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TRANSPORT NOTES

TRANSPORT ECONOMICS, POLICY AND POVERTY THEMATIC GROUP

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Notes on the Economic Evaluation of Transport Projects

In response to many requests for help in the application of both conventional cost benefit analysis in transport and addressing of the newer topics of interest, we have prepared a series of Economic Evaluation Notes that provide guidance on some of issues that have proven more difficult to deal with.

*The **Economic Evaluation Notes** are arranged in three groups. The first group (TRN-6 to TRN—10) provides **criteria** for selection a particular evaluation technique or approach; the second (TRN-11 to TRN-17) addresses the selection of values of various **inputs** to the evaluation, and the third (TRN-18 to TRN-26) deals with specific **problematic issues** in economic evaluation. The Notes are preceded by a **Framework** (TRN-5), that provides the context within which we use economic evaluation in the transport sector.*

The main text of most of the Notes was prepared for the Transport and Urban Development Department (TUDTR) of the World Bank by Peter Mackie, John Nellthorp and James Laird, at the Institute for Transport Studies (ITS) , University of Leeds, UK (The draft text of Note 21 was prepared for ITS by I.T. Transport Ltd). TUDTR staff have made a few changes to the draft Notes as prepared by ITS.

The Notes will be revised periodically and we welcome comments on what changes become necessary. Suggestions for additional Notes or for changes or additions to existing Notes should be sent to rcarruthers@worldbank.org

FISCAL IMPACTS

THE FISCAL IMPACTS OF TRANSPORT INVESTMENT

Transport projects have an impact not only on citizens and businesses, but on **governments** – central, regional and local.

Financing and managing the project will place demands on the government's capital and current accounts. Whether these demands are greater or smaller, and how they are phased over time, will depend on the financing mechanisms used and the extent to which the public sector is involved. Alternative approaches for private finance and management are described in the World Bank's 'Public-Private Options' toolkit

Once the project is operational, it may generate a positive net **revenue stream** or require an **operating subsidy**, so there may be ongoing implications for the government's current account. Infrastructure projects which are provided on the traditional 'public good' model – free at the point of use – will not generate a direct revenue stream, so operations and maintenance may require funding in other ways. Conversely, infrastructure projects which are provided according to the 'user pays principle' will, by definition, be self-funding.

Transport is a major generator of **tax revenue** in many countries, and the most taxed items are: fuel, vehicle ownership and vehicle purchase. A World Bank funded infrastructure project may – for example – stimulate demand for all of these, leading to an increase in tax receipts, or may shift the pattern of tax receipts – between modes for example – or may in the worst case reduce total tax receipts.

Sometimes the effects on government will be felt **indirectly through competitive interaction** between modes. For example, rail projects which abstract demand from (relatively highly taxed) private transport may act to reduce total tax receipts. In another example, if a road project abstracts demand from modes that are in state control (such a public rail or metro services), then there may be a negative fiscal impact from deficits on those modes, but a positive fiscal impact on tax revenue.
Finally, there may be effects felt indirectly through other government departments – for example, healthcare costs of road accidents.

In this paper we consider how the appraisal should take these effects into account, and how they fit within the appraisal results, as described in the Framework.

ESTIMATING THE FISCAL IMPACTS

The costs to the **government of financing and managing** the project should be taken from a carefully prepared financial appraisal. They should be reported at resource cost – this will typically involve no adjustments as the expenditures involved do not usually incur indirect tax (VAT).

Fuel consumption in the study area is roughly proportional to total vehicle km, although trends in fuel efficiency have an impact too. Functions for vehicle fuel efficiency should be consistent with the vehicle operating cost model *(See Note No.9)*. The demand for vehicle km should be taken from the demand model *(See Note No. 6)*. Induced traffic will be quite important here.

These estimates can be combined with the relevant tax rate data to produce an estimate of tax revenue impacts. World Bank data on fuel and vehicle taxation is available for 160 countries [1].

Indirect effects on other modes will emerge automatically if the transport model is set up in a multi-modal way. If it is not, key variables will be the responsiveness (elasticity) of demand on competing modes to the project.

Having estimated fiscal effects, the remaining task is to report them within the Framework.

INCLUSION OF FISCAL IMPACTS IN PROJECT APPRAISAL

The Framework allows fiscal impacts to be reported in the appraisal results. Table 2 gives the example of a public-private partnership highway project, in which the users are charged tolls and the operator receives a relatively small contribution of $4.5million from the Government towards the project. In addition, public sector bus and rail operators who lose through abstraction of demand to private car, receive subsidies of −110,000 and −230,000 respectively. The fiscal impacts are shown in the block of rows headed 'Government impacts'.

Table 2. Appraisal Results for a Public–Private Highway Project

Impact	TOTAL Present Value, $ 2003 Prices and Values		Disaggregation by mode:			
User benefits & disbenefits						
Personal travel			Car	Bus and coach	Rail	Other
Travel time	28,730,000		28,730,000			
Vehicle operating costs	3,120,000		3,120,000			
User charges	-380,000		-380,000			
NET BENEFIT	31,470,000		31,470,000			
Freight			Road freight	Rail freight	Other	
Travel time	29,080,000		29,080,000			
Vehicle operating costs	7,970,000		7,970,000			
User charges	-340,000		-340,000			
NET BENEFIT	36,710,000		36,710,000			
NET BENEFIT	68,180,000	(1)	68,180,000			
Private sector provider impacts			Road infrastructure	Bus and coach	Rail	Other
Revenues	720,000		720,000			
Operating & maintenance costs	430,000	(a)		430,000		
Investment costs	-55,100,000	(b)	-55,100,000			
Grant/subsidy	4,500,000		4,500,000			
NET BENEFIT	-49,450,000	(2)	-49,880,000			
Public sector provider impacts			Road infrastructure	Rail	Other	
Revenues	-340,000			-110,000	-230,000	
Operating & maintenance costs		(c)				
Investment costs		(d)				
Grant/subsidy payments	340,000			110,000	230,000	
NET BENEFIT	0	(3)		0	0	
Government impacts			Roads and cars	Bus and coach	Rail	Other
Grant/subsidy payments	-4,840,000		-4,500,000	-110,000	-230,000	
Indirect tax revenue	540,000		540,000			
NET BENEFIT	-4,300,000	(4)	-3,960,000	-110,000	-230,000	
TOTAL						
Net Present Value, NPV	14,430,000	(5) = (1) + (2) + (3) + (4)				
Present Value of Costs, PVC	-54,670,000	(6) = (a) + (b) + (c) + (d)				
Benefit:Cost Ratio, BCR	1.26	(7) = [(5) - (6)] / - (6)				

The fiscal impacts are added to the impacts on users and transport providers (public and private), to give the overall project Net Present Value.

FURTHER READING

[1]Metschies GP (2001). Fuel Prices and Vehicle Taxation with comparative tables for more than 160 countries: Pricing Policies for Diesel Fuel, Gasoline, and Vehicle Taxation in Developing Countries, Second Edition. The World Bank: Washington, DC. http://www.zietlow.com/docs/Fuel%202000.pdf

[2] UK Department for Transport (2000), *Guidance on Methodology for Multi-Modal Studies.* London: DfT. http://www.dft.gov.uk/itwp/mms/index.htm. See Volume 2: Chapter 6 and Annex F.