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Abstract

This paper is a contribution to the understanding and development of social discounting regimes. It first addresses three, often overlooked implications of how public funding differs from private financing by debt and equity. One implication is that the cost of systematic (income-correlated) risk in public service benefits does not fall as a rate of return, but as an absolute reduction in the value of the benefits. This is quantitatively important. Another is that, while ‘social opportunity cost’ discounting can for some governments be the best practicable option for most cost benefit analysis, it is unsuitable for other applications, which require lower rates. This can be handled by a hybrid regime. Third, with ‘social time preference’ discounting it is usually assumed that the cost of public funding should be handled by an explicit shadow price (≥ 1) for public spending. However a value-for-money approach, optimising spending from given, constrained budgets, is in important ways superior. The paper then examines US Federal and United Kingdom central government conventions, illustrating hybrid and value-for-money regimes, and also illustrating the difficulties of establishing and maintaining analytically rigorous social discounting procedures in practice.

1. Introduction

International practice and academic opinion on social discounting differ widely. Some differences reflect institutional constraints or ideology. Others arise from differences in how issues are framed.

The social opportunity cost (SOC) discounting convention frames the cost of public funding as if it were very similar to the financing of a commercial enterprise by debt and equity. The social discount rate is typically derived as a weighted average of the rates of return on displaced investment, postponed consumption, and incremental foreign funding and applied as if it were a commercial body’s weighted average cost of capital. The consumption value of the public service benefits are then treated as if they were providing a commercial return to financial investors. This has great strengths of simplicity, political appeal and ease of application. However it has many anomalous implications as discussed in Section 2.

The social time preference (STP) convention frames the issues by separately specifying a social time preference rate for consumption and a cost of public funding from taxation. Social time preference alone is sufficient for comparing consumption over time with consumption, or public spending with public spending. But a marginal dollar of tax costs more than the loss of one dollar of consumption, so a dollar of tax funded public spending

costs more than a dollar of consumption. The comparison of public spending dollars with consumption dollars therefore needs a ‘marginal cost of public funding’ (MCPF). Deriving a value for the MCPF has proved to be surprisingly challenging and no widely accepted methodology has emerged.ⁱ A way around this is discussed in Section 3.

The SOC approach is long-established in Federal Canada, in Federal and State governments in Australia and in New Zealand. The European Commission and several European countries apply STP rates, often with an explicit shadow price for public spending. The UK applies and STP rate and, for cost benefit analysis (CBA), uses value-for-money (VFM) ratios to handle the MCPF.

Some countries apply an STP rate, or a risk free market rate, plus a systematic risk premium based on financial market data.

In US Federal government, the Office of Management and Budget (OMB) specifies a hybrid regime, which recognises that for CBA the STP convention is “analytical preferred”, but specifies an SOC rate as the default for CBA and an STP rate or other low rates for everything else.

Section 2 compares in conceptual terms the social costs of private financing and public funding.

Section 3 discusses how the MCPF may be handled rigorously in CBA without its being explicitly valued.

Section 4 looks at the US OMB and UK government social discounting conventions. These illustrate operational hybrid and value-for-money (VFM) regimes. They also illustrate some of the practical problems of designing, improving and implementing social discounting regimes.

Section 5 concludes.

2. Private financing and public funding

A private enterprise financed by debt and equity and a publicly funded service such as national defence both incur financial costs to produce goods and services. However in appraising options they have many problems in common but face radically different funding..

The private enterprise will compare its spending with its expected revenues. The net financial revenues, plus associated gain in asset value, provide the financiers’ return on their investment.

The publicly funded service will compare its spending with its expected outcomes. However there are generally no financiers expecting a financial rate of return. The cost of funding is very different in kind. The cost of an extra dollar of aggregate spending is equal to a dollar of consumption taken from the private sector plus what the OMB describe as the ‘marginal

excess tax burden' (METB) arising from the distortionary and other costs of taxation. If the METB were say 0.8, then MCPF would be 1.8.

There is little or no literature on the distribution over time of the cost stream of the distortionary and other costs of marginal taxation. However it cannot grow indefinitely at a rate higher than the economic growth rate.ⁱⁱ The MCPF for aggregate funding is the present value, at an STP discount rate, of this cost stream for one unit of marginal taxation. An SOC discount rate is a broad measure of the cost stream's internal rate of return.

However the SOC convention assumes that the cost of public funds can only be measured, as with commercial debt and equity financing, by a rate of return. Given this framing it follows that *"No project should be accepted if its return is less than the return available on alternative projects. This rule is as basic to economics as one that requires the analyst to take into account opportunity cost generally."* (Burgess and Zerbe, 2013, 391. Emphasis as in original.) This is the basis for that frequent claim that only an SOC regime can achieve Pareto (Kaldor-Hicks) efficiency.

But public funding is different. Its social cost is measured uniquely as a shadow price relative to consumption, not an annual rate of return. There is also no significant relationship, except in principle at an extreme high political level in planning aggregate fiscal policy, between the cost of public funding and the timing of subsequent benefits. Spending agencies typically draw funds from some form of consolidated fund, maintained by general taxation, and spend within budgets negotiated with a central finance ministry. Money in the consolidated fund is homogeneous: a dollar spent on public administration, for example, is up to that point identical to a dollar spent on public investment or on social security benefits.ⁱⁱⁱ

The SOC convention frames publicly funded spending in CBA as if the consumption value of the benefits were converted into cash and paid to financiers as a return on capital. This is a clever model and superficially plausible. But there are no financiers expecting such cash returns. And it is almost universally accepted that social time preference for marginal consumption is much lower than a typical SOC discount rate. Thus, while the model can in some institutional contexts be a reasonable approximation for many CBAs, it is poorly suited to other applications.^{iv}

One limitation of the SOC convention is that it does not differentiate between public spending and consumption. Thus it would rank an expenditure to produce in ten years of \$B of consumption-equivalent benefit equally with the same expenditure to produce in ten years \$B of public expenditure saving. But this is clearly wrong, unless we believe there is no marginal excess tax burden.

Another problem is timing. The SOC convention implies that the social cost of public spending depends upon the interval between the spending and the subsequent benefits. This is the case with private debt and equity financing. But public funding is different. Public service outputs are preferred earlier rather than later because society has a positive time

preference for consumption. But the time of the benefits has no bearing on the MCPF. This problem is one reason why social discounting in the context of long term climate change is now globally dominated by social time preference – although Nordhaus (2021; 340), whose view has been countered by Hänsel et al (2020), remains a prominent dissenter and other leading dissenters include Harberger (Harberger and Just, 2013, 21-22,) and Burgess (2018).

A more subtle but important problem, which is conceptually challenging until framed in such a way that it can become obvious, is the SOC convention's lack of differentiation between CBA and CEA. For a conventionally financed commercial enterprise the appraisal of investment to produce revenue and investment to achieve cost savings are similar. A marginal dollar of private revenue has the same value as a marginal dollar of private cost saving. But public funding is different. CBA compares public spending with *consumption-equivalent* benefits. CEA compares public spending with *public expenditure savings*. CBA needs to handle the MCPF, giving more weight to public spending dollars than to consumption dollars. But CEA is comparing time streams only of public spending. Thus the MCPF is thus generally irrelevant to the ranking of CEA options and can generally be ignored.

This difference between CBA and CEA has been recognised in the literature for more than 50 years (Feldstein, 1970; Moore et al, 2013b) and in some governments for almost as long. However it can still seem counterintuitive. It is incomprehensible if framed as if the cost of funding must be measured as rate of return, or as if a dollars public spending and consumption have the same value. It is not universally recognised in administrations adopting SOC discounting regimes. Use of an SOC discount rate for CEA will lead to some loss of efficacy in procurement and design from underweighting of expected maintenance and other operating costs and replacement costs. Unless of course the population's time preference for consumption is close to the SOC rate.

It was noted in Section 1 that some governments include in their social discount rates a substantial premium for systematic risk (from the correlation of public service benefits with income), based on the risk premiums in financial market returns. This paper does not address the relevance to public financing of the private financial market premium. However the financial market premium is compensating financial investors and falls as an increase in their required rate of return, so its cost increases exponentially over time. Any cost of systematic risk with public funding falls instead on the beneficiaries as an absolute percentage reduction in the consumption value of the benefits, not as an accumulating rate of return. This is quantitatively very important but does not appear to be widely recognised.

3. Handling the cost of public funding

Early proponents of STP discounting saw that two instruments (a shadow price and a discount rate) can achieve consistent handling in CBA of both the MCPF and social time preference. However quantifying the MCPF presents difficulties and practice varies.

The MCPF concept itself is framed in different ways. Here we follow the OMB in framing it as the cost of marginal taxation. We assume that the cost of marginal public funding and the cost of marginal public spending are numerically identical, although the choice of terminology depends on the context.

The MCPF is in practice widely ignored.^v It is sometimes explicitly set equal to 1 or, more often, to around 1.25. However professional opinion ranges from 1 to more than 2.

Bos et al (2019) argues for a MCPF value of 1. It explains that, in the Netherlands, “BCA and the correction for MEB [Marginal Excess Burden of taxation] has been subject to intense debate among leading economists for some time” and that the Dutch BCA guidelines stated only that “the issue still has to be clarified”. The Dutch government had therefore “asked a special BCA Working group to advise on this issue”. Bos et al suggests “broadly in line with the Working group’s report” that “the best pragmatic approach is ... to assume first that a policy measure is financed out of general tax revenues and then that *the MEB of these taxes is broadly counterbalanced by the benefits of redistribution of these taxes*” (emphasis added). The assumption of financing out of general taxation is fair, but the conclusion that the excess burden of marginal taxation is offset by its distributional benefits appears to have little international support. Boardman et al (2020, 15-18) discusses some questionable assumptions on which it relies.

Regimes applying an MCPF of around 1.25 receive support from the extensive and well respected work of Dahlby. This work focuses mainly on governments within federal nations, as in Dahlby and Ferede (2011) for Canada, but it has also examined 20 OECD national governments (Dahlby, 2009).

The Dahlby estimates are described as marginal costs of public funds (MCF). However they are the reciprocal of the tax’s efficiency *as a source of revenue*. If a 1% increase in a tax generates a revenue increase of 0.8% the tax’s MCF is $1/0.8 = 1.25$. As the initial level of a tax approaches the top of its Laffer curve, at where a rate increase raises no extra revenue, the MCF approaches infinity.^{vi}

Dahlby and Ferede report MCFs for Canadian Federal government, for Corporate Income Tax, Personal Income Tax and General Sales Tax, of 1.71, 1.12 and 1.11. For a general tax change in 20 OECD countries Dahlby (2009) reports Denmark and Sweden as outliers with MCFs of 3.2 and 2.2, with the others clustered equally into two groups, one around 1.5 and the other around 1.2 to 1.25. Lowest is the USA, at 1.1. .

These figures are relevant to the distortionary impacts of marginal tax changes and, crucially, they are measurable. But they are not designed to capture the full impact of the distortions. Feldstein (1997, 209) notes on employment taxes that

‘distortion to labor supply is not only the effect of tax rates on participation rates and hours but also their effect on education, occupational choice, effort, location, and all of the other aspects of behavior that affect the short-run and long-run productivity and

income of the individual. Unfortunately, we still know very little about how taxes affect labor supply defined in this broad way. [Furthermore] the relevant distortion is not just in labor supply broadly defined but is also in the forms of compensation and in the demand for deductions and other ways of reducing taxable income.’

Feldstein also stressed the effect of increasing a tax in a system where there are already substantial tax (and other) distortions. He noted that, looking only at the areas of lost surplus on a supply and demand graph, the deadweight cost of raising an existing 30 percent tax rate by five percentage points is more than ten times the deadweight cost of an initial five percentage point tax.

There are however very few estimates for the marginal cost of taxes estimated from a wide perspective. Cline (2004), on the basis of a literature review in the 1990s, suggests a ‘typical shadow price of capital’ of 1.6. Analysis by Barrios et al (2013) suggests an MCPF for labour taxes in the region of 2.0 and much less for environmental taxes. Feldstein (1999, 678), reports an MCPF estimate for the US general taxation of just over 2.0. A slightly earlier, broader review, also including some modelling (Feldstein, 1997), estimated a value of ‘more than two’.

The interpretation of this and other evidence is very much a matter of judgement. Marginal tax will perforce tend to be raised disproportionately from more costly taxes, which argues for a number perhaps much closer to 2 than to 1. On the other hand relatively low cost taxes, such as general sales taxes and some environmental taxes may become more widely used, and so reduce MCPF s. However changes in this direction during the Reagan-Thatcher era in the 1980s are already embedded. Environmental concerns are becoming politically ever more prominent, but the disappointing history of environmental taxes does not suggest that they will greatly expand over the next few decades.

Explicit valuation of an MCPF can however be by-passed by reframing the problem and comparing options in CBA directly in terms of value-for-money (VFM): that is net dollars of consumption benefits per dollar of budget-constrained public spending. This VFM ratio is something that competent financial planning in a spending agency with a constrained budget will do anyway, in prioritising spending. Prioritisation of options in this way will maximise the total consultation benefit from a given expenditure budget.

The boundary between proposals that are accepted and rejected will broadly indicate the MCPF for that agency and that budget, as has long been recognised.^{vii} However the procedure is better seen as a method of prioritisation in its own right, rather than a revealed preference method of estimation an MCPF, which may always be in practice a fuzzy concept.

This procedure is promoted in the literature, with some historical precedent, by Finkelstein and Hendren (2020), which defines the ratio as the ‘marginal value of public funds’.^{viii} However, relative to literature seeking to derive an MCPF from first principles, this VFM procedure has no significant academic profile.

This may be partly because of the fairly widespread belief (as in Gollier, 2021) that the social discount rate is a significant determinant of *aggregate* public spending. If this were so, then advising governments to apply STP discount rates without the restraint of an explicit MCPF would be irresponsible. However aggregate government budgets in developed economies are set at a very high political level, supported by macroeconomic modelling. They have regard to future national wellbeing, but the social discount rate becomes relevant at lower levels. It may influence the distribution of the aggregate budget across some government functions, such as flood management or transport, but its main role is in the distribution of spending within agencies, down to detailed design.

Deriving VFM ratios for CBA needs no more information than deriving NPVs. However it is not quite so simple. Public spending dollars need to be separated from consumption-equivalent dollars and the terms cost and benefit defined by their numeraire (public spending or consumption), not by their sign. There will be “negative benefits” (i.e. losses of consumption) and “negative costs” (i.e. government revenue or savings). This increases transparency, which analytically is good, but in process terms adds complexity by prompting questions such as “which budget(s)?” Also, VFM ratios are appropriate for CBA – that is comparing public spending with consumption. They are generally not relevant to other applications such as CEA, which compares alternative time profiles of public spending. VFM ratios do however properly reflect the social opportunity cost of public spending from the specific budget more accurately than an exogenously specified MCPF.

The effective use of VFM ratios for CBA, even if the principle is accepted, needs an institutional environment that can provide clear and well enforced guidance from the relevant central authority and in spending agencies.

Boardman et al (2020) propose the alternative of quantifying a uniform MCPF, taking this as the marginal cost of labour taxes. This might often provide a realistically high MCPF and may be the best practicable optioning in some intuitional contexts. It would be a simpler than a VFM regime, far superior to a basic SOC regime and better than a hybrid regime. .

However, while a VFM regime, once established, may be politically uncontentious, the same cannot always be said for an explicit, realistic MCPF. An MCPF of 1.2 or 1.3 may attract little political attention, but higher, probably more realistic numbers are likely to be politically sensitive.

4. Two discounting regimes in practice

Sections 3 suggested that the robust, explicit valuation of an MCPF may not currently be possible. It also noted that the MCPF is relevant only when, as in CBA, public spending is being compared with consumption. And that it can then be handled in principle by comparing options in terms of VFM ratios of net consumption-equivalent benefits divided by net public expenditure costs. This section compares and contrasts the US Federal OMB guidance, which handles the MCPF in a hybrid regime with an SOC discount rate for CBA

alone, with the UK central government guidance, which adopts a VFM regime. This includes observation on how the drafting and implementation of guidance in this field faces serious obstacles to achieving full analytical coherence and full compliance.

US Federal guidance is issued in OMB Circulars A-94 (OMB, 1992) and A-4 (OMB, 2003). Circular A-94, issued after extensive internal review and public comment, replaced an earlier version from 1972. Its coverage is wide, albeit limited by exclusions including water resource projects.^{ix} It covers benefit-cost analysis (CBA), cost-effectiveness analysis (CEA), lease-purchase and asset valuation and sale. It originally covered regulatory impact analysis (RIA), but this was subsequently revised and then issued as Circular A-4, after wide academic peer review.

There is no reference in either Circular to VFM ratios, perhaps because debate in the US on the MCPF was and remains focused on its explicit valuation.

For CBA an SOC discount rate is the default, with a real value of 7 percent. With respect to STP, A-94 says that ‘Using the *shadow price of capital* to value benefits and costs is the analytically preferred means of capturing the effects of government projects on resource allocation in the private sector’.^x But that, for practical purposes, this may only be used if the relevant agency provides a value for the shadow price that the OMB can approve. This seems never to have happened. So STP advocates succeeded in establishing it as the *analytically* preferred approach, but SOC prevailed as the preferred *practical* approach for CBA.

A-94 also specifies late in the document under “Special Guidance for Public Investment”, that ‘public expenditures should be multiplied by a factor of 1.25’, reflecting a ‘marginal excess burden [METB] of 25 cents per dollar of [tax] revenue’. It is explained that this applies only to cases where public spending is being compared with consumption, as in most CBAs, and not to cases where costs are recovered in fees or charges, nor to CEA. However specification of an METB with SOC discounting for public investment in CBA is technically inconsistent and illustrates the problems of editorial control of such guidance. Evidence suggesting that many federal officials applying CBA are not aware this METB (Mannix, 2020) illustrates the challenges of guidance clarity and enforcement.

For all applications covered by Circular A-94 other than CBA the prescribed discount rate equal to the Treasury borrowing rate for a comparable term. Values are published annually. In the 15 years to 1992 the 10 year real rate averaged over 4.5% and never fell below 3%. That rate could have served as both a financial rate and a tolerable compromise approximation for an STP rate. However it fell below 2% in 2011 and has since averaged 0.5%. The current rates, issued in November 2020, include negative real rates of -1.1%, -0.7% and -0.3% for maturities of 10, 20 and 30 years (OMB, 2020).

Such rates may be reasonable for some financial comparisons. However they will be widely seen as too low for CEA. Continuation of the procedure illustrates the difficulties, administrative and political, of major changes.^{xi}

Circular A-94 is however an impressive achievement for such a complex institutional and political environment.

Circular A-4, on RIA, notes that many RIAs are cost-benefit analyses and repeats the main A-94 CBA guidance, without however mentioning the METB of 0.25. Exclusion of the METB from Circular A-4, may have contributed to difficulties with the METB in 2017, summarised later below.

It notes that regulatory investment costs often fall to private sector rather to public funding. In this case supplying an SOC discount rate of 7% to the consumption-equivalent benefits links back to the SOC framing described in Section above. If the consumption benefits were converted to cash and paid to the commercial bodies which had had to invest, a positive NPV would mean, if their real cost of capital was 7%, that those bodies were better off. But this is not the real world and the process will sometimes seriously understate the potential net social benefits of impact that extend beyond one or two decades. The need for a simple convention that is seen as fair to regulated enterprises has prevented more analytical rigour.^{xii}

Circular A-4 notes that ‘When regulation primarily and directly affects private consumption ... a lower discount rate is appropriate’ and that ‘The alternative most often used is sometimes called the "social rate of time preference”’. The Circular derived a figure from the real return to long term government debt over the previous 30 years, as an approximation for household time preference for consumption. This gave 3 percent, which has remained analytically and politically acceptable.

The Circular prescribes however that ‘For regulatory analysis, you should provide estimates of net benefits using both 3 percent and 7 percent’, adding that this range should sometimes be extended. Thus ‘if there is reason to expect that the regulation will cause resources to be reallocated away from private investment [and] you are uncertain about ... the opportunity cost, then you should [use] a higher discount rate ... as well as using the 3 and 7 percent rates’. For intergenerational analysis the Circular notes that from the literature ‘Estimates of the appropriate discount rate ranged from 1 to 3 percent’.

Circular A-4 is a technically thoughtful text, seemingly written to be tolerable to a very wide range of technical experts, politicians, government officials and users, necessitating very broad guidance on discount rates.

However some mishandling in RIAs of Federal resource spending seems to have persisted for decades, implying problems with monitoring and enforcement. This discussed later below in the context of the METB.

We now turn to a very different institutional context, in the highly centralised government of the UK. Here one institution ('the Treasury') issues high level the guidance on central government appraisal, controls the budgets of central government ministries and other agencies, and grants or withholds approval for major projects.^{xiii} The same institution is also responsible for fiscal policy.^{xiv}

The Treasury guidance on appraisal closely specifies the discounting regime. This includes the excuse of any explicitly valued MCPF, described in UK government as the 'social opportunity cost of exchequer finance'. A value of 1.3 was almost included, in response to pressure from a spending agency, in a draft public consultation document in 2002, but withdrawn just before publication at the request of the finance minister's office (Spackman, 2013, 197). This cost has always, since the acceptance of STP discounting, been seen as adequately handled by budget constraints.

However development of other technical aspects of appraisal are led mainly by the relevant spending agency. The transport department historically leads on many aspects of methodology, including the use of VFM ratios for CBA, and the environment department on most environmental valuation. The Treasury guidance refers readers to these and other sources. It also in recent years has increasingly emphasised the integration of economic analysis into the wider business case development.^{xv}

Until the late 1970s public sector discounting was focused on the many nationalised industries. The first rate was set in 1967 at 8 percent on an SOC basis and soon rose to 10 percent in an attempt to restrain spending. It was perversely applied almost exclusively to CEA of alternative energy sources and engineering designs to supply a given output. Prices, for which SOC conventions might have been analytically more appropriate, were set under political pressures to meet much lower, nominal financial objectives.

The discount rate was reduced in 1978 to 5 percent, reflecting poor returns in the private sector, and some officials saw this as an acceptable STP rate. So when economic recovery led officials overseeing nationalised industry spending to demand a return to 8 percent there was extended internal debate. The final compromise included a nationalised industry rate of 8 percent, and this was the last such regime, as most of the remaining industries were privatised during the 1990s. For the public services the rate was from 1991 recognised as an STP rate and set then at 'the top of the range' of 4 to 6 percent (HM Treasury, 1997, 84).

Following the election of a government favouring public investment and (unrelated) changes in officials, new guidance in 2003 introduced a much lower STP discount rate of 3.5%, with a declining schedule of rates over the long term.

The guidance is that benefit cost ratios should be used for 'optimising over a constrained budget' HM Treasury (2020, 51), although clarity is not always sustained.

The best developed guidance on this VFM regime is illustrated in Department for Transport (2017, pp 25-26, Boxes 5.1 and 5.2), where the VFM ratio categorisations are pragmatic but

appear to serve well in practice.^{xvi} They imply a typical MCPF for these transport budgets closer to 2 than to 1.

Both the UK Treasury and the US OMB regimes illustrate similarities and differences in the practical handling of many of the issues that arise in the specification of STP regimes.

Mode of publication: The US OMB Circulars and UK ‘Green Book’ on Appraisal and Evaluation in Central Government” are familiar and authoritative documents. Both maintain authority partly by making only occasional and generally only relatively minor and uncontentious changes. Both regimes have seen only two changes to their discount rates in the past 50 years. Views will differ on whether decision making would have been better or worse had there been more changes. Many practitioners might consider that such stability is strongly beneficial.

The equity risk premium: The OMB guidance says very little on systematic risk. Circular A-94 notes that absolute variability in an outcome ‘can be much less significant than its correlation with ... nation income’. It advises however that ‘In general, variations in the discount rate are not the appropriate method of adjusting net present value for the special risks of particular projects’, and that there may sometimes be a case for estimating certainty-equivalents. In UK government the relevance of the equity premium, or of CAPM, to public funding was considered in the late 1970s and rejected and this has remained the Treasury’s position. Following the introduction of an STP rate the guidance advised that private financing risk premiums were not relevant to public funding and set out the neoclassical, ‘Little and Mirrlees’ algebra for estimating income-correlated risk and this was sustained until 2003 (HM Treasury, 1997). In 2003 an apparent loss of institutional memory led to the dropping of any reference to income-correlated risk.^{xvii} The STP discount rate however is still presented as including a very small element for systematic risk, as a demonstration that the issue has been addressed.

The very long term: Very long term discounting developed a high profile in the late 1990s and is now, in the context of global climate change, led by academia and the UN rather than national government guidance.

OMB Circular A-94 makes no reference to discounting over the very long term. Given the political divisions on climate change it may have been unrealistic for this to be added to an OMB Circular. Circular A-4 covers the issue with its advocacy of very low discount rates for intergenerational analysis. The UK Green Book set out a schedule of declining rates in 2003, extending into the indefinite future. This timescale was curtailed in 2018 to 125 years.

Valuation of STP: The OMB value in Circulars A-94 and A-4 of 3% in real terms is at the low end of any plausible range for years before the 2008 financial crash, but derived in a simple, politically acceptable way. UK Treasury guidance, reflecting European academic interest, has always derived value from the conventional Ramsey equation, defining STP for consumption as social time preference for marginal utility plus a larger factor for the

expected decline in the marginal utility of consumption as per capita incomes increase. Until the 2003 Green Book the guidance had indicated plausible values for the parameters in this equation but from 2003 it has chosen to quote specific values. This allows less flexibility about, for example, inclusion of any pragmatic optimism bias element and about the value of the small but ideologically contentious “pure time preference” factor of marginal utility.

MCPF or METB: The UK Treasury has consistently opposed the explicit valuation of an MCPF. US OMB Circular A-94 prescribes an METB of 0.25 to be applied “to public investments with social benefits apart from decreased Federal costs”. This is inconsistent with discounting such appraisals at 7% and there is evidence that have been widely overlooked. However the METB recently developed a high profile in the context of US *regulation*.

Executive Order 13771 of January 2017 (one of several subsequently revoked on President Biden’s Inauguration day) specified a one-in-two-out rule for new regulations, like such conventions in Canada, the UK and Australia. It *also* required that the total cost of regulation should not increase. Q&A guidance by the OMB (OMB, 2017) on implementation of the Order brought to light that nearly all of the substantial Federal resource spending on regulation had traditionally been categorized as transfers. This led to a public consultation (OMB, 2019) about the value of the METB, noting that Circular A-94 specified a value of 0.25, but that research now suggested 0.4 to 0.5. The consultation appears to have produced only a modest response, with little advice on METB valuation.

5. Conclusion

It is a paradox that the literature on social discounting routinely proclaims its high importance to practical decision making, yet also tolerates the persistence over five decades, across the world’s developed economies, of two analytically inconsistent social discounting conventions (and the emergence of more variants).

From a practitioner’s perspective the importance of the social discount rate is often overstated. Inefficient public spending arises mainly from grossly optimistic projections of costs and benefits. Nonetheless discounting regimes do matter, especially given their very wide application.

Exchanges between proponents of Social Opportunity Cost (SOC) and Social Time Preference (STP) discounting regimes are today rare and tend to lead only to restatements of respective positions. One commendable but unsuccessful attempt to achieve some convergence is Moore et al., 2013a,b and Burgess and Zerbe, 2013.

This paper takes a fresh approach in three main respects.

One novelty is to step back from the SOC model of public funding by hypothetical financiers seeking a personal or institutional financial rate of return, to examining how public spending agencies are funded in practice. This exposes two extreme differences between public

funding and commercial financing by investors in debt and equity. One difference is that neither the timing of the benefits (nor any systematic risk in the benefits) has any bearing at all on the cost of their public funding. The other difference is that a budget-constrained public spending dollar is worth more than a consumption dollar. These contrast very sharply with commercial equity financing, where the revenue benefits fund the cost of capital, which is paid to the financiers, and where a marginal dollar of revenue generally has the same value as a marginal dollar of cost saving.

An SOC social discounting regime, in imposing on CBA a commercial financing model, ascribes an implicit cost to public spending that wrongly depends upon the timing of the subsequent benefits and wrongly fails to discriminate between contemporary public spending and consumption.

As noted at the end of Section 2, **the common assumption that systematic (income correlated) risk in public service benefits falls as a rate of return is also biased on the implicit assumption of commercial funding. With public funding this risk reduces the value of the benefits to the beneficiaries, but not as a rate of return.**

The second, more mundane novelty is to emphasise that social discounting is applied much more widely than to cost benefit analysis (CBA), on which SOC advocacy is generally focused. There is sometimes a pragmatic case for applying an SOC regime to CBA of proposals that extend over two or three decades. An SOC regime, with a discount rate higher than an STP rate, does weight early dollars (often mainly public investment) more heavily than later dollars (often mainly consumption-equivalent benefits). It may often rank CBA option in ways similar to that of an STP regime with a realistic marginal cost of public funding (MCPF).

However it is often not recognised that this similarity for many CBAs does not apply to cost-effectiveness analysis, nor to any other application which is not mainly comparing early public spending with later consumption benefits. The US OMB is a rare example of this being handled by a hybrid regime where institutional constraints require a default regime for CBA of SOC, but lower rates are applied to CEA and most other applications.

The third and final, at least fairly new emphasis applies to the difficulty of deriving a robust value for the MCPF, at the aggregate level or for specific programme budgets. This may be the main obstacle to establishment of efficient STP regimes. **An analytically superior approach to estimating a precise value, which will anyway be done at least implicitly in allocating funds from a constrained budget, is to appraise options in terms of their value-for-money ratios of ‘net present value consumption benefit’ to ‘net present value spending from the constrained budget’.** This is workable but more complex than using a rough and ready MCPF.

There are often severe practical problems in improving and maintaining analytical rigour in a social discounting regime. However a number national regimes might be improved by moving over time towards hybrid or value-for-money structures.

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Notes

ⁱ There is no well established terminology here. The acronym MCPF follows Boardman et al (2020).

ⁱⁱ So for realistic values of economic growth and social time preference, the cost has a finite present value.

ⁱⁱⁱ There are of course revenues sources other than general taxation, such as charges and hypothecated taxes, but these are in aggregate relatively small.

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- ^{iv} These and other problems were recorded in Feldstein (1973), with no published response.
- ^v In the author's experience some years ago a respected environmental consultancy, when a peer review noted that it had overlooked the MCPF, declared that this was not an issue that it should consider. If a government client wished to apply it, it would be for the client to do this.
- ^{vi} This situation, and worse, is not exceptional. Dahlby and Ferede (2011) found that five of the ten Canadian Provinces set corporate income taxes at levels at which a reduction in the tax rate would *increase* revenue, as well as reducing distortions caused by the tax.
- ^{vii} As noted by Marglin (1963, 278) and more formally and more fully by Minken (2016).
- ^{viii} Finkelstein and Hendren apply this to a field of policy appraisal some way from that of capital investment projects, which is the usual focus of debate on cost benefit analysis, but the logic is the same.
- ^{ix} The US EPA discounting guidance (EPA, 2010) is consistent with OM guidance. Although Zerbe et al (2002), reviewing use of social discounting across all levels of US government, found "little consistency in government decisions to use or not to use discount rates or in their choice of particular rates when they are used." This illustrates the difficulty of achieving consistency across levels of government and across agencies.
- ^x Use of "shadow price of capital" to mean 'shadow price of public spending' appears to stem from the 1960s, when the focus was on curtail intensive public investment and the differences between private capital financing and public funding were not full recognised.
- ^{xi} Presumably this is now handled by setting budgets at levels that prevent excessive 'spending to save'.
- ^{xii} There is little academic interest in the handling of private investment in CBA. One pragmatic approach promoted by UK economic regulators is at JBCA (2012).
- ^{xiii} There is significant delegation to Northern Ireland, Scotland and Wales in the distribution of budgets, but not on discount rate policy.
- ^{xiv} Monetary policy lies with an independent central bank.
- ^{xv} The elements being Strategic, Economic, Commercial, Financial and Management.
- ^{xvi} The finance ministry does however emphasise the role of BCRs, albeit with a less than precise definition of costs (HM Treasury, 2020).
- ^{xvii} Apart from a notional, unquantified "small premium for 'systemic risk'" in the social discount rate.