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THE TREATMENT OF NON-RECOVERABLE VAT IN APPRAISAL

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Final report to the Department for Transport

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1 INTRODUCTION

1.1 Background

The background to this thinkpiece is that potentially, for some capital items associated with Department for Transport (DfT) funded infrastructure, VAT may not in the future be recoverable by the DfT. The question then arises how should this be treated in a webTAG style cost benefit analysis? The current webTAG position is that changes in government revenues are perceived in factor prices and are then uprated by the market price adjustment factor (MPA) before inclusion in the cost benefit analysis. This applies to changes in indirect taxation revenue, which feature in the numerator to the Benefit Cost Ratio (BCR), and changes in DfT related expenditure both capital and revenue, which feature in the denominator of the BCR. Changes in DfT related expenditure are also referred to as changes in the Broad Transport Budget (BTB).

The background to this paper can be traced back to a paper by Tyler (1972)subsequently updated and revised by Schraer. Building on this foundation, Sugden's two papers form the basis for the DfT's policy framework in this respect. Some relevant documents were produced at the time of the NATA Refresh. In this paper we take the framework proposed by Sugden and adopted in webTAG as a given and seek to apply the principles to this particular issue of non-recoverable VAT.

The theoretical foundation to WebTAG is an economic welfare analysis. In policy terms it follows guidance in the Green Book (HMT, 2003). Broadly speaking economic welfare defined in webTAG is the sum of changes in externalities, changes in user benefits, changes to transport providers and changes to government relative to some reference case and all suitably discounted and summed over project life. This then leads to a net present value (NPV) identity of

$$NPV = E + B_{NB} + B_B + BTB + ITR \qquad (1)$$

Where:

E = externalities: the sum of changes in noise, local air quality, greenhouse gases, journey quality, physical activity and accidents
B_{NB} = Non-business user benefits
B_B = Business user benefits plus transport provider impacts less developer contributions
BTB = Broad Transport Budget (revenue directly received by government from the transport scheme, operating costs directly incurred, investment costs including capital grants to transport operators netted of developer contributions, and revenue support/concession payments received to/from transport operators)
ITR = Indirect Taxation Revenues

The BCR is defined as follows.

$$BCR = \frac{E + B_{NB} + B_B + ITR}{BTB} \qquad (2)$$

These terms are all expressed in a consistent unit of account. This is market prices. It requires that the business and government impacts are adjusted to the market price unit of account. This is because government perceives prices in the factor cost unit of account, whilst businesses perceive in the production cost unit of account. The MPA factor, which converts between the factor cost and

market price unit of accounts, is defined as $(1 + t)$ where t is the average rate of indirect taxation in the economy.

1.2 Objectives

Related to this background five questions have been posed, as set out in the specification.:

1. What considerations should guide our decisions around how and where in the BCR (as defined in TAG Unit A1.1) non-recoverable VAT payments by the Department (or, more generally, public sector bodies) should be included? For example, should they be treated as a cost to the 'Broad Transport Budget' (BTB), therefore entering the denominator of the BCR, with an offsetting entry in the numerator (so that the NPV is unchanged)?
2. Should the market price adjustment factor (1.19) be applied to these non-recoverable VAT flows?
3. In cost benefit analyses for DfT funded schemes, what is the relevance of the counterfactual in terms of government expenditure and taxation when determining the appropriate MPA factors to apply? For example, should costs to the BTB be uplifted by 1.19, given that the rationale for the uplift is expressed in terms of the indirect costs (i.e. lower indirect tax receipts) to the Exchequer (as opposed to the DfT BTB) of raising direct tax to balance the budget?
4. Assuming MPA factors should be reflected in the BCR, should these effects be included in the numerator of the BCR or in the denominator?
5. Given the existence of the social cost of exchequer finance (SOCEF), which the upcoming refreshed Green Book is expected to acknowledge, are there any further considerations about whether it might be appropriate to include indirect tax effects in the numerator of the BCR?

Finally, there is an objective to set out in equations any necessary changes to TAG guidance to accommodate the issue of non-recoverable VAT.

1.3 Method

Our basis for this work is twofold : firstly underlying economic theory behind cost benefit analysis and secondly Professor Robert Sugden's original papers (Sugden, 1998, 2005) and the relevant webTAG guidance notes on the treatment of indirect tax that have been based on them (Units A1.1 cost benefit analysis, A1.3 User benefits and provider impacts and A5.3 rail appraisal). We review these and establish the baseline theory, and conjunctly how WebTAG is applied in practice. The issue of the social cost of exchequer finance is considered by drawing on this analysis and comparing it to the distortion that this social cost is considered to represent.. This then allows us to offer an opinion on the final question posed by the Department.

1.4 Report structure

Following this introductory chapter, Chapter 2 sets out the underlying economic principles to CBA that are relevant to this note, whilst Chapter 3 reviews the relevant government appraisal guidance. Based on this background we then set out our answers to the Department's five questions in the concluding chapter, Chapter 5..

2 ECONOMIC PRINCIPLES

2.1 Cost benefit analysis – underlying principles

The underlying principle to a cost benefit analysis (CBA) is that social surplus is the sum of surpluses to consumers, producers and government. The change in social surplus created by a project can therefore be calculated by summing the changes in these three surpluses. In CBA texts the producer surplus term is often further disaggregated into component parts – see for example Boardman et al., 2011 p61 or De Rus, 2010 p17. From the perspective of this paper our primary interest, however, is in the treatment of the government surplus term, and it is that which we focus on.

One way in which transport investment impacts on government surpluses is that the capital investment for the project tends to originate from government. This is the case even if the project is delivered through a third party. This is because the financing of the project stems from government, usually through some form of grant.

Another way that transport can impact on government surpluses is by affecting the amount of revenue received from taxation. Taxes are income transfers. This is because the tax revenue received by government as part of its surplus corresponds to a reduction in surplus experienced by either consumers or producers. When taxes are levied on resources at different rates, then if the project is expected to change the quantities demanded then taxation revenue can alter. It can be shown that not all of these changes are transfers. There is therefore a need to include a non-resource correction term[1] in the social surplus calculation. This reflects the change in taxation revenue.[2] In the transport sector, a classic example arises if new projects affect traveller choices and thereby increase or decrease the quantum of fuel duty revenue accruing to Government. Similar issues arise with public transport, electric versus conventional fuel vehicles etc where differential indirect tax rates apply.

Within cost benefit analysis we also focus on maximising output with a given set of resources – that is allocative efficiency. As we are interested in allocative efficiency, it is therefore important that all prices used in the CBA reflect their resource costs. Observed (traded) prices may be distorted for a variety of reasons including taxation, subsidy and inefficient, poorly regulated markets. It is therefore important to remove these sources of distortion when undertaking a CBA. This typically includes removing the effects of tax and subsidies on unit prices and also shadow pricing where markets are distorted. This is relevant to our interests for two reasons:

1. We are primarily interested in the effect of taxation on a resource – the capital cost of construction.
2. The capital cost of the investment, whilst in our 'problem' is subject to taxation, is itself also financed through taxes. As taxes are usually distortionary, the underlying principles to CBA inform us that we need to correct prices for this distortion. Therefore in a CBA, revenue

[1] Consumers and producers surplus refer to changes in quantities of resources. The non-resource correction term relates to the divergence between perceived price and resource cost when quantities change.

[2] de Rus (2010 pp31-32) gives a short exposition.

derived from taxes should be shadow priced to give a measure of its full economic cost. The shadow price adjustment factor is known by a variety of terms (e.g. marginal excess tax burden, marginal cost of public funds, social cost of exchequer finance).[3]

To summarise, there are three key points of principle which need to be considered in transport appraisal practice :

- All the entries in the cost-benefit table need to be in the same unit of account and this is achieved by applying the MPA factor to entries which arise in factor costs. This is a generic point which applies regardless of the two points below
- Special transport taxes such as fuel duty need to be handled correctly in the appraisal through the non-resource correction term. In the willingness to pay calculus this is encapsulated in the ITR term in the equations set out in the introduction. It is not discussed further in this note.
- Relevant price distortions might need to be taken into account. In the UK, guidance tends to assume that shadow pricing of unskilled labour and foreign exchange is not required in sector project appraisal. However, the possibility that there is a SOCEF, due to the deadweight cost of raising public finance is discussed in the Green Book, and is adopted in some countries e.g. Sweden.

It is very important to keep these points analytically distinct and not to allow them to become intertwined.

It is also worth noting that the terminology in use does not always help our understanding of this topic. The term market prices can be confused with prices that occur in the actual market place, rather than being a unit of account that is the final unit of account. Indirect tax correction factor is used in webTAG to refer to the MPA and can be confused with the non-resource correction term in the CBA.

2.2 Decision criteria

The net present value (NPV) is an unambiguous metric for decision making. The greater the NPV the more value the investment delivers.

There is some debate in the literature regarding the use of benefit cost ratios as a decision-making metric. The attraction of the benefit cost ratio is that it makes clear the return of the project. If projects are independent and infinitely divisible, then ranking projects whose NPVs are greater than 0 by benefit-cost ratio and then selecting projects until the budget is exhausted will maximise the NPV. By independent we mean all projects can be selected regardless of whether other projects are selected, and secondly their benefits and cost stay the same regardless of what other projects are

[3] See Boardman et al (2011 pp56-57, pp64-65) for a short exposition.

constructed. The divisibility criterion only refers to the last project to be selected and, as long as that project is small relative to the total budget, does not have a material impact on project selection. The denominator in this benefit-cost ratio is the cost item that is rationed (i.e. the budget). The operational definition of the denominator in transport appraisal practice was discussed in the 2008 NATA Review and the Broad Transport Budget was settled on.

If projects are mutually exclusive or there are other interactions between projects then a rigid application of benefit-cost ratios to choose between projects can lead to sub-optimal decision-making. That is it is possible to select a set of projects that do not maximise the NPV. There is a further issue associated with the benefit cost ratio, which relates to how the numerator and denominator are constructed – as this affects the BCR metric. This has led some authors to recommend the use of NPVs as the most reliable decision making criteria (see e.g. de Rus, 2010 pp131-133). Boardman et al. (2011 pp32-34) go further and recommend against using benefit cost ratios.

2.3 The calculus and units of account

A CBA can be undertaken in two alternative ways: using either a willingness to pay calculus or a real resources calculus. Both approaches are practised in transport appraisal. For example, the Department for Transport uses a willingness to pay calculus, while some international development agencies (World Bank and Asian Development bank) use the real resources calculus. Either approach is acceptable.

In the real resources calculus transfers are excluded from the analysis. These are transfers between consumers and producers, and between government and either producers or consumers. The focus of the analysis is on reductions in resource costs and on the social surpluses/deficits created by changes in demand.

In contrast a willingness to pay calculus identifies consumer, producer and government surpluses in their entirety. Such an approach can make it easier to identify winners and losers. A willingness to pay calculus therefore calculates consumer surpluses using the prices consumers are observed to be willing to pay. These will include indirect taxation – for example on fuel.

The resource costs in a CBA can be either expressed in factor costs or in market prices. Factor costs are prices that exclude taxes, subsidies and have been corrected for market distortions. Market prices are factor prices marked up to reflect the rate of indirect taxation in the economy (the market price adjustment factor). Conceptually market prices are 'closer' to the prices faced by consumers – the ultimate audience of the CBA. As a consequence there has been a tendency for an increasing number of countries to present CBAs in market prices – and the UK is one of those.

Analytically the NPV in market prices is a scalar of the NPV in factor prices. The scalar being the MPA. Depending on which NPV measure is used, all the project NPVs are scaled up or down by (1 + t).

$$NPV^{market\ prices} = (1+t)NPV^{factor\ costs}$$

3 UK practice – The Green Book and WebTAG

The Green Book (HMT, 2003) and webTAG govern transport appraisal. For the cost benefit analysis a willingness to pay calculus is used along with market prices as the unit of account. The NPV of a project is calculated along with a Value for Money criterion based on a benefit cost ratio (BCR). The value for money criterion is used as a key indicator in the decision support process.. The decision to fund a project or not is however based on a mixture of monetised and non-monetised impacts – and is not purely driven by the Value for Money criterion.

Government impacts in the BCR in two places. The denominator is the cost to the broad transport budget. This is the sum of capital maintenance and operating expenditure, plus revenues received in the form of tolls, user charges or fare revenues accruing to the broad transport budget minus any developer contributions. These impacts can either be incurred directly or via third party delivery agencies – who would receive grants or subsidies or may pay a concessionaires fee to operate a service. In the latter situation it is the grant/subsidy or concessionaire's payment that appears in the government account.

The second place government impacts appear is in the numerator. This is the non-resource correction factor and reflects the fact that differences in indirect taxation rates between transport commodities – principally road and public transport use – can have a significant impact on the change in government surplus.

Prices of government impacts, as already discussed, are expressed in the market price unit of account. The relationship between the different units of account (factor and market prices) and observed prices has been outlined by Sugden (2002, 2005). In the model outlined by Sugden the government does not pay any tax[4] and therefore faces prices in the factor price unit of account.[5] The government impacts, in both the numerator and the denominator, are therefore all marked up by the market price adjustment factor *(1+t)*. These terms are the BTB and the ITR in the NPV and BCR equations defined earlier.

In webTAG this factor is referred to as the indirect tax correction factor. As mentioned above we think this nomenclature is a possible source of confusion with the non-resource correction factor described above, and therefore prefer the term MPA factor when ensuring the consistency of the units of account throughout the appraisal.. Sugden's paper also identifies that the factor price of construction is also net of excise duties. Thus if the costs of construction include excise duties these need to be removed to convert to the factor price unit of account, before then being uprated by *(1+t)* to be in the market price unit of account (Sugden, 2005 p11). In this regard it is also worth quoting in full a summary point made by Sugden:

> If a particular good X is taxed at rates different from those applying to the economy as a whole, the social cost of a unit of X, expressed in the final-price unit of account is the factor X multiplied by $(1 + t^*)$, i.e. the hypothetical final price that X would have had,

[4] Or the tax it pays is recovered.

[5] The Sugden model assumes there are no price distortions other than taxation. If there were distortions affecting government surpluses, prices would need to be adjusted for these distortions.

> had it been subject to excise duties and consumption taxes applying in the economy as a whole.
>
> Sugden (2005 p12)

In line with economic principles Sugden argues that the appraisal needs to adjust for differential taxation regimes between goods. The Green Book however advises that such adjustments can be complex and difficult to undertake. It therefore takes a pragmatic approach and suggests that differing rates of taxation should only be adjusted for in the appraisal if this materially affects the decision.

> The adjustment of market prices for taxes in appraisal is appropriate where it may make a material difference to the decision. In practice, it is relatively rare that adjustments for taxation are required, because similar tax regimes usually apply to different options. It can also be difficult in practice to estimate costs net of tax. However, where the tax regimes applying to different options vary substantially, this should not be allowed to distort option choice. In such cases it is important to adjust for any differences between options in the incidence of tax arising from different contractual arrangements, such as in-house supply versus buying in, or lease versus purchase. Options attracting different VAT rates, for example, should be compared as if either the same VAT payments, or no payments were made in all cases.
>
> (HMT, 2003 p28)

Economic principles, see the exposition by Sugden referred to above, would also advise that excise duties should always be removed from government expenditure before conversion to market prices. This is clearly onerous and the Green Book therefore suggests that this is only necessary in <u>practical</u> appraisal should this distort choices between options. Given the manner that public transport use and road use are taxed in very different ways, it has been long standing practice within transport appraisal to account for these taxation differences. This gives rise to the ITR term in the NPV and BCR formulas set out in the introduction.

With respect to investment costs, given the prevalence of excise duties is likely to be similar across most transport investment choices there would be little return to the extra analytical effort to adjust investment costs to the true final unit of account (by stripping out excise duties and uplifting by the MPA). Our interpretation therefore of the NPV (and BCR) formula used by DfT, and set out in the introduction, is that the BTB term is a practical approximation to the social cost of the investment. In the vast majority of circumstances this will not bias decision-making. One example outlined in the Green Book where decision-marking may be materially affected is when different procurement routes may lead to different incidences of taxation. We consider that the issue of non-recoverable VAT being experienced by a third party delivery agency is an example of such a situation.

4 The Department's Five Questions

4.1 Introduction

Having set out the background economic principles and the relevant aspects of DfT and HMT appraisal guidance we are now in a position to turn to answering the questions posed. We do so by assuming that in questions 1 to 4, the SOCEF is unity, while in question 5 we consider the position if the SOCEF is greater than unity.

4.2 Question 1

What considerations should guide our decisions around how and where in the BCR (as defined in TAG Unit A1.1) non-recoverable VAT payments by the Department (or, more generally, public sector bodies) should be included?

Building on the previous sections in this report our starting point is that each of the terms in the NPV and BCR calculations should be in the correct unit of account. This is a key underlying principle to cost benefit analysis. It is the framework adopted by DfT and is also the one set out by Sugden. Given our focus on the treatment of non-recoverable VAT on investment costs our primary interest is in the Broad Transport Budget (BTB) term and the Indirect Tax Revenue (ITR) terms in the NPV and BCR webTAG formulas.

It is clear that the NPV of any project subject to non-recoverable VAT remains unaffected by how the non-recoverable VAT element is treated within the Broad Transport Budget. We can see this most simply if we take a real resources calculus perspective. In such a calculus tax transfers are ignored unless they lead to a change in the amount of tax revenue received (the non-resource correction term). It is clear in this instance that net tax revenues will not change and therefore the NPV remains unaffected. A willingness to pay calculus has to give the same result, and it does.

We now turn to the BCR as used by DfT in its VfM criterion. The issue is if the DfT, or one of its third party delivery agencies, has to pay non-recoverable VAT then the nominal cost of the project to the DfT increases, with potential ramifications on the DfT's financial budget. Our interest however is on the cost benefit analysis, rather than the DfT's budget per se. Our starting point once again is that the different terms in the BCR formula need to be in market prices. If we think carefully about a potential project, the inclusion or not of non-recoverable VAT, whilst having financial implications for DfT, does not affect the cost of the project in the factor cost unit of account. Therefore, by definition, the cost of the project in the market price unit of account does not alter either. That is the cost of the project to the BTB, when expressed in the market price unit of account, remains unchanged whether VAT is recoverable or not recoverable.[6]

[6] Consider the example of a tender competition between a sole trader who does not charge VAT and a consulting company which does. Suppose VAT is non-recoverable. The Sugden and Green Book position, with which we concur, is that the VAT should be stripped out when undertaking a WebTAG compliant appraisal of the project options. The social cost is BTB in the factor cost unit of account multiplied by (1 + t). This is not the same as the financial cost to the DfT budget.

Given the obvious financial implications of non-recoverable VAT on the DfT's budget this may seem surprising. Our opinion, however, is consistent with the framework set out by Sugden and also with Green Book advice. Investment costs that include non-recoverable elements of indirect taxation are in the production-cost unit of account. Sugden (2005 pp11-12) describes the transformation that such costs need to go through to be converted to market prices, and we discussed this in the previous section. In essence to express the costs to the BTB in market prices, the components of indirect taxation that have to be paid by DfT or its agents need to be removed, to give the investment costs in the factor price unit of account. The resultant value then needs to be uprated by the MPA factor.

The market price adjustment process is a device for assuring that all entries in the monetised CBA table are in the same unit of account (which has been chosen to be market prices). An MPA factor needs to be applied to all entries which are not already in market prices – these can include some items in the numerator of the BCR as well as some in the denominator. To convert the entry to market prices the standard rule is to remove indirect taxes and then uplift by the MPA *(1+t).* Entries which are already in market prices (e.g. non-work travel time savings) do not require adjustment ; people are assumed to trade between non-working time and money which is used to buy goods at market prices. If the investment cost attracts a non-recoverable VAT component then it is not in factor prices, it is in the production-cost unit of account. If the standard rate of VAT is levied and no excise duties are present, then this production cost unit of account will be close to, but not exactly the same, as cost in the market price unit of account.[7]

From a policy perspective we also see that the Green Book indicates that VAT treatment of different options should not affect choices between options. Thus extra analytical effort needs to be gone into to ensure that investment costs in the production unit of account are correctly converted to the market price unit of account. Our interpretation of the Green Book advice reproduced in the previous section is that this adjustment to investment costs[8] is not needed on practical grounds for the vast majority of appraisals as similar tax regimes will usually apply to the different investment options. However, where different tax regimes apply to the different options an adjustment to derive investment costs in the correct unit of account is needed.

It is therefore our view that the non-recoverable VAT component of construction costs should be removed from the scheme capital cost, before adjustment to market prices. An alternative way of presenting this is that at the level of project appraisal we need to split the cost entries into

i. A VAT recoverable component with no excise duties applied to it. This needs to be multiplied by (1 + t) to bring it to market prices.
ii. A component which includes non-recoverable VAT and/or excise duties. This needs to be converted to market prices, by firstly converting to factor prices and secondly multiplying by the MPA.

[7] It would be the same if the MPA factor equalled the VAT rate.

[8] DfT appraisal guidance already takes account of the differences in tax between public transport revenues and road fuel costs, as the large differences in taxation regimes can potentially distort the appraisal.

In a standard application of the BCR in the VfM criterion, this adjustment would only occur in the denominator of the appraisal metric. The formulae for the numerator would remain unadjusted.

A number of alternative formulations for the BTB and the ITR terms in the NPV and BCR formulas, each with a different treatment of non-recoverable VAT in it, can be posited. Our view, however, is that for a BCR in a cost benefit analysis, Sugden's view and the NATA Review decision that the appraisal as a whole and the BTB and ITR terms should be expressed in the market price unit of account continues to have merit. Thus whilst some of these alternative specifications may seem appropriate for some forms of financial analysis, for a cost benefit analysis the BTB needs to be adjusted in the manner outlined above.

To summarise our view therefore is that the inclusion of non-recoverable VAT in construction costs should not affect either the NPV or the BCR of a welfare appraisal of a transport investment funded by Government. Clearly the inclusion of non-recoverable VAT may have financial budget implications for the DfT and we turn to that in one of the later questions.

4.3 Question 2

Should the market price adjustment factor (1.19) be applied to these non-recoverable VAT flows?

It follows that the answer to this question is no. The financial flows between different government departments (DfT and the Exchequer) created by non-recoverable VAT have been netted out of the appraisal by the conversion of the construction costs to market prices. The non-recoverable VAT flows therefore do not appear in the calculation.

By implication the denominator of the BCR, whilst related to, is not actually the impact on the Broad Transport Budget in nominal terms. It is and always has been the government's Broad Transport Budget expressed in the market price unit of account. We think that possibly some of the arguments within the DfT may have overlooked this point.

4.4 Question 3

In cost benefit analyses for DfT funded schemes, what is the relevance of the counterfactual in terms of government expenditure and taxation when determining the appropriate indirect tax correction factors to apply?

The above discussion is centred around a fiscal budget that is variable.

Arguably the DfT budget is fixed by Treasury, and the DfT is in the position of allocating a budget that maximises economic benefit. A number of different situations can be envisaged, of which two are outlined below.

If the taxation regime of all investment options was similar – for example all investments attracted non-recoverable VAT – the DfT could express the BTB in nominal terms or in the market price unit of

account and achieve the same project prioritisation rankings[9]. The BCR cut off (i.e. the value for money criteria thresholds) would, however, vary between these BTB definitions.

If the taxation regime varies between different investment options - for example some investment options attracted non-recoverable VAT and others did not – then a BTB based on nominal prices to DfT would lead to a different set of rankings compared to one where the BTB was in the market price unit of account. The BCR cut-off would also vary between these BTB definitions. A BTB based on nominal prices to DfT would, in this situation, give misleading results. This is because the project prioritisation process would favour projects for which VAT was recoverable, rather than favouring projects which maximised net social surplus. Therefore the BTB should always be converted to the appropriate unit of account – irrespective of whether the DfT's budget is viewed as fixed or variable.

4.5 Question 4:

Assuming indirect tax correction factors should be reflected in the BCR, should these effects be included in the numerator of the BCR or in the denominator?

It follows from the above that the indirect tax correction factor (that is the market price adjustment) should be applied wherever entries in the CBA table require conversion from their natural entry values to market prices. The exact treatment in the appraisal table of revenue effects, grants, fuel duty, toll revenues etc is important to understand. MPA factors are likely to be used in both the numerator and the denominator. Indeed , one of the consequences of adopting Sugden's methodology is that most of the entries in the CBA table need to be adjusted.

4.6 Question 5

Given the existence of the social cost of exchequer finance (SOCEF), which the upcoming refreshed Green Book is expected to acknowledge, are there any further considerations about whether it might be appropriate to include indirect tax effects in the numerator of the BCR?

Questions 1-4 above deal with an accounting adjustment to ensure that all entries in the CBA table are in the same unit of account. The SOCEF is dealing with something entirely different, namely the deadweight cost to the economy of raising £1 of exchequer finance to spend on a public investment scheme. The precise definition of the SOCEF – whether applying to both capital and current expenditure and revenues, whether to all future years etc – would be needed, so the discussion below is illustrative rather than definitive. We also think it is difficult within appraisal to 'acknowledge' the existence of a SOCEF unless a decision is made across Government to ascribe a particular shadow price or scarcity value to a unit of public finance.

[9] Noting that prioritisation using the benefit cost ratio will only maximise economic benefit if all projects within 'the pot' are independent and are small relative to the budget.

If a SOCEF were introduced in the new Green Book, this would create a number of complexities and options for DfT appraisal practice. Effectively, our interpretation is that the DfT's decisions would face a double constraint – one represented by the SOCEF on the overall Government budget position and the other on the broad transport budget. All the questions about the definition of the denominator which were visited in the NATA Refresh of 2008 would recur. Assuming the current BCR formulation does not change, then the SOCEF would be incorporated into the VfM criterion by multiplying all changes in government related expenditure by the SOCEF. This would include changes in indirect taxation and revenues accruing to Government agencies in the numerator, and the net cost to the Broad Transport Budget in the denominator. The scheme BCR values would change because public finance would have become 'more expensive' relative to scheme benefits. Relative BCR values in a ranking list would change as projects with revenue streams would perform differently to those without.

The treatment of revenues derived from the transport system is an interesting case with respect to the SOCEF. If for example government wishes to reform the funding of transport infrastructure through the use of new transport charges hypothecated by a third party who manages and invests into the transport network, whilst leaving existing taxation such as vehicle excise duty and fuel tax unchanged, these new revenue streams will not subject to the SOCEF. Recent changes to Highways England and Network Rail funding regimes might lie close to this line. It therefore seems likely that a thorough going review of the BCR formulation might be required should HMT mandate the use of a SOCEF.

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