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**Roger Vickerman**
Centre for European, Regional and Transport Economics, University of Kent, UK

Center for Network Industries and Infrastructure (CNI)
at Berlin University of Technology (TU Berlin)
www.cni.tu-berlin.de

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**Roger Vickerman**
**Centre for European, Regional and Transport Economics**
**University of Kent, Canterbury, CT2 7NP, UK**

**Tel: +44 1227 823495 Fax: +44 1227 827784 Email R.W.Vickerman@kent.ac.uk**

## Abstract

The traditional approach to transport investment appraisal assumed that such investments were taking place in a world where transport users were operating under perfect competition. There has been considerable work in recent years improving the methods for the economic and financial appraisal of transport investments where this assumption does not hold and thus there are wider economic benefits. This paper examines the situation where the market for transport provision operates under a regulatory regime.

The impact of regulation has tended to focus on the price and output decision rather than the investment decision. In this paper we look in more detail at the implications for appraisal. This develops further the issues which arise in the appraisal of investments by public-private partnerships where essentially different objectives may be used by the private and public sectors, for example differential consideration of the wider economic benefits arising from the investment. The paper discusses the theoretical issues involved in different forms of regulatory regime and examines the experience with investments in regulated transport markets in the UK and in the case of appraising Trans-European Networks to provide some empirical evidence and the implications for the development of appraisal.

**Key words:** Transport investment appraisal, regulation, wider economic benefits, public-private partnerships

**JEL-code :** D61, H44, L51, R42

**Introduction**

Traditional investment appraisal procedures for transport, whether based on purely financial appraisal or on a wider social cost-benefit analysis, have normally worked with the assumption that prices reflect costs. In the case of the use of CBA the distortions are usually due to market failure in the form of the existence of various externalities such that all (social) costs are not fully included. However, it is, at least implicitly, assumed that once all costs are included all agents will respond fully to these inclusive or generalised prices. Thus user benefits will be a good estimate of the total economic benefit (Dodgson, 1973; Jara-Diaz 1986).

Jara-Diaz recognised the problems which would occur if the degree of competition was different in the different markets served by a transport link. More recently this has been analysed more fully to show that, where the economic agents using transport are operating in imperfect markets, i.e. where prices would not (even without externalities) reflect marginal costs, rather different results may emerge. In such cases the user benefits estimated in a traditional way by taking the difference in generalised costs and relating this to a linear demand curve to obtain an estimate of the change in consumers' surplus may typically underestimate the total economic benefit (SACTRA, 1999; Venables, 1998; Vickerman, 2006a). In certain circumstances, for example where there are subsidies to the transport using sector such that prices are less than marginal costs, user benefits may overestimate total economic benefit.

In urban areas the major impact of transport improvements may be felt more in the labour market. Thus an improvement can lead to both increases in employment and agglomeration effects which raise the productivity differential of core areas over the more peripheral areas providing a benefit rather greater than the directly measured benefits to users in terms of time savings (Venables, 2004; Graham 2005; Department for Transport, 2005).

In these analyses, although there has rightly been an emphasis on the relevance and importance on the transport-using sectors this had drawn attention away from the changing nature of provision in the transport sector itself. The key issue here is the extent to which transport is being provided under a regulatory regime which has itself been undergoing changes of emphasis. The move from largely public sector provision of public passenger transport and of roads to a situation where the private sector provides service under some form of franchising or public-private partnership regime has been a feature of the past two decades. Although the introduction of private sector provision was usually foreseen as involving only relatively light regulation, largely to maintain service quality, there have been moves towards a greater degree of regulation (often referred to as 're-regulation') in recent years.

The question to be addressed here is what happens to the appraisal of investments when service providers on the infrastructure (including operators of the infrastructure itself) operate under different types of regulatory regime. Key questions involve the level of service provision, the maintenance and renewal regime and the pricing decision (where this is not the instrument of regulation).

The remainder of this paper is in three main sections. First, we recap briefly the arguments concerning the wider economic impacts of transport projects. Secondly, we introduce a basic analysis of the impacts of different forms of regulatory instrument. Thirdly, we assess the potential implications for appraisal.

**Wider economic impacts of transport investments**

What is meant by the term 'wider economic impacts'? These can be viewed in two ways. On the one hand they involve an increase in total welfare which is greater than the measured increase in consumers' surplus to users through time savings, reductions in accident rates etc. On the other hand these benefits can be seen as the increase in GDP which occurs as a result

of the changes in economic activity which derive from the transport change. These represent different ways of measuring benefits and typically give different numerical results. For example, time savings accruing in the course of commuting or leisure travel are welfare gains to the user, but do not have a direct effect on GDP unlike time savings in the course of work. However, where such time savings lead to an overall gain in productivity because people can access more productive jobs more easily, this will be recorded as a change in GDP. For the economy as a whole the overall impact will be broadly similar, but the ratio of total benefits to user benefits will differ. There could also be important differences in the impact on individual regions such that the welfare gain accrues in one place but the GDP benefits accrue in another. If improved transport infrastructure leads to greater concentration of employment this could have different relative impacts on central and more peripheral regions.

Wider benefits are those which typically cannot be recouped from users through charging and they arise in a number of ways, through impacts on the labour market, through direct impacts on productivity and competition in product markets and through changes in patterns of agglomeration. In each of these cases the main reasons for wider benefits occurring is due to the absence of perfect competition; as Dodgson (1983) and Jara-Diaz (1986) have shown where there is perfect competition in transport using markets then user befits will be an accurate and sufficient measure of total benefits from transport improvements.

We put the labour market first, because it has frequently been ignored in studies of wider benefits. Labour market effects in imperfectly competitive labour markets arise in three possible ways: changing participation rates, increased working hours and moves to more productive jobs (Department for Transport, 2005). Improved transport can enable access to jobs which would not otherwise have been possible. If this enables workers from employment-deficient regions to access jobs in labour-deficient regions there will be gains to the workers, to employers and to the public sector which gains tax revenue and faces lower social security payments. Similarly if easier commuting encourages existing workers to work

longer hours there will be potential gains to all three groups, although it might seem more likely that in practice workers would takes the gains in increased leisure rather than increased work. Possibly of greatest importance, however, is the impact on productivity which arises thorough workers being able to move more easily from less productive to more productive jobs.

There are also non-labour market effects in which the reduction on transport costs enables firms to enlarge market areas and thus gain scale economies. Firms are also in a position to rent seek in which they are able to capture some of the potential benefits.

**Regulatory instruments and their impacts**

There exists a range of possible regulatory instruments which can be used in the transport sector. In the initial move to the deregulation and privatisation of transport it was thought only necessary to provide a form of quality regulation which would ensure that firms would not attempt to gain market advantage by cutting such costs as those associated with essential maintenance or indulging in unsafe operating practices. Decisions on service quality and quantity (frequency) and fare levels were seen to be commercial decisions for which both actual and potential competition would yield efficient outcomes. Experience has suggested however that further regulation of service levels, price and/or rate of return may be necessary to ensure an efficient outcome. Let us examine each of these possible regulatory instruments in turn.

The simplest form of regulation is a quantity regulation in which the regulator controls the allocation of capacity on a network or the level of service provision. Here the regulator decides the level of service to be provided so the service provider is insulated from consumer demand by the regulatory authority. Such systems are found both in slot allocation on rail infrastructure and at airports and in some franchising operations where the operator simply delivers to a service contract. These latter are similar to the situation found for example on

London buses and the latest passenger rail franchises in the UK where there is little scope for innovation.

From the perspective of appraisal the issue is the extent to which the actual supplier is not able to respond directly to demand and it is dependent on the regulator to set the level of output. If the regulator is able to set output efficiently so as to reflect the true costs of the operator and to induce effective competition for the franchise so that the costs of delivery are set at the most competitive level, then there is no difference from a conventional appraisal. However, where regulators are not able to do this, where for example there is ineffective competition for franchises or the regulator attempts to set a service level and guide price for a franchise or slot which is uneconomic, then there will be an inaccurate assessment of the value of user benefits.

Auctions of slots or franchises are supposed to get round this problem by ensuring that the bidder correctly evaluates the worth of the franchise and bids the correct value. Experience with such auctions suggest however that this may not happen. There is a tendency to over-bid for franchises leaving the revealed value of the franchise insufficient to meet costs (the 'winners curse') .This has been found both in recent cases in the UK rail passenger rail franchises and particularly in the auctions of new telecommunications bandwidths (Klemperer, 2002a, 2002b, 2006).

Where the market is allowed to function more normally at the level of final demand regulations can occur over price or rates of return. To some extent such regulation may lead to similar results to the quantity regulation discussed above, but the impact on the overall appraisal may be different because of the redistribution implied. It typically implies that without such regulation the operator would supply too low a level of output as a result of the monopoly power enjoyed. Price regulation typically takes one of two forms: cost plus or price-cap. In the former case the focus is on the operator's costs to which an acceptable profit

or rate of return on capital is added. Such regulation removes most incentives from the operator and all the risk (or gain) is taken by the regulator. In such cases the user benefit may be reduced. In the case of a price cap the regulator typically fixes a maximum rate of increase of prices which is related to the overall consumer price index, usually with a requirement for some efficiency savings. Here both risk (and potential gain) accrue to the operator. Rate of return regulation simply operates on the rate of rerun on capital but has similar effects to price cap regulation.

The interesting cases with price-cap regulation arise when there is asymmetric information since there is an incentive to the operator not to reveal the full extent of efficiency savings possible to avoid facing a more stringent price-cap in subsequent periods. The operator may also be inclined to under-invest if it is felt that the regulation will be too stringent (Helm and Thompson, 1991).

Thus the incidence of regulation is likely to lead to distortions both in the level of capacity provided and the allocation of that capacity which will impact on costs, user benefits and hence the potential for wider benefits. For example, if there is under- investment due to the expectation of too stringent regulation (and hence an unacceptable rate of return on investment) not only will user benefits be lower but also the benefits from agglomeration effects which might be induced. The question is therefore whether the loss through regulation is greater or smaller than the loss which would arise through allowing monopoly exploitation of the infrastructure. This will depend on the price elasticity of demand for the particular service (and hence the degree of monopoly power which can be exercised), the stringency of the regulation, and the scope for regulatory capture by which the operator seeks to use informational asymmetry to capture a larger share of the potential gains.

**Appraisal in a regulatory environment**

The basic conclusion from this preliminary analysis of the problem is that the regulatory structure may lead to possible divergences between the expected and actual user benefits which need to taken into account in the appraisal process. These divergences may lead to further impacts on the wider benefits. In a single regulatory framework these divergences can be accounted for by an adjustment to the valuation of user net benefits which allows for the extent to which the regulatory environment distorts costs. Most new investments fit into such a single regulatory structure. However there are increasing numbers of instances where a single investment may straddle regulatory structures leading to problems for both the setting of price and the evaluation of net benefits.

Consider two such cases. The first case is that of the creation of a new rail link between a major city centre and a more peripheral part of its hinterland. Suppose that the core part of the metropolitan area has its own transport authority which regulates fares and service levels, but the more peripheral parts of the city region lie outside this structure. This is not dissimilar to the case of Transport for London or the Passenger Transport Executives in other major UK cities, but rather different from the rather wider coverage of the typical German Verkehrsverbünde. Suppose the metropolitan transport authority has a policy of subsiding fares and promoting investment in and the use of public transport as part of a policy to reduce congestion, but that services outside the authority's area have to be provided on a commercial basis. In such circumstances the likelihood is that new projects will concentrate on serving the needs just of the authority's area and service levels will be less well developed in the more peripheral parts of the city region outside the authority's area. One consequence of this is that the potential agglomeration economies through the enlargement and thickening of the metropolitan labour market may be lost as fares will be higher and service levels poorer in the more peripheral areas. Different parts of essentially the same project will be evaluated on a different basis.

The second example is that of rail investments in the Trans-European Networks. This applies both to the international elements in the high-speed passenger rail network (such as the North European HSR Network which links five member states) and the main multi-modal links. Despite an overtly common accounting system for rail under various European directives, investment is appraised differently in different member states, particularly with regard to the relative use of public and private finance. Even allowing for this there remain differences in key elements of the public sector appraisal system, such as different discount rates which make it difficult to get a common appraisal basis for a complete project. The North European HSR system involves separate projects in each country (more than one in Belgium, for each of the three links radiating from Brussels towards France, Germany and the Netherlands). Since the link between Brussels and Köln involves services operated by two different technologies there have been further technical problems in accommodating both services on a single infrastructure (see Vickerman, 2006b for a more detailed discussion). This has led to distortion both in the timescale for the development of such services and in their wider impact. Whilst the French parts of the network were completed in 1993, the entire network will only be completed in 2007. The root cause of the problem can be traced back to the different regulatory structures in place for the rail sector in the five countries.

Hence regulation, and above all variations in regulation, have led to major problems in the effective and consistent appraisal of investments and consequently the realisation of benefits.

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