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VALUING HEALTH-RISK AND RESOURCE TRADE-OFFS

A Presentation to the Parliament of Victoria Road Safety Committee

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INTRODUCTION

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- Applications of economics in the public sector often involve
  - Cost-benefit analysis (CBA) or cost-effectiveness analysis (CEA).
- CBA demands that benefits are monetised
  - This enables benefits and costs to be compared in the same units
  - So CBA enables one to answer the question “Is it worthwhile [to do X]?”
- CEA does not require benefits to be monetised
  - Outcomes must be measured in the same “physical” units so that a cost per unit of output can be computed

HEALTH SECTOR

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- For *health sector* interventions, benefits are rarely monetised

- A form of cost-effectiveness analysis, called cost-utility analysis (CUA) is commonly used
  - a measure that combines the quantity and quality of life—usually a quality-adjusted life-year (QALY)—is usually the denominator
  - in theory, if all health sector interventions were similarly evaluated comparisons across them could be made
  - under particular assumptions, this information could be used to maximise the social benefit created from the (health) budget.

PRACTICAL ISSUES

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- While CUA is widely used, it is a more limited approach than CBA
  - it does not enable us to assess whether or not an intervention is worthwhile (the outcomes are not monetised so we can't compare them directly to costs)

- Commonly this leads back to a common question “what is a QALY worth?”

MONETISING BENEFITS

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- There have been three popular approaches to monetising health-risk tradeoffs in economics:
  - the human capital (HK) approach;
  - stated preference (SP) approaches; and
  - revealed preference (RP) approaches.

- The HK approach involves assigning values to life and limb that are based purely on value in (market) production.

- This approach measures only a subset of the benefits of interventions that prevent morbidity and loss of life.

WILLINGNESS TO PAY

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- The remaining (SP and RP) techniques are consistent with the latent construct that is of interest
  - viz. what is the maximum amount a person would be willing to pay (WTP) (e.g., for a reduction in some risk to health)?; or
  - what is the minimum amount a person would be willing to accept (WTA) (e.g., for an increase in some risk to health)?

- Stated preference approaches are based on survey methods.

- A noteworthy example is contingent valuation.

CONTINGENT VALUATION

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- Contingent valuation (CV) involves asking individuals questions about their WTP for a good or their WTA compensation for a loss

- The method has come under intense scrutiny over the past two decades.

- The first concerted inquiry into its use followed the Exxon Valdez oil spill in Prince William Sound.
  - Under The Oil Pollution Act 1990 (United States), the President must establish procedures to establish damages to natural resources due to the discharge of oil.

THE NOAA PANEL

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- Panel of eminent economists appointed in 1992 by Bush Administration's National Oceanic and Atmospheric Administration (NOAA) to inquire into the validity of CV measures of " non-use value".

- The NOAA panel highlighted a number of problems:

(Arrow, Solow *et al*.1993, p.5)

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"The CV technique is the subject of great controversy. Its detractors argue that respondents give answers that are inconsistent with the tenets of rational choice, that these respondents do not understand what it is they are being asked to value (and, thus, that stated values reflect more than that which they are being asked to value), that respondents fail to take CV questions seriously because the results of the surveys are not binding, and raise other objections as well. Proponents of the CV technique acknowledge that its early (and even some current) applications suffered from many of the problems critics have noted, but believe that more recent and comprehensive studies have already or soon will be able to deal with these objections."

HAUSMAN (2012, p.43)

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- "Contingent Valuation: From Dubious to Hopeless" , *Journal of Economic Perspectives*:

"Approximately 20 years ago, Peter Diamond and I wrote an article for this journal analyzing contingent valuation methods (Diamond and Hausman 1994). At that time Peter's view was that contingent valuation was hopeless, while I was dubious but somewhat more optimistic. But 20 years later, after millions of dollars of largely government-funded research, I have concluded that Peter's earlier position was correct and that contingent valuation is hopeless."

HYPOTHETICAL BIAS

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- Three problems remain:
  - hypothetical response bias leads contingent valuation to overstatements of value
  - large differences between willingness to pay (WTP) and willingness to accept (WTA) values
    - these should be approximately equal, but seldom are
  - problems of embedding and scope
    - valuations are prone to differ depending upon whether evaluated on their own or as part of a larger project

HYPOTHETICAL BIAS

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- What people say they will do, differs (often markedly) from what they actually do
  - Jamieson and Bass (1989) studied stated intentions to buy new products and found them to be overstated
  - More recent work (Hsiao et al. 2002 and Morwitz et al. 2007) produces similar results.
- This bias
  - affects both private and public goods (Arrow et al. 1993)
  - seems to be large
    - Arrow et al. (1993) recommended halving CV estimates for nonuse value (Hausman 2012).
- The empirical basis for using a weighting scheme (etc.) to adjust for hypothetical bias is “scanty at best” (Hausman 2012, p.46)

WTP ≠ WTA

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- Attempts to rationalise differences between WTP and WTA results from CV studies have not been successful.

- The persistence of this gap is

> *"…likely due to the reality that answers to contingent valuation do not actually reflect stable or well-defined preferences but instead are opinions invented on the fly"* (Hausman 2012, p.47).

SCOPE AND EMBEDDING

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"Desvousges' [et al. 1992] result is very striking; the average willingness to pay to take measures to prevent 2,000 migratory birds (not endangered species) from dying in oil-filled ponds was as great as that for preventing 20,000 or 200,000 birds from dying. Diminishing marginal willingness to pay for additional protection could be expected to result in some drop. But a drop to zero, especially when the willingness to pay for the first 2,000 birds is certainly not trivial, is hard to explain as the expression of a consistent, rational set of choices" (Arrow et al. 1993, p.12).

SCOPE AND EMBEDDING

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- Diamond and Hausman (1994)
  - also provide an example of embedding effect where the value for cleaning up one lake is approximately equal to the stated WTP for cleaning up five lakes.
- The Diamond-Hausman “adding up” test
  1. ask one group of respondents about their WTP for public good X
  2. ask a second group about their WTP for public good Y
  3. ask a third group about their WTP for public goods X and Y together
- Subtracting 2 from 3 should approximately result in the value obtained for 1 if there are no scope or embedding problems.

SCOPE AND EMBEDDING

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- Desvouges et al. (2012a)
  - Review 109 CV studies
  - only one (Chapman 2009) passed a scope test…
  - …but even that study failed the Diamond-Hausman adding up test.

- Desvouges et al. (2012b) expanded the Chapman (2009) survey, showing that the sum of the incremental values obtained directly by CV were *three times* those obtained when WTP is estimated for a program that includes all the increments.

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- Problem: what compensation should cable TV providers pay to copyright owners (Free-to-Air (FTA)) broadcasters for retransmission of content?

- CV study by Carson and Borland
  - 2,662 individuals sampled
  - 10-minute personal interview with surveyors who visited their homes
  - questions about household structure and behaviour
  - respondents asked to read descriptions of retransmission and available substitutes
  - Then, asked if they had the choice of paying $X per month and continuing to receive FTA services or not paying $X per month and losing those channels (but perhaps get them via a TV aerial).

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- Random allocation to five monthly fees ($1.00, $2.50, $5.00, $7.50, $10.00).

- First part of the study
  - did not correctly implement the “call-back” procedure for respondents who were not home
  - It was therefore repeated with 2,369 respondents
  - the only significant change was that respondents in Study 2 were shown both a monthly fee and an annual fee (Hausman 2012).

- The following table provides some results:

Binary Choice Data from the Australian Cable Television Contingent Valuation Survey

	Monthly subscription fee				
	$1.00	*$2.50*	*$5.00*	*$7.50*	*$10.00*
Study 1					
Pay	299	224	176	139	140
Not pay/Don't know	224	294	333	403	390
Study 2					
Pay	292	207	152	85	90
Not pay/Don't know	199	288	321	375	360

Source: Hausman (2012, p.51)

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- The ACT decided to disregard this evidence completely.
- Quoting a 1965 case it argued that:

"[A] person exercising quasi-judicial functions must…not spin a coin or consult an astrologer, but he may take into account any material which, as a matter of reason, has some probative value… If it is capable of having any probative value the weight attached to it is a matter for the person to whom Parliament has entrusted the responsibility of deciding the issue…

And concluded that

Courts and tribunals must proceed on the basis of probative evidence, not speculation…We have such a level of doubt about the Survey that we attach no weight to it.

REVEALED PREFERENCE

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- Revealed preference studies examine the trade-offs between health risk and money that people make in practice.

- *"...the wages of labour vary with the ease or hardship, the cleanliness or dirtiness, the honourableness or dishonourableness of the employment"* (Smith 1776, p.12 in Aldy and Viscusi 2007, p.6).

- Can observe similar types of trade-offs in other (e.g., property, motor vehicle) markets
  - but the best available data tends to come from observations on labour markets.

VALUE OF A STATISTICAL LIFE

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- Abelson (2008) provides a good overview of the issues and ultimately recommends Australia adopt a value of a statistical life (VSL) of $3m-$4m for a “healthy prime age individual” (p.19)
  - assuming 40 years of life lost: $151,000 per life-year saved (approx. $176,250 (AUD2013)).

- Aldy and Viscusi (2007, p.9) “The most plausible labor market estimates involve VSLY values in the $300,000 [USD] range”.

CROSS-PORTFOLIO ISSUES

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- The adoption of a different threshold values as decision rules across sectors is a source of potential inefficiency
  - e.g., if a threshold of $75,000 per LY were applied to “health sector” investments; and a $225,000 threshold were applied to road safety investments; then
  - some investments that pass the threshold test in the latter would fail the threshold test in the former; and
  - the social return to public investments would not be maximised.

THE BUDGET CONSTRAINT

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- An established threshold may itself prove problematic:
  - do public resources exist to fund all projects that “pass” a threshold test?
  - The threshold itself is dynamic: as investment increases in one portfolio, diminishing returns are likely to set in.
  - The marginal benefits of additional investment in a particular portfolio will change
  - And investments may be displaced (e.g., in other portfolios) at increasing marginal opportunity cost.

- See Gafni and Birch (2006) for related arguments.

CONCLUSION

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- In my view, revealed preference data are more enlightening than stated preference data.

- The use of VSL measures brings with it a number of challenges
  - across public portfolios
    - including variability of measures and investment rules used by different departments
  - and in relation to the implications for public spending of applying such measures
    - does the public budget allow for all investments with VSL<$X to be made?

CONCLUSION

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- Stated preference methods—contingent valuation in particular—have been under intense scrutiny for the past two decades.

- Modern studies by experienced economists are unable to pass some basic tests (e.g. the Diamond-Hausman adding up test).

- Other ways of eliciting such information from surveys—e.g., stated choice or discrete choice analysis—have now gained in popularity.
  - I have not yet seen the adding-up test applied to validate the results.

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