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by

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Abstract

Australian local government has come under increasing financial pressure and has recently begun financing urban infrastructure, including roads, by means of exactions or developer charges. This paper examines the question of funding roads through developer charges in the Australian state of New South Wales by focussing on the determination of developer charges by two distinct municipalities, namely Eurobodalla Shire Council and Tweed Shire Council. Various methods of improving existing practice are suggested.

Key Words: Developer charges, Section 94 contribution, road financing

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Traditionally Australian urban infrastructure, such as drainage, community facilities and some roads, has been financed out of general tax revenue at the state and local government levels. However, in recent years constraints on borrowing and a reduction in grants from higher levels of government mean that local government in Australia is not only finding it more difficult to fund new urban infrastructure, but also to maintain existing infrastructure. With its own revenue base limited by various factors, not least "rate pegging" (i.e. state government limitations on increases in property taxes), municipal councils have explored other methods of financing urban infrastructure, including user pays. A significant Australian example of a user pays funding mechanism resides in Section 94 of the *New South Wales (NSW) Environmental Planning and Assessment Act of 1979*.

Of all the types of urban infrastructure, funding for roads appears to be the most topical (see, for example, *The Economist*, 6 December, 1997:13-14, 19-22; Industry Commission 1994). According to Kirwan, 1990:188, road financing is also 'probably the most difficult part of any infrastructure cost recovery system to get right'. Neutze's (1997) extensive analysis of urban physical infrastructure, which includes case studies of roads (Neutze, 1997:45-50; 82-3; 164-70; 174-8), provides some indication of the complexities involved. In essence, there are multiple outputs or products associated with roads (e.g. they provide durability or strength for use by buses and trucks, and they also produce access to properties). Roads exhibit economies of scale and scope in some circumstances and increasing costs in others (e.g. road widening in inner city areas). Marginal costs are low when the road is not congested, but rise quickly as congestion begins; and all road users impose external diseconomies on others (e.g. pollution, damage and injury from accidents). One puzzling aspect of the recent literature on road financing is that whilst there appears to be a growing interest in the area, particularly in road pricing (see, for instance, ACIL Economics and Policy 1995 for a survey of the international literature on road pricing), the question of developer funding of roads is seldom analysed or even mentioned.

Neutze, (1997:50, 69) represents an exception to this general neglect of developer charges insofar as he is clearly aware that some roads in the Australian state of NSW are currently being funded by developer charges and he provides an analysis of when this form of funding might be appropriate. For instance, he argues that developer charges are a suitable way to finance that 'output' of roads which provides access to places, although he also observes that there is seldom a clear distinction between access roads and through roads.

Whatever the particular merits or otherwise of developer charges as a means of funding roads, it is clear that developer charges are currently being used by resource-constrained municipal councils in NSW to fund urban roads within their jurisdictions. The present paper seeks to analyse the chief economic attributes of roads and examine two NSW case studies of

the determination of developer charges with a view to suggesting how existing practice could be more closely aligned with the standard efficiency prescriptions of economics.

The paper itself is divided into four main parts. Section one outlines various salient economic characteristics of roads which present difficulties for the application of developer charge regimes. The second section provides a brief synopsis for the legislative basis for developer charges in NSW. Section three presents a discussion of two case studies of the determination of developer charges on roads in NSW, namely the Eurobodalla Shire Council and the Tweed Shire Council. The paper ends with some brief concluding comments in section four.

The Economic Attributes of Roads

According to standard neoclassical economics, all user charges can be viewed analytically as benefit taxes, where the charge levied on any individual is derived from both the benefit of the service to the individual and the cost of provision. A helpful distinction in conceptualising developer charges hinges on long-run decisions about the appropriate *quantity* of the service in question and short-run decisions on the appropriate *use* of the service. In general, allocative or paretian efficiency requires that the marginal social cost of the service should equal the marginal social benefit of the service to society. Put differently, where marginal social benefits approximate marginal private benefits (i.e. where services primarily benefit the direct consumer), price should equal marginal social cost. But the question naturally arises as to which marginal social cost. Invoking the earlier distinction between long-run and short-run decisionmaking, standard economic theory holds that users should pay all or part of the long-run capacity costs of providing a service in the form of a charge assessed independently of the degree to which the service is actually used. By contrast, users should pay for the variable or operating costs of the service in the form of a price set equal to short-run marginal cost.

Although the principles of marginal cost pricing underlying user charges for various municipal services are clearcut in theory, in the real world their application is heavily influenced by the particular characteristics of specific services. Thus public open spaces, roads, sewerage and water systems all possess special features which involve adjusting the marginal cost basis of user charges. In the present context, we focus on the characteristics of roads.

It is generally neither technologically nor economically feasible to extend road capacity in small increments to match expected marginal increases in the use of a road as demand arises. Like public open space, it is probable that a road will usually have excess capacity for a time, even if it is built to minimum specifications. However, it is also frequently the case that it is efficient to anticipate the future load on a road and build it to the expected higher standard earlier (rather than later) when development pressures have raised the value of land. This

means that the calculation of the developer charge encounters an 'excess capacity' problem where estimates must be made of final demand and the period over which this demand will build up, before a charge per unit of demand can be calculated.

A particular problem with roads, not typical of other types of urban infrastructure, must be considered. That is, roads possess the non-excludability characteristic of public goods, except where direct road pricing is introduced. Since road tolls are only introduced for significant arterials, all but the most isolated of rural roads will have an element of through traffic in the 'final demand' using the service. The difficulty this raises for the calculation of a developer charge can be phrased as follows: should *all* beneficiaries of the road contribute to its funding ('through traffic' paying through general rates) or should it be only those who have occasioned the need for the road? This issue is discussed below when we examine real world practice in the case studies of Eurobodalla Shire Council and the Tweed Shire Council.

Road use has significant external costs on which there is a large literature (see, for example, Industry Commission, 1994:237-266, Maddison, Pearce *et al.* 1996, and Barde and Button, 1990). The question this raises for developer charges can be phrased as follows: to what extent should developer charges attempt to reflect some of these costs? Given that the direct 'environmental impact' of any particular road would be difficult to identify, pragmatic considerations suggest that externalities may better be internalised through charges which have a wider base, but yet still contain a 'polluter pays' dimension. Petrol taxes or motor vehicle registration charges are examples.

One 'institutional' attribute of roads provision which might be mentioned in the Australian context is the fact that roadworks are funded by all three levels of government, and it appears that there are times when institutional responsibility for a road is unclear. In principle, the Commonwealth government funds national highways, the states finance the major 'arterials', and local government resources 'local' roads (see Commonwealth Government, 1996:33-34, 43-44). However, confusion arises, among other instances, when a road within a local jurisdiction serves more than one of these functions and is difficult to classify. The Industry Commission (1994:112) observed that overlapping responsibilities did appear to be a particular problem with roads, and some participants in that inquiry indicated that 'there is some evidence to suggest that both the State and Federal Governments rely on the existing confused position to avoid their responsibilities to the detriment of all Australians' (Australian Road Federation submission to the Industry Commission Urban Transport Inquiry, Industry Commission 1994:112). Accordingly, the problem is not only one of how to calculate a charge, but rather how to identify the roads to which developer charges should apply.

Developer Charges in New South Wales

In terms of Section 94 of the NSW Environmental Planning and Assessment Act of 1979 local governments acquired the legal rights to levy developers for the provision of infrastructure, services and amenities attendant upon some new development. However, due to various legislative complications associated with Section 94 of the Act, these levies, known colloquially as "developer contributions", have only been fully utilised since 1989. Moreover, in accordance with a recommendation of the 1989 Simpson Inquiry, as of 17 December 1992 local governments were required to have a complete Section 94 Contributions Plan in place before they could impose developer contributions. A Contributions Plan should "... contain an implementation program for contributions and a fiscal strategy to enable efficient, economic and equitable administration of Section 94" (Department of Planning, 1992, p.1).

A great deal of time and effort has been invested in improving the procedures involved in the implementation of Section 94. The NSW Department of Urban Affairs and Planning produced a *Section 94 Contributions Manual* over 1992/1993 which has been widely used by all the parties involved. Moreover, some research has also been directed at the efficacy of contributions levied under Section 94 (Barnes and Dollery, 1996a) and various proposals put forward for improving on existing methodologies, including the adoption of an *ad valorem* tax by small councils (i.e. property taxes based purely on the value of new developments) (Barnes and Dollery, 1996b). [See also, for instance, the Industry Commission (1992) and Kirwan (1991)]. Recently a new *Section 94 Contributions Plans Revised Manual* was prepared for the NSW Department of Urban Affairs and Planning by Scott Carver Pty Ltd (1996). This has now been transformed into a new *Section 94 Contributions Manual* by the NSW Department of Urban Affairs and Planning in 1997, which provides guidelines as to how municipal councils should administer Section 94 policy.

The *Manual* itself places particular emphasis on four basic principles of policy: the demonstration of the '*nexus*' (between the type of development and the demand for additional public facilities); the requirement for '*reasonableness*' in determination of the contribution (comprising, according to the Manual, 'fairness, equity, sound judgement and moderation' (NSW Department of Urban Affairs and Planning, 1997, p. 12)); '*apportionment*' of costs of a public facility (such that 'the contributing population only pays for its share of the total demand' (NSW Department of Urban Affairs and Planning, 1997:13)); and the necessity for '*accountability*' of public funds (requiring, for example, clear and informative documents, maintenance of appropriate financial records, and public participation in decision making).

Similar approaches have been developed in other advanced countries. For example, an illuminating literature exists in the United States on development exactions as a means of financing urban infrastructure, including roads (see, for instance, Burchell *et al*, 1994; and

Frank and Rhodes, 1987). However, obviously legal and other institutional differences between countries mean different kinds of user charges often have to be employed.

The Determination of Developer Charges in NSW

THE CASE OF RURAL ROADS IN EUROBODALLA SHIRE COUNCIL

The method used by Eurobodalla Shire Council to calculate developer charges for rural roads is notable for the amount of effort devoted to identifying particular catchments for specific development areas (see Westing, 1995).

Eurobodalla Shire comprises an area of 3250 sq km on the south coast of NSW. The resident (or non-vacation) population is around 29,000. The Shire contains three main population centres (Batemans Bay, Moruya and Narooma), about 35 km apart from each other, and a number of smaller communities on the coastline between these centres. Development in the area is largely 'new' development. Redevelopment or 'infill' development is not significant in the Eurobodalla Shire.

The steps in the calculation procedure of developer charges, as described in Eurobodalla Shire Council, (1993:2-3) and Westing, (1995:3-4), appear to be as follows:

- divide the non-urban section of the Shire into thirteen road catchments;
- identify the number of existing and future lots which will be served by each of those road catchments;
- estimate the potential traffic generation by lots within a road catchment area at 'full development' using 'adopted traffic generation rates' and also estimate the through traffic using the roads at this time (Eurobodalla Shire Council, 1993:2);
- apply road design standards and estimate the cost of the necessary roadworks in each road catchment;
- apportion the cost of roadworks between through traffic, existing lots and future lots; and
- designate existing lot and through traffic costs to council to fund by other means and assign the costs attributable to future lots to the developer charge.

From an economic perspective, the method used by Eurobodalla introduces desirable elements of fairness and locational variation into charges for roads. However, whilst this aspect of the methodology should be retained, there are a number of difficulties with the actual apportionment procedure outlined. In particular, the assignment of a portion of the cost of new roads to through traffic and to existing lots raises at least two problems.

Firstly, a difficulty which does not seem to be widely appreciated is the fact that if new roadworks are undertaken in response to development pressures, and existing lots and through traffic are automatically assigned a portion of the cost, then the expenditure has not been subjected to systematic evaluation of whether the benefits exceed the costs. Those

involved in new development may certainly want the road to the extent of their (say, one-third) share of the costs, but do existing residents really want the road (notwithstanding the fact that it may be convenient to use it once it is in place), and how do the benefits of this project compare with competing projects?

The second problem is closely related to the first in that if existing residents are almost 'automatically' assigned a share of costs, then as development proceeds there will be an accumulation of debt to be serviced by existing residents. This is, in fact, one of the most frequently mentioned problems of Section 94 legislation in NSW (McNeill 1998: 272).

Both problems are exacerbated by the fact that once developer charges begin to be collected an expectation is created that the particular capital works for which a levy was paid will proceed in the near future, which may not be true for all of the capital works and consequently may estrange residents "left out". This is a factor which also arises with charges for community facilities and as a result some councils deliberately choose to avoid these pressures by not charging for community facilities at all. Section 94 legislation requires that councils use the contribution 'within a reasonable time' (NSW Department of Urban Affairs and Planning, 1997:11). The Departmental Manual notes that '3-5 years' has been suggested by the courts as a reasonable time (NSW Department of Urban Affairs and Planning, 1997:12), although the Manual also states that 'reasonable time' will vary with the nature of the project.

To lessen problems of debt accretion and concerns that new roadworks may not be adequately scrutinised, there may then be an economic case for a new development to fully fund some new roadworks necessitated by the development, even though existing residents may use the new roads. In other words, 'apportionment' may need a special interpretation for items such as roads and community facilities. In particular, apportionment should reflect the need (demand) for the additional infrastructure, rather than the incidence of benefits derived from the infrastructure once it is provided. The problem does not typically arise for other types of urban infrastructure. For instance, water and sewerage have a technology which excludes 'free-riders' from any new system, and public open space, while it clearly could be used by persons anywhere in an urban area, tends naturally to exclude those who live a distance from the facility.

At least one local authority, the Tweed Shire Council, has adopted the approach that developers pay for (almost all) works necessitated by a development, irrespective of later use by existing residents or through traffic. We now examine the Tweed Council methodology.

THE CASE OF DEVELOPER CHARGES IN TWEED SHIRE COUNCIL

The methodology used by the Tweed Shire Council for determining developer charges for roads has several distinctive features, one of which is that it employs what has become known as a 'Trips' model. This model appears to have originated for the calculation of road impact

fees in the United States (see, for example, Snyder and Stegman, 1987:82; Downing and McCaleb, 1987:60-62; Heath, Kreger *et al.* 1988:214-216). A key feature of Trips modelling is the attempt to be more precise about the quantum of demand for road capacity generated by various forms of development. Trips models are based on the assumption that traffic will behave in a mathematically predictable way (Downing and McCaleb, 1987:60). Following Downing and McCaleb (1987:60-61), Trips models generally consist of four steps:

(1) Calculation of the number of trips a proposed development will generate. These trip generation rates for the type of land use associated with the development are usually derived from empirical observation (e.g. through the use of automatic counters). The rates are multiplied by the number of each type of land use (e.g. mobile homes, townhouses, single houses in a residential area, square feet of office space in a commercial area, schools, shops, etc.).

(2) Calculation of the minimum path from the development to specific sites or centres of influence. Traffic is assumed to be attracted to specific places, such as shopping centres, schools, office buildings. In assessing specific routes to these various centres, it is the shortest time rather than the shortest distance which is relevant (Downing and McCaleb, 1987:61).

(3) Distribution of trips to and from the development among each of the centres of influence. The 'strength' of trip attraction is assessed (i.e. how often are trips likely to be made to these places), again using empirical observation.

(4) Assignment of trips to and from the development to specific road segments. After assessing the number of trips that will be generated between the development site and the attraction centres, and the minimum path for these, the number of trips is assigned to each segment of roadway along each minimum path. Half of the number of trips can be assigned to the centre and half to the development site (Downing and McCaleb, 1987:61).

The Trips model used by Tweed Shire Council appears to follow these steps broadly (Tweed Shire Council, 1997:9-10), although traffic generation patterns are developed for the whole shire in addition to new release areas. For the new release areas, the roadworks required to serve the site, given the trip numbers, are calculated and this figure is divided by the relevant number of trips attributable to the area to derive a charge per trip. The charge for any specific developer will therefore depend on the share of total trips attributable to his or her site and the charge per trip.

For existing residential areas, it appears that the cost of road capacity consumed per trip is calculated by estimating the value of all roads in each sector of the shire and the total number of trips (existing and new) which will be generated by that sector at 'build out'. This appears to be an essentially correct approach to a per unit charge per trip in terms of the standard principles of economics. In effect, the method holds that there is sufficient capacity in the existing road system to service the estimated amount of traffic (until, say, the year 2011), both existing and new, and given the total amount of final demand a charge per unit of

demand can be calculated. Clearly, only new development will actually be charged these amounts since existing development will already have contributed to the cost of existing roads (either by earlier developer charges or by some other form of funding). Two main difficulties seem to be embedded in the Tweed Shire Council description of their procedures. Firstly, no details are given as to the basis on which the existing road system was valued (e.g. was a modern equivalent asset (MAE) approach used? Were grants from other levels of government deducted? etc). Secondly, net present values do not appear to have been used. However, with regard to the latter deficiency, Tweed Shire Council has included some interest costs in the calculation by apparently ascertaining the amount of money that it will be necessary to borrow and including an interest cost at 10 per cent for twenty years. Given the fact that price inflation in Australia has not exceeded 2 per cent for some years, this is not a perfect treatment of interest costs. However, it is at least a recognition of interest costs in the calculation of the charge.

Some other NSW councils, like the Hastings Shire Council, have also used a Trips methodology in a broadly similar manner to the Tweed Shire Council. With these councils, the question of administrative efficiency must arise with the use of a Trips approach because of the volume of data required. Is the benefit (including the reliability) of the forecast trip estimates worth the cost and time devoted to obtaining them? McNeill (1998: 275) has suggested that anecdotal evidence shows that such studies are increasingly being done as a part of a Councils' forward financial plans and normal capital budgeting activities. To the extent that this is so, then re-using this data to calculate rational developer charges is clearly desirable.

Other NSW councils' Contribution Plans for roads, like Wyong and Wagga Wagga, demonstrate an awareness of the need to identify the amount of traffic generated by different types of development, but do not indicate how this was estimated. Still others, especially ones for new urban release areas (e.g. Boambee Valley, Coffs Harbour, Castle Hill, Baulkham Hills and Horsley at Wollongong) simply estimate future roadworks required and divide this by the estimated population of the new area (without using present values). Simpler methods may be feasible for new release areas especially if the type of development is relatively uniform (e.g. all residential).

Concluding Remarks

The preceding discussion seems to indicate that in NSW few Contribution Plans set out the criteria for deciding when new development pressures create sufficient congestion to necessitate an expansion of capacity. From an economic perspective, this is clearly an important issue in the cost of roads. Johnston (1995:1) provides relevant information here by setting out the processes which should 'normally be considered' by road authorities. The

timing of extensions to capacity will depend on 'network efficiency' - which is 'how efficiently the network is at moving traffic between relevant origins and destinations' (Johnston, 1995:2). Johnston defines six levels of service. These range from free flow of traffic and excellent levels of 'comfort and convenience' through increasing discomfort and inconvenience, and slower traffic flows, until long delays result. Johnston (1995) argues that it will not be the theoretical level of traffic failure (Level F, which has the greatest inconvenience) which determines when improvements are necessary but the level at which local communities demand better conditions. The latter may vary between communities.

Whatever criteria are used in a local jurisdiction, it would seem important to publish and advertise this broadly in public documents. But even more importantly, economic principles suggest that supply side considerations (i.e. how much it costs to expand a road in a location) should also be taken into account. These appear to be being ignored in the processes being described by Johnston (1995). Rather than any 'automatic' progression up to a higher level of service, or as a response to community complaint, it is clear that the current congestion and maintenance costs of existing road capacity should be compared with the costs of capacity expansion in an area before decisions are made. In some inner city areas, for example, one might expect expansion to be delayed. Neutze (1997:132) has argued as follows:

... the fact that roads are narrow and sewers are inadequate in some older parts of cities may not be a result of inadequate investment but rather a reflection of the very great cost of increasing their capacity. Short of demolition of all buildings and resubdivision, which itself would be economically and socially costly, such differences in service quality should probably continue.

In sum, this paper has analysed some of the conceptual problems in the application of developer charges to roads, examined real-world practice and suggested some ways in which developer charges policy might be improved. For example, a case has been argued that where through traffic cannot be avoided, and the primary purpose of the road has been to service a site, then the principle of apportionment of costs between final users might be reconsidered. If sufficient data are not available to calculate the benefits accruing to potential users, then a Trips model approach can be deployed. We have also queried the practice of automatically upgrading road standards by reference only to demand rather than supply (cost) considerations.

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