and switch bypass.

customers than would be efficient and the public network and its captive customers would continue to face a growing cost burden.

From a perspective of pure economic theory, the answer to the cost recovery problem is almost trivial. If a service price exceeds its associated marginal cost, economic inefficiency results only if the price increase somewhere reduces consumer quantities demanded. Regulators may therefore ensure efficiency simply by recovering costs and subsidies exclusively through service prices that do not affect demands if they exist. Because telephone subscription now is a virtual necessity, many have contended that customer hookup and fixed monthly charges can be effectively raised without reducing either customer number or usage; such prices then are instruments that would enable efficient cost-recovery. However, as a matter of political reality, this approach seems hopeless; the FCC was stymied in its 1984 attempt to increase subscriber line charges for NTS cost recovery to \$6/month, and most state commissioners are not inclined to allow customer flat-rate fees to increase.⁴

A similar political difficulty infects the flat-rate interconnection charges that interconnecting providers could pay. Because these long-distance carriers and competitive access providers would recover interconnection charges through customer rates, flat-rate charges would most increase the prices charged by small competitors and would therefore lead to a noncost-related advantage for the larger.

⁴Required flat-rate monthly payments for NTS cost recovery could average around \$20/month, with greater amounts in rural areas.

If no admissible service price were to meet the inelasticity condition specified above, economists have advocated Ramsey pricing as the least distorting means of increasing price above marginal cost to recover public network costs and subsidies. Under Ramsey pricing, product prices exceed their associated marginal costs in inverse proportion to the demand elasticities of the related services; Ramsey rules have been devised for two-part tariffs and nonlinear price schedules as well. Recent economic research has contended that utilities regulated by price-caps have long-run incentives to reach Ramsey prices without regulator need to measure demand elasticity or marginal cost.

While Ramsey strategies may provide monopoly prices that maximize theoretical consumer surplus while simultaneously recovering necessary network costs, they present three problems that appear to be insurmountable. First, Ramsey pricing marks up most the price of services with the fewest competitive substitutes; i.e., on captive demands. In the political arena where regulation is played and constrained, this is often seen as unfair. Second, the actual measurement of particular utility services performed, and the prices based thereon, have become increasingly problematic.⁵

Finally, when some utility services are competitive, the Ramsey outcome is not necessarily sustainable; i.e., alternative providers can undercut Ramsey prices and attract customers who may then avoid contributing to the public network. To offset this

⁵The best example is calling minutes-of-use and number of switched access lines, which are made problematic by packet switching and cross-connect arrangements.

threat, local companies will attempt either to lower competitive prices across-the-board or to implement nonlinear arrangements, such as volume discounts and negotiated bulk contracts, thereby passing the fixed cost burden on to a diminished base of noncompetitive services. As network competition intensifies, further constraints on local company price levels can be expected. In the end, the local company's cost burden may be too large to recover from its noncompetitive customer base.

3. Tax Strategies

The above inefficiencies arose because subsidy and cost burdens were recovered exclusively through local company service, creating an inefficient price-cost wedge that customers and alternative providers attempted to avoid. This problem can be reduced if necessary costs and subsidies can be recovered from a wider base of payers drawn from the population-at-large or from competitive network users.

From the perspective of theoretical economic efficiency, general taxes on sales, personal income, or property would be nearly ideal ways of generating the network's necessary financial support; e.g., additional subsidy dollars could be recovered through personal income taxes or through an $x\%$ tax on personal consumption. If cost dollars were so recovered, the local company could compete symmetrically with its incumbent and emerging rivals without the fixed cost burden that it now carries. Except for the possible substitution of leisure for work or savings for

consumption, these taxes would affect no person's choice between any two products in the entire economy. However, whatever theoretical validity these taxes may have, they are politically problematic; any tax increase is more likely to be earmarked for deficit reduction, public infrastructure, and perhaps foreign aid long before making its way to a communications subsidy.⁶

Much as highway dollars are now financed by user taxes on gasoline purchases, public network subsidies will probably need to be recovered exclusively from the users and providers of communications equipment and services who directly benefit from the network; we now discuss possible options. Because local companies and regulators would have a difficult time monitoring consumer usage of competitive facilities, it is unrealistic to attempt to recover network subsidies by affixing a per unit markup on total calling minutes, number of calls, or customer transport capacity. We shall then consider tax schemes that are relatively easy to implement, that symmetrically affect all communications providers, and that do not place a disproportional burden upon users of any one network; under a proper scheme, telecommunications customers would no longer have incentives to shift from one communications technology to another in order to avoid contributing a subsidy amount.

As one alternative, network taxes could be assessed on property now owned by the local company and its competitors. Such taxes would affect no company's marginal production costs, which

⁶The same is true for reductions in the defense budget that may result in the next decade.

economists would find very desirable. However, if property taxes are to be implemented, each company's asset base must be measured; since very difficult measurement problems would arise if measured plant were based on replacement costs, the tax base must be based on embedded historic cost. If so evaluated, the tax burden could differently affect two direct competitors with different plant vintages; this is neither efficient nor fair. Furthermore, a property tax may actually discourage net investments that would improve carrying capacity, service quality, or system reliability; this burden may fall disproportionately upon new providers that must install facilities from scratch.

Profits taxes would be levied on the difference between producer revenues and costs; the latter includes labor, materials, capital, and energy. An economic theorist would point out that a profit-maximizing producer has incentives to price and invest identically with and without a positive profits tax; by not affecting product prices, output levels, input mix, or competitor entry, profits taxes perfectly preserve competitive results without any distortion. However, because competition presumably drives competitive producer profits to zero, competitive services may contribute little toward needed public network subsidies. As the cost burden is passed back on to noncompetitive services, our initial problem reemerges; i.e., if dependent upon its own base of noncompetitive customers, the local company may eventually be unable to recover its costs at all.

Value added taxes have been used in other nations to finance government expenditures (see Tait, 1988). A producer's value added

can be measured in two different ways; it is the difference between its customer revenues and costs, excluding labor and capital, but may be alternatively measured simply by summing its wages and capital payments. Value added taxes are assessed in the production chain wherever value added is positive, from providers of raw materials through to the service providers that sell to end-users. They are usually collected as sales taxes on all market transactions; each provider may debit from the amount due the input taxes that it pays.

If used to recover network subsidies, value added taxes could be levied on consumer purchases of telecommunications services and equipment (as well as associated input purchases) that are purchased either from or for use with the public network and its competitors. In addition to local company services through which subsidies are now recovered, this would include PBXs, LANs, VSATs, wireless equipment, modems, remote intelligence, answering machines, and any other piece of equipment or service now used to substitute for local company network services. Unlike company profits, value added will be positive for all competitive providers; consequently, value added taxes may reasonably distribute the cost and subsidy burden to a wider base of taxpayers.

Sales taxes are a simpler variant of value added taxes.

Sales taxes may be levied exclusively on end-user purchases of service and equipment regardless of provider; all intermediate goods would be exempt. Sales taxes would evidently recover subsidy dollars from any network provider who has a customer base and

therefore would also extend the tax base to competitive services well beyond the domain of the public network alone.

If levied proportionally, both sales and value added taxes would symmetrically affect all competitor prices and therefore not distort consumer choices between network providers. We are then left to choose between them. As defined, a company's value added is the difference between its incoming revenues and its costs, excluding labor and capital; the industry's total value added is simply the difference between consumption revenues and composite costs of material and energy purchases. The total tax amount is simply the product of this composite difference times the prevailing tax rate. By comparison, the sales tax would be levied solely upon the end-user consumption. Because material and energy represent a relatively small fraction of costs in the telecommunications industry, the tax base in the two regimes might not differ substantially.⁷

There are three reasons to favor sales taxes. First, sales taxes would be affixed only upon end-user purchases of communications services and equipment. By contrast, value added taxes must be levied at every stage in the production chain. Administratively, the latter is considerably more involved.

⁷To the extent that both tax bases do differ from one another, economic analysis confirms that a sales tax tends to increase consumer prices and reduce producer output more than a value added tax; from the standpoint of short-run economic efficiency, value added taxes are preferable. However, economic analysis also confirms that a sales tax provides higher producer profits and therefore greater incentives for process and product innovations that would be beneficial in the long run. How these conflicting economic benefits are weighted depends upon regulator concerns.

Second, value added taxes are assessed upon each market transaction involving a service and equipment provider and its input suppliers. This unfairly and inefficiently advantages manufacturers and network providers that can integrate upstream with their suppliers. One could therefore expect some providers to integrate vertically in order to avoid value added taxes. By contrast, sales taxes are assigned only on end-user purchases and do not provide any cost advantage to vertically integrated entities.

Finally, value added taxes permit tax writeoffs for purchases of nonlabor/capital inputs, but no compensating allowance is made for stock that has already been purchased and is now embedded in provider plant. This inefficiently advantages entrants with no existing plant who will make a disproportionate amount of new purchases.

4. **The Universal Service Subsidy**

We now consider two issues regarding the universal service subsidy that would seem to be a part of any cost recovery requirement -- how should payments be made and whom should be subsidized?

Regarding means of payment, dollar subsidies can be paid as income grants to qualifying individuals or earmarked for use exclusively with specific network services. The first approach makes dollars to consumers available without lowering their service prices and therefore provide no incentive to purchase service

that would otherwise be foregone; the second approach reduces each subscriber's actual payments for interconnection. Since new network subscribers provide benefits to other existing users,⁸ the second approach may be an appropriate way to encourage marginal subscribers to join the system. This also seems more consistent with the original motivation behind universal service subsidies and also more politically palatable; the public may more willingly accept medical, food, and housing subsidies for the deserving poor rather than general use-as-you-will grants.

As with taxes, the subsidy amount should be nondistorting and therefore not vary with a recipient's choice of access technology. Subsidies should be confined to services that provide significant externalities to the people who fund the subsidy. For example, the first POTS line of a needy customer may provide externalities to other users and could be subsidized; the second is a convenience good and should not be supported.⁹ By contrast, cable television and home shopping/banking currently provide no network externalities to other users and should not be subsidized.

Regarding the rural service subsidy, aid to all rural users seems overly generous. Rural communities include ranchers, farmers, mining companies, lumber concerns, and vacation resorts that chose their location primarily as a business matter. It is arguable whether these businesses and their employees are more entitled to communications subsidies than brokerage houses and

⁸I.e., each member may place calls to and receive calls from the new subscriber.

⁹At some future point, second lines for personal computer interconnection might qualify, but doing this now seems premature.

banks that must locate in urban areas. While the rural middle class may indeed be disadvantaged if faced with the true costs of telecommunications, other cost inequities between rural and urban dwellers (such as housing costs) favor the former.

Subsidy recipients then should be means-tested in some manner. Rather than assigning telephone companies the managerial responsibility and costs of administering the subsidy program, the existing tax code can be modified to provide necessary subsidies. Individuals or families with less than a predesignated income level can be regarded as indigent and may deduct all monthly fixed charges from their owed taxes. As with (IRAs), individuals with increasingly larger incomes can deduct increasingly smaller fractions of hookup and monthly payments. People, such as students, who do not pay taxes can apply for a direct subsidy from the government.