

Charge Questions for SAB-EEAC Review of an EPA White Paper: “Valuing mortality risk for environmental policy: a meta-analytic approach” and Technical Memorandum: “Income Elasticity of VSL”

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White Paper: Meta-analysis dataset

The White Paper assembles a database of stated preference and hedonic wage estimates of the value of statistical life (VSL) and, where possible, their standard errors. Criteria for inclusion in the database are based on recommendations from the SAB-EEAC (U.S. EPA Science Advisory Board 2011) (see section 4.4, page 13-20). EPA requests comments on whether the selection criteria previously recommended by the SAB-EEAC were appropriately interpreted and applied both for selecting studies to include in the meta-analysis and for selecting estimates within studies. **In answering questions 1(a) – 1(c), in addition to responding to the specific questions, please comment, in general, on whether the selection criteria previously recommended by the SAB-EEAC have been appropriately interpreted and applied in the White Paper.**

- 1a. Evidence of validity for stated preference studies:** The SAB noted in its earlier advisory report (U.S. EPA Science Advisory Board 2011) that each selected stated preference study “should provide evidence that it yields valid estimates” (page 16). The SAB did not, however, specify how validity should be assessed. In applying this criteria, EPA included studies and estimates that passed a weak scope test or provided other evidence of validity (e.g., a positive coefficient on the risk variable as in the appendix for Viscusi, Huber and Bell 2014) as explained in Appendix B of the White Paper. Please comment on whether the methods EPA used in the White Paper to assess the validity of studies and estimates are appropriate and scientifically sound.
- 1b. Construct of the risk variable in hedonic wage studies:** The SAB noted in its earlier advisory that the EPA should “Eliminate any study that relies on risk measures constructed at the industry level only (not by occupation within an industry)” (U.S. EPA Science Advisory Board 2011, page 18). It is not clear whether the SAB’s parenthetical addition was meant as an example or as a directive. Only four studies constructed the risk variable by occupation and industry and met other selection criteria. In applying this criteria EPA included studies and estimates where the risk measure is differentiated by industry and at least one other characteristic (e.g., occupation, gender, age). Please comment on whether the hedonic wage studies included in the White Paper constructed the risk variable in a manner appropriate for use in the meta-analysis.
- 1c. Estimates for immediate risk reductions:** To estimate the average value of the marginal willingness to pay for reduced risk of immediate death, the EPA selected estimates from the Stated Preference literature that are most closely comparable to the accidental deaths from the hedonic wage literature. The EPA made several judgement calls in determining the appropriate estimates to use from the stated preference literature. Specifically, Viscusi, Huber and Bell (2014) estimate reductions in risk of bladder cancer that will occur in 10 years. The authors discount the estimates to derive a comparable estimate for an immediate risk reduction. Alberini, et al. (2004) estimate

a willingness to pay for an annual reduction in risk over 10 years. We include estimates from both of these studies in the meta-analysis. Please comment on whether appropriate estimates from the stated preference literature were used in the White Paper to estimate the marginal willingness to pay for reduced risk of immediate death.

2. Please comment on whether relevant empirical studies in the stated preference and hedonic wage literatures are adequately captured in the White Paper. If additional studies should be included in the white Paper please provide citations.
3. Some estimates in the meta-analysis dataset in the White Paper are constructed by weighting subpopulation-specific estimates within a study in order to approximate an estimate for the general population. The specific weights used are described in Appendix B of the White Paper. Please comment on whether the population-weighting approach used in the White Paper is appropriate and scientifically sound.
4. In some cases EPA estimated standard errors in the White Paper using information within studies or provided by the study authors, as described in Appendix B. Please comment on whether the methods used in the White Paper to estimate standard errors when such information was not readily available are appropriate and scientifically sound.

White Paper: Analysis

Section 4 of the White Paper describes methods used to estimate representative VSL estimates from the meta-analysis dataset and presents results.

5. Please comment on whether the methodology used in the White Paper to analyze the data represents an appropriate and scientifically sound application of meta-analytic methods to derive generally applicable VSL estimates for environmental policy analysis.
6. The White Paper classifies estimates into independent samples, also called groups, as described in Section 4. Estimates from some hedonic wage studies that use the same or very similar worker samples are grouped together for the analysis. Similarly, some of the stated preference estimates using the same sample are grouped together. Please comment on whether this methodology represents an appropriate and scientifically sound approach for accounting for potential correlation of results that rely on the same underlying data.
7. Section 4.1 of the White Paper presents an expression that characterizes optimal weights that account for sampling and non-sampling errors, a framework that guides EPA's approach. Please comment on whether this is an appropriate and scientifically sound approach for addressing sampling and non-sampling errors.
8. The analysis in the White Paper adopts both non-parametric and parametric approaches (sections 4.1 and 4.2, respectively). Please comment on whether these approaches span a reasonable range of appropriate, scientifically sound, and defensible approaches to estimating a broadly applicable VSL for environmental policy and whether there are other methods that are more appropriate than those used in the White Paper.

White Paper: Results

9. The White Paper presents estimates using parametric and non-parametric models, pooled across stated preference and hedonic wage studies as well as balanced (i.e., equal weight to each study type), and weighted using different approaches. Of the range of estimates presented (see Section 4) the White Paper proposes the use of estimates from the following models:
 - Non-parametric model, balanced, mean of study mean
 - Parametric, balanced

Please comment on whether these proposed estimates represent reasonable and scientifically sound conclusions from the analyses in the White Paper and whether there is a different set (or sets) of results that are preferable based on the data and analysis in the White Paper.

10. The results section of the White Paper concludes with an influence analysis. Please comment on whether this analysis is a reasonable way to characterize the influence of individual studies on the estimated VSLs, whether the results of the influence analysis suggest any changes or modifications to the estimation approach, and whether it is important to include an influence analysis.

Establishing a Protocol for Future Revisions:

11. In the previous SAB advisory report (USEPA Science Advisory Board 2011), the SAB endorsed the idea of establishing a standardized protocol and regular schedule for future updates to the Agency's mortality risk valuation estimates. Please comment on relevant statistical criteria for the inclusion of additional eligible estimates and/or the exclusion of older estimates that could help inform the development of a standardized protocol for future updates and the timing or frequency of those updates.
12. In its 2011 report the SAB-EEAC recommended "...EPA work toward developing a set of estimates...for policy-relevant cases characterized by risk..." (U.S. EPA Science Advisory Board 2011, pp. 10). Among the studies that meet the selection criteria in the current White Paper, three stated preference studies provide values for reductions in risks of cancer (i.e., Hammitt and Haninger 2010, Chestnut, Rowe, and Breffle 2012, and Viscusi, Huber and Bell 2014). Only two of those studies (Hammitt and Haninger 2010 and Chestnut, Rowe, and Breffle 2012) allow for a within study comparison of values for cancer and non-cancer risk reductions. However, EPA could augment the literature by modifying the selection criteria to include studies from other countries or from the grey literature, and/or using other methods (e.g., risk-risk studies). Please comment on whether, and if so how, selection criteria for identifying studies for estimating a cancer differential should differ from those used in the current White Paper. Does the literature support a non-zero cancer differential?

Technical Memorandum: Income elasticity

13. The EPA document *Technical Memorandum: Income Elasticity* presents a summary of the recent income elasticity literature based on a review presented in Robinson and Hammitt (2015). Please comment on whether Robinson and Hammitt (2015) and the EPA Technical Memorandum provide an appropriate and scientifically sound summary of the income elasticity of VSL (IEVSL) and income elasticity of non-fatal health effects literatures. If there are additional relevant empirical studies that should also be included in the summary, please provide citations.
14. Several reported mean income elasticity estimates from stated preference studies are quite low, sometimes even zero. The “balanced” approach in the EPA Technical Memorandum does not include reported mean estimates of zero, but does include very low reported mean estimates (e.g., 0.1). Please comment on whether this an appropriate and scientifically sound choice. How should very low, non-zero, mean reported income elasticity results be addressed in the analysis?
15. Please comment on whether the selection criteria applied by Robinson and Hammitt (2015) are clearly enumerated, appropriate, and scientifically sound and whether the additional inclusion of Viscusi, Huber, and Bell (2014) in the Technical Memorandum is appropriate based on results reported in the study’s on-line appendix (attached).
16. Given the relatively limited number of studies upon which to draw for estimating the income elasticity of VSL, the EPA Technical Memorandum describes two alternatives for arriving at a central IEVSL estimate and range for use in environmental policy analysis. Of these alternatives which is the most appropriate and scientifically sound? Please provide the rationale for your choice. Would it be appropriate to consider using the alternative as a sensitivity or uncertainty characterization?
17. As described in Robinson and Hammitt (2015), there are limited data on income elasticity of non-fatal health effects. As a result the Technical Memorandum recommends using the IEVSL to estimate income elasticity for the value of these non-fatal health risks. Please comment on whether this represents an appropriate and scientifically sound approach given the available data.

References

- Alberini A, Cropper M, Krupnick A, Simon NB. 2004. Does the value of a statistical life vary with age and health status? Evidence from the US and Canada. *Journal of Environmental Economics and Management* 48(1): 769-792.
- Chestnut LG, Rowe RD, Breffle WS. 2012. Economic valuation of mortality-risk reduction: stated preference estimates from the United States and Canada. *Contemporary Economic Policy* 30(3):399-416.

Hammitt JK, Haninger K. 2010. Valuing fatal risks to children and adults: effects of disease, latency, and risk aversion. *Journal of Risk and Uncertainty* 40:57-83.

Robinson, Lisa A. and James K. Hammitt. 2015. The effect of income on the value of mortality and morbidity risk reductions. Review draft prepared for U.S. EPA. Contract EP-D-14-032 with Industrial Economics, Inc.

USEPA. 2011. Review of Valuing Mortality Risk Reductions for Environmental Policy: A White Paper (December 10, 2010). Office of the Administrator, Science Advisory Board. EPA-SAB-11-011. July 29. Available at:
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Viscusi WK, Huber J, Bell J. 2014. Assessing whether there is a cancer premium for the value of a statistical life. *Health Economics* 23:384-396. [On-line appendix available at:
<http://onlinelibrary.wiley.com/doi/10.1002/hec.2919/supinfo>]