
NOTES AND TOPICS

William Baumol's Contributions to Public Utility Economics

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SEVERAL aspects of public utility organisation and regulation have recently become the subject of widespread discussion in both Australia and New Zealand. This has coincided with moves by governments in both countries to reform the main public utilities, especially those in energy, transport, and communications, through restructuring and exposure to greater competition.

The well-known American economist, William Baumol, has made major contributions to our understanding of public utility issues. Baumol has been involved both academically and practically in the analysis of public utilities. After a long and distinguished academic career, including many years as Professor of Economics at Princeton University, Baumol is now Director of the C. V. Starr Center for Applied Economics at New York University and a highly successful economic consultant. His research on public utility economics has involved many co-authors, including David Bradford, Alvin Klevorick, John Panzar, Gregory Sidak and Robert Willig.

This note provides a brief guide to Baumol's many contributions to public utility economics. While best-known perhaps for co-authorship of the Baumol-Willig rule for interconnection pricing, Baumol has made major contributions to all main areas of public utility analysis.

Contestability Analysis

Perhaps Baumol's most famous publication is the book written jointly with Panzar and Willig: *Contestable Markets and the Theory of Industry Structure*. Published in 1982, this work is a major contribution to understanding the nature of natural monopoly. It has had a major impact on thinking about the implications for allocative and cost efficiency of exposing natural monopolies to greater competition. The term 'contestability'—the idea that under certain circumstances establishing the potential for competition can force a natural monopoly to price and operate efficiently—has become part of the vocabulary in public utility discussions.

The Baumol-Willig Efficient Component Pricing Rule

In several access cases that have emerged in different countries in recent years—especially involving telecommunications and rail—attention has centred on the so-

called 'efficient component pricing rule' (ECPR) associated with Baumol and Willig.

Where a vertically-integrated firm opens part of its network to a competitor, the rule suggests charging the entrant the full incremental cost (including incremental capital cost) of its use of the component plus all of the opportunity costs of the entry to the owner of the facility, including any lost contribution to overhead costs and any lost monopoly profits.

The ECPR has apparently not arisen from Baumol's academic work, but emerged in presentations at regulatory hearings. On the many occasions when Baumol has applied the ECPR to access pricing in court or regulatory hearings in telecommunications and rail cases in a number of countries, he represents the incumbent rather than the rival. For example, he has recently represented New Zealand Telecom (see Baumol & Willig, 1991; Ross, 1995).

That the ECPR preserves monopoly rents is clear from the following statement. The required payment to the component supplier is to:

... include all *opportunity costs* incurred by the supplier. ... Here opportunity cost refers to all potential earnings that the supplying firm forgoes ... [including] by offering services to competitors that force it to relinquish business to those rivals, and thus forgo the profits on that lost business. (Baumol & Sidak, 1994b:94; emphasis in original).

This implication of the rule has been very controversial.

The Second Efficiency Rule

In their most recent paper, partly in response to a critic of the unqualified use of ECPR (Tye, 1994), Baumol and Sidak emphasise:

the second economic efficiency requirement that, in addition to the efficient component-pricing rule, final product prices must be constrained by market forces or regulation so as to preclude monopoly profits. (1995:178)

This has not previously been stressed.

A Floor and a Ceiling

Baumol (1995) has argued that the first (ECPR) efficiency rule should operate within a floor and a ceiling.

A rival seeking access should never be charged less than the average incremental cost of its usage of the incumbent's facility. This is to avoid cross-subsidy. As defined by Faulhaber (1975), cross-subsidy inherently involves pricing below incremental cost. At the other extreme, the rival should never be charged in excess of the stand-alone cost. The stand-alone cost ceiling is important for markets that are not contestable.

Where appropriate the floor and the ceiling have to be defined on a 'combinatorial' basis, involving a series of tests on the prices of different segments. This is explained in Baumol (1995:266-7).

Ramsey-Boiteux Pricing

Ramsey (1927) set out to solve the problem of how to raise a given amount of taxation revenue from a set of commodity taxes with the least overall cost to economic efficiency. Ramsey's idea was rediscovered by Boiteux (1956) in the context of public utility pricing. In the case of the natural monopoly, the aim is to cover all variable and non-variable costs through a single tariff on the different user groups with the least cost to overall economic efficiency. For efficiency, mark-ups on marginal costs for different services or customers would have to vary inversely with the elasticity of demand.

This 'Ramsey-Boiteux' pricing approach received little attention in the literature until given prominence by Baumol and Bradford in their 1970 paper in the *American Economic Review* on optimal departures from marginal cost pricing. As they put it in the their opening sentence:

The need for this paper is a paradox in itself and indeed it might be subtitled: *The Purloined Proposition or the Mystery of the Mislaid Maxim.*

Baumol has not emphasised Ramsey-Boiteux pricing with respect to component pricing. But there is extensive discussion in Baumol (1995) of the role of what he calls 'Ramsey pricing' in the pricing of final products. On the one hand, Baumol notes that:

Ramsey pricing . . . is a pricing rule that produces an optimal compromise between the requirement that the regulated firm be able to earn a fair rate of return . . . and the requirement that the prices be those that most effectively promote economic efficiency. (p.261)

However, there are two further observations. First, 'customer interests will often be served better by flexible price arrangements such as two-part tariffs . . . or multi-part tariffs . . .' (p.259). Second, he refers to 'measurement difficulties' (p.261) and the possibility in some cases that where 'evidence favouring rebalancing [according to Ramsey principles] were only marginal and lacked robustness, that evidence would merit little credence' (p.279).

The Averch-Johnson Effect

When a public utility operates under rate-of-return regulation and the allowed rate of return exceeds the cost of capital, it will have an incentive to operate with an excessive capital base, since the allowed rate applied to a larger base results in an increase in absolute profits. The process of excess capitalisation — sometimes

known as 'gold-plating' — was first analysed in a seminal article by Averch and Johnson (1962). The Averch-Johnson effect was analysed further and more formally in an important paper by Baumol and Klevorick (1970), which provided a graphical analysis and derived a corollary proposition that lowering the allowed rate of return will increase the degree of overcapitalisation.

Conclusion

In recent years William Baumol's name has been associated with a widely-discussed rule — the Baumol-Willig efficient component pricing rule — for pricing access of rivals to part(s) of the existing operator's production facilities. This rule has been discussed in relation to public utility industries such as telecommunications, gas and electricity in a number of countries. One notable case — the access dispute between Clear Communications and Telecom New Zealand — revolved around ECPR and attracted worldwide attention.

However, Baumol's work on public utility economics extends well beyond the analysis of access pricing to encompass most major aspects of the literature. His many contributions, spanning over 25 years, have helped to clarify the definition of a public utility, how it behaves and how to achieve an efficient outcome. His work has helped to guide efficient policy-making with respect to each of structure, regulation and exposure to competition.

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