Beyond cost-benefit analysis; the search for a comprehensive evaluation of transport investment

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ABSTRACT

Major advances have been made in trying to go beyond the conventional cost-benefit analysis appraisal of major transport projects that focus almost entirely on user benefits. Whilst newer methods to estimate the potential for agglomeration impacts in an imperfectly competitive world have become more mainstream there is still a desire to be able to capture more robustly the even more transformational impacts that are often claimed to result from major projects. This paper reviews some of these approaches and discusses how they have been used in some projects in the United Kingdom. It concludes that there is still scope for further improvement but that the desire of policy makers for precise estimates may have to be modified.

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1. Introduction

Cost-benefit analysis (CBA) has been the mainstay of the appraisal of transport investments for at least the past fifty years, though its origins go even further back. Throughout this time there has been a debate about the appropriateness of CBA as a means of evaluating projects and of choosing between alternatives. The main elements of this debate fall into two broad areas: what is included and what is left out; and what values should be imputed to those elements where either there is no market price or the market is distorted such that any observed price does not reflect the true resource value (see de Rus, 2010, for a useful overview and Priemus & van Wee, 2013, for a discussion in the context of large-scale projects).

For many years CBA was restricted to those elements that could be observed and quantified reasonably easily, if not in an actual market at least in a surrogate market. Thus elements such as time savings, the cost of accidents and noise pollution were included, but wider environmental effects, visual intrusion and such elements typically left out. This left one major area of contention, the impact on the economy. It is known that transport improvements that change accessibility can have important impacts on land values, but these have typically been excluded because of the danger of double-counting the accessibility change reflected in time savings with the resulting impact on property prices. This was taken as a warning not to try and inflate the benefits by including what were in effect alternative measures of the same thing. However, the problem that was often hidden was the implicit assumption that whatever was going on in the transport markets, the rest of the economy was in a state of perfect competition with constant returns to scale. In such a state, where prices were equal to marginal costs, the exclusion of these perceived secondary benefits was correct since any change in transport ‘prices’ would be reflected in an equal change in the prices in the affected market. But, as highlighted by SACTRA (1999), following the insights of Krugman (1991), once the transport-using markets were in a state of
imperfect competition, where increasing returns to scale were possible, this assumption was no longer valid, and hence it was legitimate to try and identify the existence of additional economic effects.

This also relates to a further debate. The traditional approach is based firmly in a welfare economics framework in which the primary objective is one of maximizing net benefits/consumer surplus. More recently the focus of policy makers has switched to an objective of the output or employment arising from transport improvements. This is equivalent to the move from a world of perfect competition in which welfare and output were broadly equivalent to the imperfect world in which they could diverge. Under this approach the focus will be much more on the impact of changes on the productivity of resources than on the attempt to value the welfare benefits from time savings. Thus impacts on gross domestic product or gross value added, at both local and national level have become the focus of debate. In particular the question of redistributive versus net impacts has come to the fore.

In this paper we take up these themes looking first at the standard and then the extended cost-benefit analysis model with a view to assessing their limitations. We then turn to the inclusion of wider economic impacts, but essentially as an add-on within the broad framework of the CBA model, before examining whether it is possible to approach the problem from a different direction to avoid the limitations of the CBA framework. That different direction is to look directly at the impact on value added or employment rather than inferring this from the welfare changes addressed by the more conventional approach. The paper concludes with a comparison of some ex ante and ex post evidence from various major projects to illustrate the argument.

2. Issues in the standard CBA model

There is no universal standard CBA model, most countries define their own specific requirements for appraisal, but most follow a similar set of criteria (see Annema, 2013; for a comparison of approaches). The UK uses a standard format summarised in a web-based platform WebTAG (Department for Transport, 2014). This defines all the inputs required for an appraisal and the current values of the standard parameters such as time savings, accident cost savings etc. At the heart of any such appraisal is the forecast of traffic with and without the scheme so that a comparison can be made with scheme against a base case of what would be the situation if no scheme were adopted. It is important to note that the base case is not the current situation. In some cases, there may be various alternatives to be assessed and compared.

Forecasting traffic for most schemes depends on a variant of the conventional four-stage transport model: generation, distribution, mode split and assignment. Frequently this is simplified to use a fixed trip matrix so that the overall volume of traffic is kept constant and simply reassigned between destinations, modes and routes as relative costs change. This is appropriate for urban schemes where the peak-load traffic is given by regular commuting trips and an individual scheme is not going to prompt relocation of workplaces or residences to any great degree. It is less appropriate for larger and inter-urban schemes that change both global and relative accessibility and where peak-load traffic is made up of people making less regular journeys such as those for business or leisure.

There have been several studies that have shown the extent to which, especially for large-scale projects, traffic forecasts have been shown to be inaccurate to a degree that compromises the ex-ante evaluation of the project (Flyvbjerg, Bruzelius, & Rothengatter, 2003, 2006). But such studies focus on the macro-financial aspects of projects. These raise questions about financing projects and risk and resurrect the concern about crowding out of private investment that was the focus of Aschauer’s original contribution in this area (Aschauer, 1989). In a recent paper (Ansar, Flyvbjerg, Budzier, & Lunn, 2016) apply such concerns to an examination of recent Chinese investment in infrastructure and conclude that it has contributed little if anything to Chinese growth which, if traffic forecasts have not been achieved or costs have exceeded estimates, a project will fail to meet its financial targets and in consequence is seen to place an expected drain on public funds that could impair economic growth by starving potentially more profitable projects of funds. This ignores the extent to which the project may have made a contribution to that investment or promoted economic growth independently of realised traffic. Moreover, the time period chosen to assess a project’s performance may be too short to realise all the potential economic impacts. The main lesson from our critique of this approach is that examining traffic forecasts alone may not be the most useful indicator of a project’s success.

This goes to the heart of the standard CBA approach, which focuses primarily on traffic, since user benefits dominate the welfare gains through time savings and lower accident costs, plus congestion and reliability effects. Whilst standard valuation methods have been developed for these welfare gains, increasingly they have come under scrutiny. Whilst fairly consistent estimates for the value of travel time savings can be derived from a variety of methods, both revealed and stated preference, the key question remains as to whether such time savings can be reinvested into welfare producing activities and, particularly when it comes to business travel savings, into productive activities. This is not the place to conduct a full review of alternative methods of valuing time-savings (see, for example, Hensher, 2011; for a review), but we focus on one issue that has come to the fore in the appraisal of major projects, the value of business time savings.

The criticism of standard approaches to business travel time savings, which are valued typically at around three times those of leisure time savings and hence close to the real wage of such travellers (whose wages are also typically much higher than the population at large) is that such values overestimate the potential savings in an age of mobile communications. Here it is argued that if business travellers can maintain contact throughout a journey as well as work on laptops, tablets etc., saving time on a journey has little or no value. Since big inter-urban projects are heavily dominated by business travellers, reducing their value of time savings could reduce the perceived value of a project significantly. Whether this argument holds therefore depends on the extent to which travellers can work effectively whilst in transit. It is clear that this is not a question to which there is a definitive answer. Whilst working on a train, for example, are business travellers being fully productive; can they work effectively, are they compromised by the lack of privacy etc.? Whilst it may be difficult to defend the values of business time savings currently used, it may be equally difficult to determine by how much they should be modified.

Some critics go even further, suggesting that conventional travel has a limited lifespan due to a move to increasingly virtual contact. In such circumstances there would be no place for time savings as virtual communication would dominate. This seems extreme in the lifetime of most current projects. Most business deals need face to face contact, certainly in dealings above a certain value and the increasing mobility of individuals implies growing, not diminishing travel for social and family contact as well as longer distance commuting (including weekly commuting patterns). One only needs to look at the importance of visiting friends and family in most travel diary surveys to see how the globalisation of labour markets and other opportunities has impacted, not just on urban travel patterns, but also on international travel. Improved communication is not always a substitute for travel but is actually a
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