LOCAL BODY RATING OF THE DISTRIBUTION NETWORKS OF UTILITY COMPANIES: AN ECONOMIC ANALYSIS

WORKING PAPER SERIES
Working Paper No. 2

Lewis Evans
New Zealand Institute for the Study of Competition and Regulation
Wellington

Neil Quigley
Faculty of Commerce and Administration
Victoria University of Wellington

This paper is work in progress. Please do not quote without the permission of the author.

Please address all correspondence to:
New Zealand Institute for the Study of Competition and Regulation Inc
PO Box 600, Wellington, New Zealand
Phone: +64-4-463-5562 Fax: +64-4-463-5566
Email: iscr@vuw.ac.nz http://www.iscr.org.nz

LOCAL BODY RATING OF THE DISTRIBUTION NETWORKS OF UTILITY COMPANIES: AN ECONOMIC ANALYSIS

Abstract

The Court of Appeal (1999 at 440) expressed the view that it is a matter of settled law that the exclusive right of utility companies to occupy the space in which their distribution networks are situated constitutes and interest in land, and therefore that local bodies may levy rates on the value of these networks. The purpose of this paper is not to question this view or the interpretation of the Rating Powers Act (and its precursors) taken by the courts in New Zealand. Instead, we provide an economic analysis of the implications of rating on t eh value of the distribution networks of utility companies.

Our analysis is concerned solely with the levy of rates on the value of the distribution networks of utilities (which may be on poles above ground or underground), and is not applicable to the land and buildings owned by utilities and rated under the standard residential and commercial rating schemes. We consider two key questions:

i. Is it efficient for utilities to be rated on the value of their distribution networks? And
ii. Does rating on the basis of the value of distribution networks provide utility companies with incentives that are consistent with New Zealand government policy?

NEW ZEALAND INSTITUTE FOR THE STUDY
OF COMPETITION AND REGULATION INC.

LOCAL BODY RATING OF THE DISTRIBUTION NETWORKS OF UTILITY COMPANIES: AN ECONOMIC ANALYSIS

Lewis Evans and Neil Quigley

23 March 2001

Executive Summary

The Court of Appeal (1999 at 440) expressed the view that it is a matter of settled law that the exclusive right of utility companies to occupy the space in which their distribution networks are situated constitutes an interest in land, and therefore that local bodies may levy rates on the value of these networks. The purpose of this paper is not to question this view or the interpretation of the Rating Powers Act (and its precursors) taken by the courts in New Zealand. Instead, we provide an economic analysis of the implications of rating on the value of the distribution networks of utility companies.

Our analysis is concerned solely with the levy of rates on the value of the distribution networks of utilities (which may be on poles above ground or underground), and is not applicable to the land and buildings owned by utilities and rated under the standard residential and commercial rating schemes. We consider two key questions:

(i) Is it efficient for utilities to be rated on the value of their distribution networks? and

(ii) Does rating on the basis of the value of distribution networks provide utility companies with incentives that are consistent with New Zealand government policy?

Taxation should be designed to minimise the current and future costs of raising a given amount of taxation revenue. These costs include implementation and compliance costs and resources that firms and individuals invest in taking actions that minimise their tax burden.

Rates levied on the distribution assets of network utility companies are a specific tax on capital assets. Their impact will vary depending on whether the products of the utilities are basic products required by household (e.g. a telephone connection) or new products that households view as discretionary (Internet access). In respect of new products we note that although there is no legal ruling on the issue at this time, the Court of Appeal decision (1999) suggests that there is at least the potential for rates to be levied on the

exclusive frequencies used for wireless distribution of products. This would provide for consistency of rating treatment between different distribution technologies.

In respect of basic products, rates will:

- Reduce the transparency of taxation because the legal incidence of the rates levied will be different from the economic incidence. For the basic services provided by utility companies, demand is inelastic, and any rates levied on their distribution networks will largely be passed through to consumers via increases the prices of their services;
- Fall more heavily on low income households who spend a higher proportion of income on basic utility services; and
- In so far as rates are passed on to consumers of basic utility products, increase transactions and compliance costs without broadening of the base already provided by property rates.

In respect of new products requiring infrastructure investment, the levy of rates on utility distribution networks will

- Reduce economic efficiency by providing disincentives to increase the value of the networks, to introduce new products through the networks and to create new networks (new products or bypass); and
- Create substantial welfare losses by delaying the introduction of new products into those markets in which demand is (in the absence of the rates) only just sufficient to provide the utility company with a normal return on its investment

As a result, we argue that the levy of rates on the distribution networks of utility companies both reduces economic efficiency and provides utility companies with incentives that are inconsistent with a range of government policies including competition policy and regional development policy. We argue that the Rating Powers Act should be amended to prohibit the levy or rates on the distribution assets of utility companies, or at least to make explicit the value of an efficiency test of any proposal to levy rates on these distribution networks.

1. Introduction[1]

Utility companies, including those running data, telecommunications, gas, and electricity distribution networks, generally have statutory rights to place cables and wires below the ground or on poles above the ground in the public road bed. There is a long history of New Zealand's Territorial Local Authorities (local bodies) levying rates on the value of the assets comprising the distribution networks of electricity and gas utilities, though at present only the Auckland City Council actually levies rates on this basis.[2]

In *Telecom Auckland Ltd v Auckland City Council* the Court of Appeal found that telephone lines above or below the ground constituted an interest in land under the Rating Powers Act (1988) and that Telecom Auckland Ltd is obliged to pay to Auckland City Council rates levied on the value of the telephone lines in that jurisdiction. In doing so the Court of Appeal followed earlier findings that had made electricity and gas distribution networks subject to rates, and affirmed the applicability of those judgements to telecommunications lines. It also opens up the possibility of rates being levied on the distribution assets of a range of other networks such as fresh water pipes (if water supplies should ever be placed in private ownership) and new networks that might emerge in the future.

The Court of Appeal (1999 at 440) expressed the view that it is a matter of settled law that the exclusive right of utility companies to occupy the space in which their distribution networks are situated constitutes an interest in land. The purpose of this paper is not to question this view or the interpretation of the Rating Powers Act (and its precursors) taken by the courts in New Zealand. Instead, our purpose is to contribute to

[1] Partial funding for this research has been provided by the Gas Association of New Zealand but the views expressed are solely those of the authors.

[2] Part IV of the *Rating Powers Act* 1988, and in particular s 80, authorises a local body to make and levy rates differentially. This means in practice that local bodies may choose which rateable assets they actually levy rates on, and within individual asset categories, can use differential rating rates (greater than or equal to zero).

debate about whether the Rating Powers Act should facilitate the levying of rates on the value of the distribution assets of network utilities.

In this paper we use the term utilities to cover telecommunications, gas, electricity and information management companies operating networks relying on networks for the transmission of their product (although much or our analysis applies to other networks such as water distribution systems). Rapid technological change has resulted in considerable convergence across the whole utilities sector. The potential synergies between cable television and telecommunications, the use of gas pipes to carry fibre-optic cable as well as gas, and the emergence of joint retailers of gas and electricity are all examples of the synergies that exist across different utility products.

This paper provides an economic analysis of the implications of rating on the value of the distribution networks of utility companies. Our analysis is concerned solely with the levy of rates on the value of the distribution networks of utilities (which may be on poles above ground or underground), and is not applicable to the land and buildings owned by utilities and rated under the standard residential and commercial rating schemes.
We use this analysis to consider two key questions:

(iii) Is it efficient for utilities to be rated on the value of their distribution networks? and

(iv) does rating on the basis of the value of distribution networks provide utility companies with incentives that are consistent with New Zealand government policy?

Our analysis builds on a substantial body of recent academic work on the regulation and taxation of network industries, particularly that relating to dynamic efficiency. We argue that levying rates on the distribution assets of network utilities both reduces economic efficiency and provides utility companies with incentives that are inconsistent with current government policy. We recommend that amendments to the Rating Powers Act should include a prohibition of local bodies rating on this basis or at least that existing provisions (such as s. 122f of the Local Government Act) should be strengthened to

encourage the courts to impose a more stringent and exhaustive efficiency test to any plans to base rates on the value of the distribution networks of utility companies.

2. The Basis for Rating Utility Assets

The Rating Powers Act 1988 deems all land to be rateable property, where "land" means "all land, tenements, and hereditaments, whether corporeal or incorporeal, and all chattel or other interests therein, and all trees growing or standing thereon". The occupier of any rateable property is primarily liable for the rates upon it (s 121) and the occupier is defined (s 2) as the owner except where there is a tenancy for 12 months or more.

In 1995 a High Court judgement by Fisher J found that Telecom's statutory right to install and maintain lines and booths constituted an interest in land for the purposes of the Rating Powers Act. He made this finding because the statutory right to use the occupied space in the soil below the street was "broadly permanent and exclusive". In so finding, Fisher J followed the decision in Auckland City Corporation v Auckland City Gas Co. Ltd 1919 and Hutt Valley Electric Power Board v Lower Hutt City Corporation [1949].

This decision was upheld by the Court of Appeal, which found that telecommunications networks, like gas and electricity pipes, constitute an interest in land. In the process of setting out its decision, the Court of Appeal also discussed the following issues:

(i) *Long established practice*. "The rating by the council of gas and electricity utilities is a long-established practice which should not be disturbed just because a New Zealand court might reach a different view if the matter were coming before it for the first time" (439 – 440).

(ii) *Legislative response*. There has been no legislative response to Auckland City Council's use of the *Rating Powers Act* to levy rates on the value of utility networks within its jurisdiction. The *Rating Powers Act* 1988 was enacted a year after the *Telecommunications Act* but made no change to the definition of land. If the legislature had viewed the decision in *Auckland City Corporation v Auckland Gas Co* or subsequent decisions as inconsistent with its intentions it could have

amended the Rating Powers Act (or its predecessors) so as to prohibit rates being levied on the value of the distribution assets of network utilities.

(iii) *Absence of restrictions*. Under the Gas Act 1992 (s 31) and the Electricity Act 1992 (s 32) there are no restrictions on the levy of rates (although local authorities are prohibited from charging for access to the road bed).

(iv) *Reasonableness*. In his High Court judgement Fisher J had concluded that unless the differences between benefits received and rates paid was "extraordinary" the Court should not intervene in the level of the rates set. The Court of Appeal considered the reasonableness (in administrative law terms) of the rates levied on Telecom Auckland and summarised its view in the following words:

> There was no apparently large disproportion between the benefits flowing to Telecom's line system and booths from Council's services as compared with the burden of rates imposed upon them. Admittedly, many of the Council's general services are of no use to a telephone network, and presumably of no use also to gas mains and electricity lines. But, as an example only, the provision and maintenance of the roading system, including an unobstructed corridor in which to locate lines, must be a substantial benefit to the line system of a utility company. Council's administrative services, such as the functioning of its district plan or its control over traffic, particularly when works are being carried out on the roads, also produce benefits. Street lighting is relevant to the telephone booths. It was therefore open to the High Court to find that substantial direct and indirect benefits were being provided by the Council.

From the perspective of an economist, the comments of the Court on the issue of reasonableness raise three concerns. First, there is good reason to question the claim that local bodies should charge utilities for access to an unobstructed right of way (the road bed). For local bodies, the marginal cost of providing this service is zero, which is consistent with the prohibition on local authority charging for gas, electricity and telecommunications network access to a road reserve noted above. In other words, if local bodies charged utility companies for access to an unobstructed right of way this would be at a price above long-run marginal cost. Since user charges should be determined by marginal cost and marginal benefit rather than by total benefit charging

utilities for this access would be inefficient. We therefore doubt the validity of incorporating this into a test of the reasonableness of local body use of the power to levy rates on utility networks.

Second, it is not clear to us that utility companies obtain benefits from any aspect of the road network other than the creation of an unobstructed right of way. What happens on top of the road does not affect the utilities – they are required to pay the cost of any work on their network, including repairing the roadway surface to its original condition.

Third, the Court's consideration of whether the rates are reasonable (in the sense that the services consumed by the utility company are consistent with the rates levied) is not equivalent to an examination of the economic efficiency of the rates.[3] As a result, the Court of Appeal has not expressed a view on whether levying rates on utility companies is efficient. The views of the Courts are therefore not central to the question that Officials must consider in any revision of the Rating Powers Act. Revisions to this Act should be built upon considerations of efficiency, and should include prohibitions on actions by local bodies that are clearly inconsistent with economic efficiency.

The Court of Appeal decision is also of importance for the clarity with which it set out the legal basis upon which rates may be levied. An exclusive right to occupy space may not require physical distribution assets if space could be interpreted as (for example) a radio frequency. Thus, it appears to us that it is at least possible that it would be possible for local bodies to claim that they have the power to levy rates on the basis of the value of the cellular distribution systems of the telecommunications companies, where the value of the distribution system would include the value of the frequency in which the cellular signals are transmitted.

[3] We note that the issue of efficiency did receive some attention in argument before Fisher J, and in his decision (at p 12), but the review of the issues was far from comprehensive.

3. Efficiency and the Taxation of Network Utility Assets

3.1 Introduction

The decision of the Court of Appeal and recent public and political interest in competition issues associated with network industries may result in local bodies viewing the introduction of rates on the distribution networks of utilities as a convenient and politically expedient means of extending their rating base. The convenience with which local bodies can extend their rating base in this way is increased by the requirement that, since the distribution networks of utilities are rateable assets, their capital value must be included on the valuation role for each territorial authority. This means that the distribution networks must be assessed according to valuation policies laid down by the Valuer General, and these valuations must be updated every three years. The Valuer General has determined that Optimised Deprival Value (ODV) or Optimised Deprival Replacement Cost (ODRC) should be the basis on which the value of the distribution networks of utilities is calculated. Government has now devolved to local bodies the responsibility to have all rateable property on their valuation role irrespective of whether or not that property will be rated. The large amount of work necessary to determine the appropriate valuation basis and prepare valuations is scheduled to be completed by the middle of 2001, and in itself this work has imposed very substantial compliance costs on the utility companies. In this section we use the economic literature on taxation to consider the efficiency implications of this potential extension of the rating base.

In Section 2 we noted that when the Courts considered whether the rates levied by the Auckland City Council were reasonable, they considered the issue of whether the distribution networks of utility companies obtain benefits from local bodies' services and activities. From the perspective of the modern economics literature on taxation, only the marginal benefits received should be considered in any analysis of the efficiency of taxation. Even where marginal benefits are received or where utility networks increase the marginal costs of local bodies, it may not be economically efficient to levy rates on

the value of those networks. In levying rates, local bodies are required to consider a number of issues, including the benefits received and economic efficiency.[4] The correct question to ask is whether rating of utility assets is efficient, and this will depend on transactions costs, the incidence of the tax, and the relative efficiency of the other tax options available. The central question is whether, when viewed in the context of the full range of taxation options open to government and the local bodies, rating the distribution network of utility companies is part of the optimally-designed general tax system.

3.2 Taxation and Efficiency

Taxes are usually levied to:

(i) Fund the provision of public goods;

(ii) Correct for a divergence between marginal social cost and marginal private cost caused by externalities; and

(iii) Redistribute wealth within society.

Public goods may be defined as goods that can be consumed whether or not payment has been made, or goods that can be consumed by one person without reducing consumption by another person. Taxes that fund government provision of public goods represent the only feasible means of overcoming the market failure associated with the potential for free-riding and inability to provide for exclusivity of consumption that are the key characteristics of public goods.[5] Even where goods and services provided by the government are not pure public goods, the transactions costs of levying charges for individual consumption may be so high as to make it efficient to fund the provision of these goods and services with a tax.

[4] Local Government Act s 122f. This raises questions about the use of value as a basis for the assessment of rates, since asset value may not be tightly linked to the value of the services consumed.

[5] We note that modern economic analysis has produced many innovative approaches to pricing that overcome claimed public good problems, so that it is now accepted that there are relatively few examples of pure public goods.

With the arguable exception of unanticipated one-time lump sum taxes based on wealth, all taxes designed to redistribute wealth reduce economic efficiency. This is because taxes change the incentives of individuals in society. In responding to those incentives individuals will behave in ways that minimise the impact of the tax on them, and thus in ways that are inconsistent with the purpose and intentions of the tax. The social costs of these adjustments in behaviour are called the deadweight loss of the tax.[6] Raising taxation revenue always results in deadweight losses due to the (usually substantial) costs associated with the operation of the taxation system such as the costs of collecting taxes (for government) and the resource costs of compliance (for individuals). The optimal tax policy is that which minimises the deadweight loss of raising a given amount of taxation revenue and minimises the adverse incentives for future actions that will yield future deadweight losses. We note that exactly the same issues arise under regulation and subsidisation. The incentives resulting from regulation and subsidisation result in changes in individual behaviour and consequently in deadweight losses. Ideally, for any such intervention the deadweight losses should be balanced against and be less than the benefit associated with any programme of regulation, subsidisation or taxation that is adopted.

To consider this issue in the context of rates on the value of the distribution networks of utility companies, consider the possibility that there is a benefit to utility companies from the presence of a road that is additional to the benefit arising from access to the public right of way. There is no prima facie reason to levy rates on the utility companies in this case, especially if utilities pay through other means the costs of their activities such as digging up the road and there are other means of recovering the costs imposed by utilities. While the existence of these benefits may provide a rationale for inclusion in any assessment of the optimal road tax, any assessment of the efficiency of levying rates would have to be assessed against the efficiency of other mechanisms such as user-pays pricing of congested roads and the incidence and deadweight loss effects of the tax.

[6] Dead weight losses result from the resources expended on sub-optimal behavioural responses to the imposition of a tax.

When local bodies levy rates on the value of the distribution network of utility companies, this is equivalent to a tax on a specific sort of capital. As a capital tax it differs from the corporate tax in the fact that it may not be related to current income from the asset as will typically be the case when cost-based valuation methods such as ODV are used. (This may be an issue associated with the distribution of returns through time or the fact that some parts of a network are more profitable than others). Thus, for example, a fibre-optic cable will have the same (cost-based) value whether it is laid in downtown Auckland or in the main street of a small town, but the current period profits generated by the two cables may be quite different.[7] And the fact that the tax discriminates among types of capital will alter the choice among infrastructure investments.

The social cost of any tax will depend upon the nature of the goods or activities being taxed, and upon the form of the taxation – i.e., the extent to which the marginal rate changes and the extent to which it is a specific tax on investment. It is likely that a specific tax on equipment, plant and infrastructure would carry a higher social cost than that of standard taxation because the specific tax is essentially being levied on investment – as opposed to income or consumption. Although a specific tax on investment may be particularly injurious for new investment, at the margin it may also lead to less investment in maintenance and service of existing plant and equipment and thereby incur a dynamic social cost.

Utilising computable general equilibrium models,[8] the economics literature provides the following standard results in respect of taxation of capital to raise revenue for redistribution. In the short-run the level of consumption increases and the level of investment is reduced by comparison with the efficient level. In the long run both

[7] In general the cost-based value of the infrastructure asset will not be sensitive to the size of the market being served. There could be a divergence between the market value of the two cables, though a more complicated range of factors will determine this. For example, all other things equal, the cable in Auckland may be worth less if it is subject to bypass but bypass is not financially feasible in the small town.

[8] These models allow for dynamic interactions between different sectors of the economy and economy-wide effects of any changes to taxation.

consumption and investment are reduced. This is because the reduction in investment in the short-term has a negative impact on long-term economic growth. Lower levels of growth in the future mean that wealth is reduced, with consequent negative implications for the level of both consumption and investment (Chamley 1987). Rating on the basis of the value of the distribution assets of utility companies represents a tax on a specific type of capital investment, which means that it will have distortionary effects in addition to these general effects of capital taxation. Those effects will apply to both investment in new infrastructure and investment in the maintenance and upgrading of existing infrastructure.

The Department of Internal Affairs (1998) has suggested that taking the choice to use rates to fund some local body activities as given, the actual rating scheme should be evaluated against the following principles:

- Collection of sufficient revenue to fund activities
- Simplicity (minimum transactions costs in collection, enforcement and payment)
- Transparency (so that it is clear who is paying for what)
- Accountability (decisions relating to the levy of rates can be explained and justified)
- Stability (predictability to reduce the costs of long-term decision-making)
- Neutrality (allocative and dynamic efficiency losses resulting from taxation are minimised)
- Enforceability (liability should be easily determined)
- Equity / fairness.

In subsequent sections we give detailed consideration to the transparency and efficiency issues identified by the Department of Internal Affairs.

3.3 Static and Dynamic Efficiency

Economists usually distinguish between three types of efficiency:

- Allocative efficiency refers to the allocation of scarce resources among competing uses.
- Productive efficiency is determined by the efficiency of production processes within firms; in particular whether firms minimise production costs.
- Dynamic efficiency refers to the efficiency of the framework for future decision-making.

Allocative and productive efficiency are static concepts, in the sense that they relate to welfare at a point in time. They reflect the outcome at a single point in time of past and present resource utilisation decisions.

Markets will be characterised by dynamic efficiency when they provide incentives for decision-making that maximises the present value of social welfare. Dynamic efficiency refers to the outcomes from the sequence of future decision-making relating to the allocation of resources, production technologies of firms, and investment in new knowledge. Dynamic efficiency is determined by decision-making relating to investment including research and development, the purchase of new capital equipment embodying those innovations, the adoption of new production processes and the entry and exit of firms. Dynamically efficient states of the world are those in which the incentives for decision-making are such as to maximise the present value of social welfare over time, subject to the overall constraints provided by the resources in the economy.

Recent work in industrial organisation and macroeconomics has emphasised the importance of new goods and the potentially significant consumer gains that arise from such goods, but it is only recently that much empirical and theoretical work has been directed at quantifying the dynamic efficiency implications of taxation and other public policies affecting the uptake of new goods and services and the rate of new investment in the technologies required to provide these. The research in this area has proceeded down several different paths. One path is associated with work in trade, and began with the work on Romer (1994) and Feenstra (1995) on the dynamic efficiency costs of tariff barriers. Their work points out that apart from the standard static efficiency losses resulting from consumers paying higher prices, tariffs reduce welfare by reducing the

range of goods and the availability of new goods in the market. A second path is associated with assessing the consumer benefits associated with the introduction of new technology, in which Hausman (1997) is the pioneering study. A third path is reflected in the work on the costs of taxation and regulation of telecommunications products that are reviewed below.

Hausman (1997) argues that although the potentially adverse effect of regulation on dynamic economic efficiency is often mentioned, the literature on the effects of regulation has largely ignored the actual effects of regulatory delays in new services. He considers how to value the introduction of new services in telecommunications and shows that the introduction of new telecommunications services can lead to very large gains in consumer welfare. Hausman's estimate of the gain from the introduction of voice messaging services introduced by local telephone companies in the United States in 1990 is estimated at US$1.27 billion annually by 1994. Similarly the introduction of cellular telephone services has led to estimated gains in consumer welfare of about $50 billion per year.

Hausman notes that losses in consumer welfare resulting from delays in investment cannot be regained in subsequent periods, and that regulation in the United States as currently implemented may be unable to keep up with the fast-paced changes that are typical of technologically driven sectors. Consumer welfare losses are likely to be quite large in the future because of regulatory delays and pricing distortions. In a subsequent paper, Hausman (1998) demonstrates that the impact of regulatory restrictions is directly analogous to the levy of a specific tax.

Goolsbee (2000) recognises that the standard approach to estimating the social cost of taxation utilises information about products actually in markets but ignores new products that are available but which do not enter markets. He argues that, where new products entail a fixed cost of entry, taxation may reduce or delay entry and thereby reduce social welfare. He considers that the efficiency effects of this market-exclusion effect are legitimately a social cost of taxation regimes. This cost is substantial because, although

the fixed costs are not incurred without market development, both producers' surplus and all consumers' surplus is lost if entry does not occur.[9] These losses can be substantial if entry is delayed.

The social cost of slower uptake of new products is likely to be very high in the current era of rapid technological change. Goolsbee studies the uptake of broadband across local markets in the USA. He argues that the entry of broadband requires the supplier to incur significant up-front fixed costs of entry no matter how broadband infrastructure is delivered. He estimates that on the standard approach to estimating the social cost of taxation, a $2 per month tax produced a deadweight loss of almost twice the revenue raised. [10] This is estimated from markets that would have broadband before and after the imposition of the tax. However, the tax also rendered it unprofitable to serve other smaller markets, at least until demand grew. The welfare loss on these markets doubled the social cost and meant that the social cost of all markets combined – i.e. both markets with and without broadband – was approximately 5 times the taxation revenue raised.[11]

The higher the responsiveness to price, the higher is the loss to consumers that will result from specific taxes that reduce network innovations and developments. It is likely that there is an asymmetry of responsiveness for new products. For example, households who are not connected to the Internet may be uncertain about the value of the use of the Internet so their demand for Internet connection may be very responsive to price. In contrast, the demand of households who are connected to the Internet may not be especially responsive to changes in price.[12]

There is a substantial academic literature on the trade-off between dynamic efficiency and static efficiency that bears directly on assessments of the efficiency of levying rates on the value of the distribution networks of utilities. The literature demonstrates that

[9] Formally, the deadweight loss when entry does not occur = producers' surplus + consumers' surplus – the costs of entry (that were not incurred).
[10] Goolsbee's estimated price responsiveness of broadband use is high.
[11] Notice that no revenue is raised in markets where entry does not occur.
[12] For example, this may be confirmed by evidence from worldwide studies of Internet connection which report that those countries with zero local call charging for Internet access have much higher penetration rates than those without – see Boles de Boer, Evans and Howell (2000).

even if there are some gaps or anomalies in the taxation system, attempts to address these perceived problems may have the unintended effect of reducing efficiency in the long term. In particular, efficiency may be reduced by policies that are designed to address static efficiency problems but at the cost of having a substantial adverse impact on dynamic efficiency.

Recognition of the trade-off between static and dynamic efficiency dates at least to Schumpeter (1943), who observed that:

> "…it is not that kind of price competition which counts but the competition among firms from the new technology, the new source of supply, the new type of organisation, competition which commands a decisive cost or quality advantage and which strikes not at the margins of the profits but at their foundations and their very lives….

In other words, the price competition that provides for short-term static efficiency may not be important in determining the long run efficiency of the market, since the latter is determined by innovation and new investment.

Evans, Quigley and Zhang (2000) developed a model that illustrates the potential for a tradeoff between dynamic and static efficiency resulting from the fact that prices above marginal cost provide firms with quasi-rents that act as a stimulus to the development of the innovations that drive the rate of economic growth. They show that it is plausible that attempts at price control could produce welfare-reducing outcomes even when the regulated price is well above the marginal cost. The potential for welfare to be reduced by attempts to control prices is greatest in industries undergoing rapid technological change, and where large scale investment is required to produce or bring into production the innovations that drive increases in national income. In terms of their analysis, price controls have a similar impact to the introduction of a specific tax in a market with elastic demand.

The most general conclusion to be drawn from this literature is that in markets where politicians and officials have concerns about efficiency, social-welfare maximising public

policy will focus on dynamic efficiency and any impediments to it. This is because allocative and productive inefficiency will not persist in a dynamically efficient market, but policies focussed on allocative and productive efficiency may have the unintended effect of reducing dynamic efficiency. Such a focus can stem from taking a very short-term view of economic performance. The examples that we have cited also suggest that the losses in social welfare resulting from long periods of dynamic inefficiency can be quantitatively very large. This is in part because of the impact on consumer welfare and the rate of economic growth that comes from slower development and introduction of innovations. The losses also stem from the very high costs associated with inappropriate investment decisions (for example poorly located electricity plants and over-investment in railway lines) the existence of which may go on influencing the efficiency of the market for long periods after initial construction.

The social costs of regulation and subsidies that are part and parcel of the evaluation of the social net benefit of these instruments are exactly analogous to the deadweight costs of taxation. Policies that impose on large incumbents the requirement to subsidise entry to the market (for example, by requiring that access to network facilities be provided at marginal cost) may have particularly important implications for dynamic efficiency. The subsidy may result in entry occurring with a level of sunk investment that is sub-optimal, with obvious implications for the incentives and potential of the incumbents to subsequently achieve a viable operating position in the absence of the subsidy. In addition, the requirement to subsidise entrants may reduce or remove the incentives for the incumbent to undertake new investment in innovation in the future. In this case, that dynamic efficiency losses resulting from the poor incentives for the incumbent will not be offset by the emergence of the new entrants as viable and dynamic new competitors in the market.

It is important for the dynamic efficiency of network markets that infrastructure investment – and where possible competition – is not impeded by public policy

instruments.[13] Investment and competition are very sensitive to incentives and a specific tax on infrastructure will fall directly on investment thereby reducing the incentives for investment and relatedly, competition.

3.4 Tax Incidence

The most elementary lesson of the literature on tax incidence is that the person on whom a tax is levied may not be the person on whom the burden of paying the tax actually falls. In the simple case of a partial equilibrium analysis of an excise tax on a single good in a competitive market, the incidence of the tax is determined entirely by the relative magnitudes of the supply and demand elasticities. This means that if a network utility company responds to a new tax by increasing retail prices to the full extent of the tax, and if consumer demand for the product of this company is not reduced by the price increase, then the consumers will pay all of the tax (its incidence will fall entirely on consumers).

The key to understanding the incidence of a specific tax is usually to understand the response of consumers to any price increase associated with the tax. If there are goods and services that are not subject to the tax and that may be substituted for those that are subject to the tax, then consumer demand will switch to the substitute products in response to any rise in price. If the goods and services subject to tax are luxuries consumers may consume less of that type of good. If the goods and services subject to the tax are not luxury goods, have no effective substitutes or are addictive, then the level of consumer demand is unlikely to be responsive to changes in price and the most or all of a tax on producers will be passed to consumers. If the goods and services are subject to price control, then it may be more difficult for the producers to pass the tax on to consumers in the short term, but the international evidence of the effectiveness of price regulation suggests that the tax will still be passed on over a longer period of time.

[13] For a discussion of public policy influences on infrastructure competition and investment in the context of Australia and New Zealand see Boles de Boer, Enright and Evans (2000).

In the case of utility assets, we have not undertaken a detailed analysis of the price elasticity of demand of the different products provided by the range of network utility companies being considered in this paper. At a general level, however, we suggest that:

(i) The basic products provided by network utility companies (such as fixed line telephone service, electricity for lighting and electricity or gas for heat and cooking) have the status of necessary features of modern life in New Zealand. Calculated price elasticities in the range from 10 – 15 percent are not uncommon for such goods and services.

(ii) Most of the basic products of network utility companies do not have near substitutes outside the network utility sector.[14]

(iii) A rise in the price of basic services offered by utility companies is likely to result in a larger reduction in consumer spending on other goods and services than in consumer demand for the utility products.

In contrast, the demand for innovative new products offered by utility companies may be much more responsive to changes in price, so (i) to (iii) may not apply to them. As a result, in the discussion that follows we consider separately the effects of rates levied on a distribution network providing basic services, and the effects of rates levied on a network that will provide consumers with new products that have a high elasticity of demand.

While most considerations of the impact of taxation policy are based on partial equilibrium analyses, the theoretically correct way to evaluate tax incidence effects is to compare the general equilibrium of the economy before the introduction of the tax with the general equilibrium after the tax has been introduced. In the case of the taxation of utility assets, a full general equilibrium analysis would include the impact of the tax on the pricing and investment behaviour of utility firms and the decisions of their customers. This analysis would complicate, but not change the fundamental conclusion that we have set out above – that with few substitutes for the products of utilities and high costs for consumers in utilising those substitutes, the incidence of the rates levied on the

[14] We consider below the implications of competition between fixed wire and wireless transmission of voice and data messages, but note that there is no feasible technology for "pipeless" distribution of gas and electricity.

distribution assets of network utility companies would fall primarily on consumers. For new products requiring new infrastructure investment the deadweight loss would be high because the of the costs resulting from the fact that specific taxes cause delays in the introduction of the products in some markets.

3.5 Transactions Costs and Financial Impact

All other things equal, a necessary condition for efficiency to be promoted by an extension of the rating base is that the efficiency gains offset the increase in transactions costs associated with requiring more individuals to pay rates. Here the efficiency gains will properly include not just the extra revenue raised but the (dynamic efficiency) benefits associated with improved decision-making in the future.

In the case of rates levied on the distribution networks of utility companies, our understanding is that local bodies are not contemplating this as a means of raising new revenue. This suggests that in their view rating utility distribution assets is a more efficient means of raising revenue than existing rating instruments. Whether introducing this new basis for rating will improve efficiency depends on whether the net efficiency benefits outweigh the transactions costs associated with increasing the number of individuals paying rates.

We have not undertaken a full analysis of the potential for local bodies to raise revenue from rates levied on the value of utility distribution networks because the total rateable value of the networks is not yet known and because the rates charged by individual local bodies may vary. As a general indication of the magnitude of the issue, we consider the following to be a reasonable guide: If the total cost or replacement-based valuation of the distribution networks (net of machinery exemption) is $1,000 million and the rate is 1% of value, then potential revenue is $100 million.

We have argued that the economic incidence of these rates is unlikely to fall on the utility companies except in respect of new investment in infrastructure. In respect of this new

investment, however, the implications for decisions about investment are very substantial. If the weighted average cost of capital of the utility companies is set at (a conservative) 10%, then rates set at 1% of value will equate to a tax at the rate of 10% of profits (on top of the existing corporate tax rate).

For network utilities and local bodies compliance with the requirements for the preparation and regular valuation of valuation roles provides for substantial transactions costs in addition to those associated with the requirement to actually pay the rates. If we take as a "ballpark" estimate a cost of $50,000 – to $75,000 for each of utility companies and local bodies in New Zealand, then even these basic compliance costs could exceed $5 million.

3.6 Summary: The Efficiency of Rating Utility Distribution Networks

The core products of network utilities are necessities characterised by inelastic demand. As a result, a specific tax on network infrastructure will fall largely on consumers of basic utility services. However, the products networks produce are evolving rapidly and in different directions: directions that are rendering previously homogeneous "commodity" products – e.g. telecommunications and electricity – differentiated – e.g. analogue/digital and electricity with differing reliability characteristics. These newer developments result in price sensitive products at least at the time of introduction. Ironically, if the commodity form was demanded inelastically the tax would fall on consumers, but taxing investment in the newer forms would carry significant social cost precisely because they are price sensitive, at least at the time of uptake.

The levy of rates on the distribution networks of utility companies is a specific tax on a capital asset. This tax will have a negative impact on the accumulation of capital because of the incentive that it provides to economise on the amount of investment. The static efficiency losses from such taxes are large, but there is no evidence that there are offsetting benefits for these welfare losses: transaction costs are increased (because rates are levied on more entities) but no more revenue may be raised**.** Recent research has

highlighted the fact that these losses may be overwhelmed by reductions in welfare resulting from the reduction in dynamic efficiency. This research (including earlier work by Goolsbee) was a very significant factor in the US Internet Tax Freedom Act signed by President Clinton in October 1998. This Act prohibited new taxes on the Internet for three years.[15]

New facilities, including upgrading of facilities and those associated with new technologies, will not be undertaken at the optimal level if an additional specific tax of around 10% of profits is levied on these investments. Since new investment is required to provide consumers with higher levels of service and new products, the impact of the tax will be particularly marked in these cases. Outside the main urban centers rating utility assets may have the effect of reducing demand below the level providing the producer surplus (profits) required to justify the utility company's fixed cost of entry.

A specific tax on the value of the assets making up the distribution networks of utility companies will also have a negative impact on the transparency of taxation. This conclusion follows from the observation that the legal incidence and the economic incidence of the tax will be markedly different. The demand for the basic products of utility companies is highly inelastic because these have the feature that they are viewed by consumers as a necessary part of modern life and have few substitutes in products from outside the network utility sector. This means that utility companies will rationally pass a large part of the tax on to consumers, and the response of consumers will be to consume less of other goods rather than less of the basic products of the utility companies. In contrast, where new products are introduced by the utility company the deadweight losses resulting from reduced uptake can be very high.

[15] See Goolsbee and Zittrain(1999).

4. Consistency with Major Government Policy Platforms

We noted above that virtually all taxes influence the present and future decisions of taxpayers. In this section we consider the incentives for utility companies that flow from the levy of rates on their distribution network, and assess these incentives for consistency with government policy.

4.1 Competition Policy

Both the current government and its predecessor have introduced measures designed to increase competition and increase consumer benefits in network utility industries. Rating utility assets will reduce competition by making it more expensive for utility companies to adopt a strategy of bypassing an existing network, upgrade their network to compete by offering new/superior products, and invest in new capacity that will allow them to offer through their network products that compete with other utilities. The overall impact of rating on the value of distribution assets will be to reduce the speed and intensity of new competition in the utility industries.

A decision to allow rating on the basis of the value of the distribution network of utility companies will have major implications for companies such as Telstra / Saturn. This company has as its explicit strategy the construction of a fibre-optic cable network in business districts and high density / high income residential areas, bypassing the local loop of Telecom and installing capacity that is capable of dealing with interactive cable television. Rating on the value of Telstra / Saturn's assets raises the costs of this bypass strategy and increases the commercial risk that Telstra Saturn has to bear.

4.2 Regional Development

The current government has as one of its major policy platforms the promotion of economic development in those regions of New Zealand where unemployment rates are

highest. A key feature of the provincial centres that are the focus of this regional development policy is that they have lower population densities than the major urban areas. Lower population densities have a major impact on the profitability of network utilities, because the cost of installing cables or pipes may not vary significantly with the density of the households and businesses being served. This means that for any given rating level on the asset value, a rates levy based on the ODV of the utility distribution network would be higher per household / business and higher per dollar of profit for a utility operating in a provincial town than for an equivalent utility operating in the major urban areas.

Of course, this does not mean that utility companies will be prepared to accept lower profitability in the provincial areas. These companies have a minimum profitability threshold that must be anticipated before they will undertake investment in new facilities or upgrading existing facilities. Given our discussion of incidence it means that the prices paid by provincial customers of network utilities will increase proportionally more than in the major urban areas. It also means that the cost of providing some services may be increased to the point where some regions that will be above the profitability threshold without rates will not be provided with services when rates are levied (see Goolsbee 2000). Both the new products and the enhanced facilities required to support the expansion of businesses in these regions will be introduced more slowly in the presence of a tax on the value of assets.

4.3 Energy Conservation

Energy conservation strategies proposed by the Government may require that utilities make a variety of investments upgrading their distribution network assets. Energy conserving networks are an example of the emergence of new differentiated products within the utilities sector. A rate on the value of utility assets provide a disincentive to make the investments that are consistent with the energy conservation strategy.

4.4 Fairness and Equity

As New Zealand governments have reformed the taxation system and the social welfare net over the last 15 years, concerns about fairness and equity have focused on the impact of policy changes on low income families. Economics does not define fairness, but economic analysis does provide a basis from which it is possible to consider the impact of taxation and other policy changes on low income families.

An analysis of the impact of rating the value of the distribution network assets of utility companies begins with the observation that use of the basic products provided by utility companies is ubiquitous and demand for basic products is inelastic. The ubiquitous use of fixed line telephones, and of gas and electricity for lighting, heating and cooking means that expenditure on the products of network utilities will make up a higher proportion of the total income of low-income households. If the rates levied on network utility assets are passed directly to consumers through a per-unit increase in the price of the basic products of network utilities, then the rates paid will be a much higher proportion of the income of low-income households than it is of households with higher incomes. In other words, rates on the value of network utility distribution assets will reverse some of the redistribution provided by the levying of rates on the capital value of land rather than the unimproved value.

5. Assessment of the Arguments Used to Justify Rating Utility Assets

In this section we utilise the ideas developed above to address a number of claimed justifications for the rating of the distribution networks of utilities.

5.1 Utility companies benefit from the use of the road bed and they should pay for this.

Local body rates are normally viewed as a charge for local body goods and services consumed by individuals within the rating area. However, in the case being considered

here the relevant use of services is that associated with the distribution networks of utilities and not the general operation of the utility (for which they pay rates on their commercial premises). In these circumstances we note that:

(i) Charging for utility company use of the road reserve (right of way) has been prohibited by the legislature;

(ii) Even if we take the view that the quantum of rates payable in respect of distribution networks of utilities should be based strictly on the costs imposed on the local body, this cost is not directly related to the value to the utility (since the utility pays corporate profit tax on the income earned through the network);

(iii) It is not clear that the distribution networks use local body services (since they use the right of way, not the road). Their use of the road is in proportion to that of other road users. In fact, the presence of a road or footpath above the utility networks increases the network companies' costs by making it more expensive to repair the network;

(iv) Any services that are being consumed by utility companies could be charged for directly in proportion to use.

The case for rating the distribution networks of utilities is also reduced by the fact that use by one utility does not preempt use by other utilities. It is well established in economics that pricing is an efficient mechanism for the allocation of a scarce resource, but since there is no "right of way" congestion as a result of the utility networks being under the road bed it is not clear that a price above zero is warranted.

Finally, we note that it is likely that consumers of basic utility products will pay most of the rates levied on the distribution networks and bear the costs of delayed introduction of new products. As we have pointed out, this raises questions about whether the benefits derived from the extension of the rating base outweigh the transaction and efficiency costs of doing so.

5.2 Utility companies impose costs that they do not have to pay

Utility companies are relatively small in number, their activities are easily monitored by making them subject to regulation (eg a permit to dig up the road). In these circumstances, if there are specific costly activities (eg motorist inconvenience from digging up the road or the aesthetic costs of above-ground cables) it would seem likely that it is cost effective to levy a direct charge on the utility companies. Such direct charge would have the advantage of giving utilities incentive to minimize the costly activities and thus have a welfare-improving impact on their behaviour. In contrast, the only incentive provided by rating distribution assets is to economise on the extent and maintenance of the network.

5.3 Rating utility assets spreads the rates burden

It follows from the analysis set out in this paper that spreading the rates burden should only be considered a useful goal of public policy if doing so enhances efficiency and there is no guarantee that increasing the rating base will do this.

We have pointed out above that it is not possible to consider the rates burden in legal terms: the burden of rates is their economic incidence not their legal incidence. Since use of utilities is ubiquitous and demand for basic services in inelastic, the utility customers bear most of the burden of rates imposed on the utilities. Further, since the customer base of utilities is not significantly different from the existing base of ratepayers it is not clear that any spreading of the rates burden actually occurs. The principal redistribution that we have been able to discern results from the fact that the rates burden would fall disproportionately on low income households, and it is not clear that this is socially beneficial.

5.4 Rating utility assets provides a means of closing a loophole in the current rates provision or is a reasonable proxy for some current gap in the rating base.

The analysis set out in this paper suggests that understanding

(i) The economic incidence of any rates levied; and

(ii) The dynamic efficiency effects of closing the loophole

lies at the heart of an assessment of whether it would be efficient to close a loophole. We have argued that the inelastic demand for basic utility services means that rating utility assets represents a lump-sum tax on households. As such rating the distribution networks of utilities does not provide for any extension of the rates base (and even if the rating base was extended this would not necessarily be efficient).

6. Why Are Utilities Networks Different From Other Improvements On Land?

To further consider the implications of the analysis provided above, this final section of the paper considers whether there is a case to be made for the distinctiveness of utility networks that would justify not levying rates on their distribution networks.

We begin by pointing out that a key implication of our analysis is that distinctiveness is not required to justify not levying rates on the distribution networks of utilities. All that is required is a demonstration that efficiency would not be enhanced by such a rate. There are, none the less, important respects in which the distribution networks are distinct from other rateable interests in land.

- Utility assets are used for commercial purposes and earn a return that is taxed via the corporate tax. It is therefore quite different from residential property. Residential property creates use value for its owners, but this value is not subject to taxation and there is no capital gains tax on residential property. Rates on residential property therefore close a gap in the taxation system, but there is no gap to close in respect of the income from utility assets.

- Utility companies are small in number, and the maintenance and investment services they consume or costs they impose on local bodies and ratepayers (eg digging up the road) may be efficiently dealt with by direct charges. In this sense they are unlike households and commercial properties which are too numerous to warrant the transactions costs of an individual assessment of the services consumed and the costs

imposed. There is therefore no market failure as there is with the provision of services to households (where transactions costs may outweigh the revenue collected (eg rubbish collection) or free riding may be possible (eg street lights))

- The incidence of a tax on utilities will not fall primarily on the utility companies or their shareholders, since demand for the basic products of utilities is relatively inelastic. In contrast, there is a close correspondence between the legal and economic incidence of property rates on residential property. There will also be a relatively close correspondence between the legal and economic incidence of rates on commercial property, since most commercial enterprises face extensive competition (including from other products and businesses in other rating districts) which precludes an increase in the rates burden being passed to consumers.

Utility networks do not pre-empt other uses of the road bed, and there is no congestion problem to be managed in terms of the available space in the road bed. In contrast, residential and commercial property does pre-empt other uses of the land on which it is built.

7. Summary and Conclusions

The decision of the Court of Appeal in *Telecom Auckland Ltd v Auckland City Council* applied earlier Court decisions on the rating of electricity and gas distribution networks to the telecommunications network. We have pointed out that it did so on the basis of a strictly legal test (the meaning of "an interest in land" under the current Rating Powers Act) and an assessment of reasonableness. In contrast, we have argued that the key public interest issue is whether it is efficient for local bodies to levy rates on the value of the distribution networks of utilities. An efficiency test is at least suggested by the words in the Local Government Act s. 122f, but these could be strengthened. In considering the efficiency of policies relating to the assets of network industries assessments of dynamic efficiency will be paramount.

Rating on the value of the distribution networks of utility companies is a specific tax on these assets. In considering the impact of this specific tax on economic efficiency we have distinguished between the basic products supplied to consumers through these networks and the development of new products that may be supplied through existing or competing networks. Consumer demand for the basic products of utility companies is highly inelastic. As a result, the incidence of any tax will fall largely on consumers rather than on the utility companies. For new products consumer demand is more elastic, which means that a specific tax will have implications for consumer demand (if prices are increased) or the ability of utilities companies to profitably invest in new infrastructure facilities and provide new products. We have pointed out in the paper that even if rating on the basis of the distribution assets of utility companies did extend the rating base, this would not necessarily increase efficiency.

We have argued that levying rates on the value of the distribution network of utility companies is inconsistent with a number of important government policies, including those on competition in network industries, regional development and energy conservation. Our analysis also suggests that the burden of any rates levied on utility networks will fall disproportionately heavily on low income households, and as such is inconsistent with the social policy of current and recent New Zealand governments.

Finally, our analysis has demonstrated that the levy of rates on the distribution network assets of utility companies is inconsistent with key principles laid out by the Department of Internal Affairs (1998). In particular,

- Transparency is reduced by the difference between the legal and economic incidence of rates levied on the value of the distribution networks of utilities providing basic services to consumers.
- Accountability is absent because it is not clear what services are being charged for;
- Transactions costs would be raised without any compensating increase in revenue;
- Fairness is not enhanced because (with incidence falling on consumers) there is no broadening of the base already provided by property rates and the price increases

resulting from the tax will represent a higher proportion of the income of lower income households than of higher income households.

- Efficiency is reduced because rating the distribution network of utilities will provide disincentives to increase the value of the networks, to introduce new products through the networks and to create new networks (new products or bypass).

We conclude that efficiency would be enhanced if the Rating Powers Act were to be amended to prohibit the rating of the value of network utility assets. While there are a number of ways in which this might be achieved, one is the explicit inclusion of the distribution assets of network utilities in the machinery exemption. Alternatively, rating on this basis should be subject to a more explicit efficiency test. This is consistent with the existing requirements in the Local Government Act and would at least encourage the courts to hear substantive evidence on efficiency rather than just the definition of "an interest in land", and to make efficiency a primary criteria for the assessment of planned extensions to the local body rating base.

8. References

(a) Cases

Auckland City Corporation v Auckland Gas Co Ltd [1918] NZLR 1028

Auckland City Corporation v Auckland Gas Co Ltd [1919] NZLR 561 (Court of Appeal)

Hutt Valley Electric Power Board v Lower Hutt City Corporation [1949] NZLR 611 (Court of Appeal).

Telecom Auckland Ltd v Auckland City Council [1995] 3 NZLR 489

Telecom Auckland Ltd v Auckland City Council [1999] NZLR 426 (Court of Appeal)

(b) Monographs and Articles in Journals

Boles de Boer D., C. Enright and L. Evans (2000) "The ISP Markets of Australia and New Zealand", *INFO: the journal of policy, regulation and strategy for telecommunications, information and media* 2(5) pp 487-495.

Boles de Boer, David, Lewis Evans and Bronwyn Howell, The State of E-New Zealand, paper prepared for the Ministry of Economics Development, 2000 (http://www.iscr.org.nz).

Chamley, C (1987) "Taxation of Capital" in The New Palgrave Dictionary of Economics (Macmillan) pp 598-600.

Department of Internal Affairs (1998) *A Future Direction For Local Government Funding Powers: A Consultation Document* (Wellington).

Evans, L., N. Quigley and J. Zhang (2000) "Dynamic Efficiency Implications of Regulation and Price Control" mimeo, Victoria University of Wellington, http://www.iscr.org.nz.

Feenstra, R. (1995) "Estimating the Effects of Trade Policy", in Gene Grossman and Ken Rogoff, (Editors) *Handbook of International Economics*, III, Elsevier, Amsterdam, 1995.

Goolsbee, A. and J. Zittrain, (1999) "Evaluating the Costs and Benefits of Taxing Internet Commerce", *National Tax Journal*, 52(3), 413-428..

Goolsbee, A. (2000) "The Value of Broadband and the Deadweight Loss of Taxing New Technology", mimeo, University of Chicago and NBER.

Hausman, J. (1997) "Valuing the Effect of Regulation on New Services in Telecommunications" *Brookings Papers on Economic Activity, Microeconomics* pp 1 – 38.

Hausman, J. (1998) "Taxation By Telecommunications Regulation" in J. Poterba (Editor) *Tax Policy and the Economy* 12 (MIT Press, Cambridge).

Pechman, J A (1985) *Who Paid The Taxes, 1966 – 1985?* Brookings Institution, Washington DC.

Romer, P (1994) "New Goods, Old Theory and the Welfare Costs of Trade Restrictions" *Journal of Development Economics* 43 pp 5 – 38.

Schumpeter J A (1943) *Capitalism, Socialism, and Democracy* London.

Shoven, J. B. (1987) "Tax Incidence" in The New Palgrave Dictionary of Economics (MacMillan) pp 609 – 611.