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Transport investment and economic performance: A framework for project appraisal

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ABSTRACT

The case for major transport investment is frequently made in terms of impact on economic performance. A recurring difficulty however faced by policy makers is a disjoint between this motivation and the cost benefit analysis, which may be too narrow. Broadening the set of economic mechanisms studied creates the risk that bad arguments are legitimised and effects can be exaggerated. There is a need for an appraisal framework that ensures all relevant impacts are captured, ensures the opportunity cost of drawing more resources into an activity is identified and meets the needs of the different audiences of the appraisal. There is a need for context specific appraisal. Central to the impact on economic performance is how private sector investment responds to changes in accessibility. Investment in one location can improve productivity, create growth, but may also displace output and employment. Thus we group impacts within the framework into four types: user benefits, proximity and productivity effects, investment and land use impacts and employment effects. Within each of these groups there are a series of transport-economy mechanisms which become relevant in different contexts. Some of these mechanisms are well established and are applied in practice. Others still are more challenging and need to be the subject of further research. Throughout improvements in the evidence base are needed.

1. Introduction

The case for investment in major transport improvements is frequently made in terms of impact on economic performance. There is an expectation that they will act as a catalyst for private sector investment, creating jobs, boosting economic activity and growing (or rebalancing) the local (or national) economy. These 'wider economic impacts' typically go beyond a conventional transport cost-benefit appraisal (CBA) which focuses on the user-benefits created by a project. This is an unsatisfactory situation which creates a disjoint between the strategic arguments put forward in support of a project, and the associated economic analysis and CBA.

Unsurprisingly therefore, studies that examine the role of CBA in transport investment decision-making have found that it can have little or no impact on decision-making (Nilsson, 1991; Fridstrom and Elvik, 1997; Odeck, 1996; Eliasson et al., 2013) or that only certain elements of the CBA seem to matter (Nellthorp and Mackie, 2000; Odeck, 2010; Eliasson and Lundberg, 2012). Arguably, even with the most developed appraisal systems a 'good' CBA is at best a hurdle that has to be cleared (Eliasson and Lundberg, 2013; Eliasson et al., 2013; Kelly et al., 2015). This is also seen in England where projects are ascribed value for money criteria which influences the likelihood of a project being funded. Ultimately this marginalisation of CBA can result in politicised decision-making and potentially bad decisions. Decision-making is undertaken by a very heterogeneous group and within that group there exist philosophical differences in the approaches of economists, planners and politicians (Mouter et al., 2013; Eliasson et al., 2013). One solution to bridge the differences between the groups is to extend the CBA to incorporate wider economic impacts, while remaining firmly grounded in careful analysis of the impact of projects on welfare, as is attempted in the UK (see e.g. SACTRA, 1999; DfT, 2005). Then even if the value of wider economic impacts turns out to be small, the appraisal has engaged with the arguments put forward by scheme promoters and local interests and runs less risk of being marginalised.

Internationally, development of transport appraisal guidance in this area remains limited (for surveys see Odgaard et al., 2005; Mackie et al., 2014). Incorporating wider economic impacts in CBA is challenging and has its own risks. Broadening the set of mechanisms that are studied creates the risk that bad arguments may appear to be legitimised, and that effects can be exaggerated. Studies tend to concentrate on areas where a transport improvement expands economic activity, and to ignore areas from which this activity may have

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been displaced. This, together with reporting of GVA effects, makes it possible that fundamental economic principles – above all that drawing resources into an activity has an opportunity cost – can be overlooked. The challenge is to be ambitious in broadening the scope of appraisal while remaining grounded in rigorous analysis of the social value of transport investments and of any private sector responses that they induce.

How should this be done? One answer is a full economic modelling exercise, in which resource constraints are properly imposed, private sector responses are modelled, market imperfections are made explicit, and real income (utility) benefits accurately calculated. This may be appropriate for some large projects, but is not a general solution. Such models are expensive and it would be disproportionate to use them for the majority of projects. A consequence of their expense is that typically one model is built and then applied to different situations in a somewhat mechanical manner, paying insufficient attention to the characteristics of the scheme and its likely effects. They then fail to capture the quite different impacts of e.g. an urban commuting scheme, an urban by-pass, or an inter-city rail line. These projects have different stated objectives and will trigger different private sector responses. It follows that the appraisals must be designed to be context specific. Some should focus on the consequences of getting more people into a city centre, others on relieving traffic congestion or on better linking remote locations, and so on.

The need, therefore, is to develop a framework of possible channels or mechanisms through which wider economic impacts can occur and to find the evidence needed to quantify these mechanisms and apply them in appraisal. The application of these mechanisms to particular projects needs to be context specific, informed by the strategic narrative that motivates the project; some mechanisms are applicable to some types of transport projects, others to others. For larger projects the mechanisms can be formulated in a complete economic model. For other projects this has to be done by the analyst's linear approximation to the formal model. This means that component parts will be studied separately and then added up. Of course, the relationship between the components must be consistent (so adding up does not double-count), the components must be exhaustive (so if some activity expands others may contract), and the focus should be on identifying the true social value of effects.

The focus in this paper is on wider economic impacts. That is not to say that social, equity and environmental impacts additional to user-benefits do not occur, but they are addressed elsewhere in the literature on appraisal. There are of course inter-relationships between wider economic, social, equity and environmental impacts – an example would be a transport investment that reduces unemployment in a remote region having wider economic, social and equity impacts. We do not delve into these inter-relationships beyond observing that, as with the treatment of wider economic impacts, double counting of the same benefit has to be avoided. Our focus here is on the correct treatment of wider economic impacts in an appraisal including avoiding double counting both between wider economic impacts and user benefits and between different wider economic impacts.

This paper sets out and discusses the key components of this approach. The next section, Section 2, presents the mechanisms that comprise the framework grouped into: user-benefits: proximity and productivity due to agglomeration: induced investment and land use change: and employment. It discusses the concept of a context specific appraisal in which the analyst focuses on the mechanisms of relevance in the analysis. Section 3 of the paper then sets out three key challenges to the implementation of the framework, whilst the final section, Section 4, presents some concluding remarks.

2. The framework

2.1. The effects of a transport improvement

A transport improvement brings time and cost savings to users of the transport network.[1] The users are individuals and households in their work and leisure activity, and firms which need to move goods, services, and employees. Time and cost savings change traffic flows, leading to increased flows in some parts of the network and possibly less traffic elsewhere. They are illustrated in the left hand column of Fig. 1. We follow practice in the transport literature and refer to the social value of these change as the ***user-benefits*** of a project.[2]

Wider economic impacts are illustrated in the right hand part of Fig. 1, and arise as a consequence of transport's impact on economic geography. Better transport increases proximity, making economic agents closer together, and may also trigger relocation of economic activity as firms and households respond to new opportunities. Together, these changes create potential sources of 'wider economic benefit' through three main mechanisms.

The first is that proximity and relocation shape the effective density of economic activity and thereby productivity. This is over and above the direct productivity effects of faster journeys, and arises because of the intense economic interaction that occurs in economically large and dense places. This is why cities and other agglomerations exist. This observation is backed-up by a substantial research literature that quantifies the positive relationship between economic density and productivity.

Second, a transport improvement, other things equal, will make affected locations more attractive destinations for investment. User-benefits are experienced by residents, workers, and firms, and this may induce investment to occur, changing land use. Investments include residential development of land, the development of office centres or retail parks, or the redevelopment and regeneration of city centres. They may in turn generate agglomeration and productivity effects, and also have further value by changing the 'attractiveness' of affected places.

Third, there may be impacts in the labour market, on both the supply and demand side. On the supply side, transport may enable labour force participation. On the demand side, jobs will be created in some places and some activities, and possibly lost in others.

Of course, there are links between all these mechanisms. A transport improvement might induce private investment, raising employment, creating agglomeration effects and feeding back into traffic flows. Distinguishing between the different mechanisms that may create welfare gain is conceptually important, while in practice care must be taken not to double-count effects.

To include these impacts in transport appraisal two economic questions must be addressed. First, is there a sound reason to think that they create a *social value*, over and above user-benefits? This requires understanding the mechanisms at work and, essentially, identifying a market failure. Absent such failures (small) quantity changes are of zero social value, as the price system equates the marginal value of changing an activity to its marginal cost. But if transport induces a change that interacts in some way with a market failure then it will create additional benefit or cost. Notice that these valuations are in terms of social welfare (ultimate household benefit), not of GVA. The distinction between the two is well known, and the focus throughout this paper is social welfare.

Second, local changes have to be set in the context of the national aggregate. In practice, this means thinking hard about displacement.

[1] Throughout we focus on the effects of the completed project. We do not investigate the construction costs of projects, nor include the temporary economic activity created by construction.

[2] Of course, they do not necessarily accrue to the user as e.g. they may be shifted to rents and captured in land value appreciation.