Intergenerational wealth transfers and social discounting: Supplementary Green Book guidance

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Author Joseph Lowe

HM TREASURY

HM Treasury contacts

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If you require this information in another language, format or have general enquiries about HM Treasury and its work, contact:

Correspondence and Enquiry Unit
HM Treasury
1 Horse Guards Road
London
SW1A 2HQ

Tel: 020 7270 4558
Fax: 020 7270 4861
E-mail: public.enquiries@hm-treasury.gov.uk

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1 BACKGROUND

1.1 The Stern Review set out to assess, from a global perspective, the effects on the welfare of current and future generations of very large and, for all practical purposes, irreversible changes to the environment resulting from climate change. The standard Green Book assessment of the economic costs and benefits of expenditure proposals is rarely concerned with such major changes to the wealth and welfare of future generations.

Pure social time preference

1.2 While starting from the standard Green Book approach to discounting, the Review, because of its very different frame of reference, had to consider fundamental ethical issues concerning the responsibility of the current generation to future generations. This led the Review to conclude that it was not ethically defensible for pure social time preference to be applied to future cost-benefit calculations where these involved significant and, for all practical purposes, irreversible wealth transfers from the future to the present. This consideration applied to the 0.5% pure social time preference element of the standard Green Book discount rate (denoted as δ in the Green Book, Annex 6).

Future wealth effects

1.3 The Review had to take account of the effects on wellbeing of a large number of possible alternative growth projections, analysing the probability of these outcomes through a Monte Carlo simulation. To allow for the effects of these various consumption projections the Review used the standard Green Book parameter of 1 for the marginal elasticity of the utility of consumption (denoted as μ in the Green Book, Annex 6), applying this to each growth projection endogenously. This follows Green Book guidance and enabled the Review to properly allow for the differing wealth effects of each growth projection.

Exogenous catastrophic risk

1.4 The Review included an allowance in the discount for the possibility of future events resulting in the human extinction. The 0.1% level used is an estimate, it being the lowest possible at the one decimal place level and the Review argued that it is a generous allowance for such a possibility.

1.5 The component of the standard Green Book discount allowing for exogenous catastrophic risk is 1% (denoted as L in the Green Book, Annex 6). This lies within the range suggested by academic investigation and allows for a larger set of possible risk factors than simple species extinction.[1] These factors relate to typical public expenditure projects and include unforeseen changes in social and political objectives and priorities and to possible wider changes in the economy, society and technology, which are not part of endogenous risk assessment. These factors were largely irrelevant to the Stern Review's assessment of climate change, which could also be said to allow for exogenous variation in the Monte Carlo calculations.

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[1] Newbery (1992), estimates L as 1.0; Kula (1987) as 1.2; Pearce and Ulph (1995) as 1.2; OXERA (2002) as 1.1 currently and 1 in the near future.

The way forward

1.6   It is the purely selfish "preference element" of social time preference which Green Book methodology now needs to take into account when addressing significant and virtually irreversible transfers of wealth between generations.

Long-term Discounting

1.7   In the long-term, defined in the Green Book as over 30 years, the standard approach to discounting uses a declining discount rate[2] and refers to the work by Weitzman (1998, 2001)[3], Gollier (2002)[4] and to a specially commissioned report by OXERA[5]. This declining rate is based on uncertainty about the future values of time preference and calculates a certainty equivalent rate taking into account the range of this uncertainty.

1.8   Recent surveys, including one by Cameron Hepburn (a member of the Stern team), indicate that mainstream academic thinking has not shifted significantly since the Green Book was revised in 2002. The declining long-term discount approach remains as the most practical and reasonable. Although Hepburn may be expected to lean in the direction of the Stern position, he closes his paper with a clear endorsement of the functional usefulness of the declining discount rate approach saying, "the appropriate trade-off between equity and efficiency, intergenerational or otherwise, raises fundamental issues in political philosophy. Consensus is unlikely, if not impossible. At least the advent of declining discount rates reduces the domain of disagreement."

New Guidance

1.9   The Green Book is intended as a methodology that supports transparent decision-making. It is not a "black box" decision-making device. Therefore, a sensitivity calculation should be carried out in cases which involve the very long term (with the qualification criteria set at a minimum of 50 years) and which involve substantial and, for practical purposes, irreversible wealth transfers between generations.

1.10   Both the standard and a reduced long-term discount rate should be applied to net cost-benefits. Both of the resulting NPVs should be included in the business case together with a clear explanation, with the difference between the two being an estimate of the wealth transfer attributable to social time preference.

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[2] See Green Book, Annex 6, Pages 98–99.

[3] Weitzman. A. 1998 - (March 2001), Gamma Discounting, American Economic Review, Vol 91, No 12001. B 1994. On the 'environmental' discount rate. Journal of Environmental Economics and Management, 26, 200-9. C 1998. Why the far distant future should be discounted at its lowest possible rate, Journal of Environmental Economics and Management, 36, 201–208.

[4] Gollier A (2002), Time Horizon and the Discount Rate, IDEI, University of Toulouse, mimeo. B The Economics of Risk and Time. Cambridge, MA: MIT Press,. 2002b. C Discounting an uncertain future, Journal of Public Economics, 85, 149-166.

[5] OXERA report for ODPM (2002), A Social Time Preference Rate for Use in Long-Term Discounting, a report for ODPM, DfT and Defra.

<http://www.communities.gov.uk/documents/corporate/pdf/146862>.

2 GUIDANCE

INTERGENERATIONAL WEALTH TRANSFERS AND DISCOUNTING BOTH WITH AND WITHOUT PURE STP

2.1   To be applied in cases where the effects under examination are very long term (in excess of 50 years) and which involve very substantial and, for practical purposes, irreversible wealth transfers between generations.

2.2   Perform a sensitivity analysis applying both the standard Green Book discount rate and the reduced long-term discount rate (which excludes pure social time preference), to net cost-benefits.

2.3   Both of the resulting net present values (NPVs) must be included in the business case and explained clearly. The difference between these two figures provides an estimate of the wealth transfer that is attributable to pure social time preference. The additional discount rate, which excludes the pure social time preference (STP) element, is given in the bottom line of the table below.

Green Book long term discount rates

Period of years	0–30	31–75	76–125	126–200	201–300	301+
Standard rate as published in the Green Book	3.50%	3.00%	2.50%	2.00%	1.50%	1.00%
Reduced rate where "Pure STP" = 0[1]	3.00%	2.57%	2.14%	1.71%	1.29%	0.86%

2.4   A table showing the long-term discount factors is shown on the next page.

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[1] The extrapolation of the reduced rate maintains the ratio between the Green Book discount rate and the reduced rate (at 7:6).

Long-term discount factors

Year	Long Term Discount Factor (Green Book)	Long Term Discount Factor (reduced)	Year	Long Term Discount Factor (Green Book)	Long Term Discount Factor (reduced)
0	1.0000	1.0000	23	0.4533	0.5067
1	0.9662	0.9709	24	0.4380	0.4919
2	0.9335	0.9426	25	0.4231	0.4776
3	0.9019	0.9151	26	0.4088	0.4637
4	0.8714	0.8885	27	0.3950	0.4502
5	0.8420	0.8626	28	0.3817	0.4371
6	0.8135	0.8375	29	0.3687	0.4243
7	0.7860	0.8131	30	0.3563	0.4120
8	0.7594	0.7894	40	0.2651	0.3196
9	0.7337	0.7664	50	0.1973	0.2479
10	0.7089	0.7441	60	0.1468	0.1923
11	0.6849	0.7224	75	0.0942	0.1314
12	0.6618	0.7014	80	0.0833	0.1182
13	0.6394	0.6810	90	0.0651	0.0956
14	0.6178	0.6611	100	0.0508	0.0774
15	0.5969	0.6419	125	0.0274	0.0455
16	0.5767	0.6232	150	0.0167	0.0298
17	0.5572	0.6050	200	0.0062	0.0127
18	0.5384	0.5874	250	0.0029	0.0067
19	0.5202	0.5703	300	0.0014	0.0035
20	0.5026	0.5537	350	0.0009	0.0023
21	0.4856	0.5375	400	0.0005	0.0015
22	0.4692	0.5219	500	0.0002	0.0006