1 Liberalization and Regulation of Network Utilities*

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1 INTRODUCTION

Network utilities are public utilities which require a fixed network to deliver their services, and include gas, electricity, water, rail and fixed link telephony. These networks are durable, capital-intensive, and, with the possible exception of rail, serve mass markets and provide essential services. As a consequence these networks must be regulated if privately owned, but are often publicly owned, either by political preference, or by default because private investors lack confidence in the stability of regulation to supply the services at an acceptable price.

The last decade has witnessed a remarkable increase in regulatory reform, liberalization, and restructuring of the network utilities, most dramatically with the extensive privatization of these utilities in Britain, which has served as a model for similar privatizations in Latin America and elsewhere. What are the advantages and difficulties in restructuring and liberalization, and what has been the experience of privatization? This brief survey will confine itself to structural reforms in electricity, telecoms and gas, rather than the design of price regulation of the network. The latter are well covered in an impressive list of books on regulating natural monopolies including Berg and Tschirhart (1988), Sharkey, (1982), Sherman, (1989) and, most recently and comprehensively, in Laffont and Tirole (1993).

1.1 Network Utilities: Natural Monopoly and Contestable Services

Foreman-Peck and Millward (1994, p. 3) show that between 1850 and 1960 network utilities accounted for between 18 and 30 per cent of total net fixed assets in the UK, and always maintained a larger share than manufacturing industry. The value of gross capital stock
of telecoms alone in the USA was 11 per cent of GDP in 1988 (Crandall, 1993, p. 49). Network utilities are thus significant in size as well as function. They also provide the clearest example of natural monopolies, that is, cases where a single firm can satisfy the entire market demand for the range of goods or services at lower total cost than any other combination of firms. Sharkey (1982) defines natural monopoly by the property that the cost function be strictly globally subadditive, that is, $C(\sum q^i) < \sum C(q^i)$, where $q^i$ is the vector of outputs of the $i$-th firm. Vogelsang (1990) prefers Ware's (1986) definition that a natural monopoly arises where the social surplus in a market is maximised by a single firm, as providing a clearer definition of the output level. Ware argues that the two definitions do not coincide. Note that the market is likely to be spatially limited.

While the network itself is normally a natural monopoly (telecoms provides exceptions), many of the services provided over the network are not. Electricity generation requires access to the network of high tension transmission and low tension distribution to deliver electricity to final consumers, but the minimum economic scale of generation is small compared to the total demand in most developed countries. Generation can be under separate ownership from transmission and distribution, with competitive entry allowed into generation, and competition between generators. That was the intention behind the restructuring of the English electricity supply industry (ESI). The same is true in gas, where US regulatory reform unbundled the services provided by the pipelines. Britain is currently restructuring the railways so that the track is separated from all other activities, and sells its services to train operating companies. In each case the network remains a natural monopoly (within any given area), but there can be multiple competing service providers none of whom owns the network.

In the case of telecoms, each company typically owns a network, but requires access rights to other networks in order to provide a complete service. Competition initially started in the USA for long-distance calls, where demand for network capacity was growing rapidly. The extra costs of having different firms provide the extra capacity appeared small, suggesting that long-distance was no longer a natural monopoly. The introduction of new technologies and services (fibre optic cables, high bandwidth traffic, mobile telephony, cable television, electronic mail and the internet) increased demand and has similarly lowered the cost of duplication at the local level, making it possible to introduce competitive supply there. The issue is one of inter-connection and access charges for each separate network, rather than a