

Valuing lives and deaths

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Ka mua, ka muri – Looking back to move forward

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Take-home messages

- ▣ Value of Statistical Life (VoSL) is useful but very hard to value in \$
- ▣ Non-economists (you?) can contribute to establishing such values

“Noncomparative evaluations are comparatively useless”

Scriven (1993)



(Evaluation + economics) > (eval XOR econ)

Context

How should we value a road death?



Photo: stuff.co.nz

‘Human capital’?

- Focus: earnings forgone
- Implication: much lower values for those not in paid employment

Table 37 Crash cost per person – Human Capital approach

Cost components	Fatality	
Human costs*		
Ambulance	\$680	
Hospital in-patient	\$3,672	
Other medical	\$2,722	
Long-term care	\$0	
Labour in the** workplace	\$904,262	
Labour in the** household	\$752,229	
Quality of life**	\$830,876	
Insurance claims***	\$21,823	
Criminal prosecution***	\$2,815	
Correctional services***	\$15,478	
Workplace disruptions***	\$14,689	
Funeral***	\$3,091	
Coroner***	\$1,015	
Vehicle costs		
Repairs****	\$15,701	
Unavailability of vehicles****	\$1,993	
Towing****	\$468	
General costs		
Travel delays***	\$86,707	
Insurance administration***	\$55,563	
Police***	\$11,179	
Property***	\$1,801	
Fire***	\$588	
Total costs	\$2,727,352	

'Willingness-to-pay'?

Out of the two alternatives shown, which one would you prefer to take?

Please select one only

	Route one	Route two
 Average travel time	20 minutes	40 minutes
 Lateness	10% of trips are delayed by 5 minutes	10% of trips are delayed by 10 minutes
 Heavy traffic	0%	20%
 Trip cost	\$9	\$3
 Deaths (per 100 billion kms travelled)	6 deaths (11% higher than an average NZ highway)	6 deaths (11% higher than an average NZ highway)
 Serious injuries (per 100 billion kms travelled)	30	30
 Minor injuries (per 100 billion kms travelled)	210	210

Looking back: A short history of VoSL in NZ (1)

VoSL = value of statistical life, aka VPF = value of preventing premature fatality

- 1980s. VoSL (transport) \approx **\$200k**, ‘human capital’ approach
- 1991. VoSL = **\$2m**, ‘willingness-to-pay’ approach
 - Miller & Guria 1991, from 1989/90 transport survey
 - Adjusted for wage increases, now \$4.9m in Treasury’s CBAX
- 1997/98. Improved survey (Guria et al) suggests 60% increase, but no change in VoSL
- 2007. Fire VoSL = $2/3$ of transport VoSL (BERL)
- 2009. “Official VOSL is about right” compared with overseas values (Leung, MoT, 2009)

... A short history of VoSL in NZ (2)

- ▣ 2008-2012. Cost of injury reports for NZ Injury Prevention Strategy. Broader than VoSL. Recommended new VoSL survey.
 - ▣ John Wren & others
- ▣ 2015. VoSL update recommended to NZTA
 - ▣ Clough, Guria & Bealing
- ▣ 2018. Pilot study for NZTA ($n = 72$), willingness-to-pay, but using 'choice modelling' not 'contingent valuation' as in 1989/90
 - ▣ Denne et al



This Transport Sector VoSL has become widely accepted by policy makers, but a review of another Ministry of Transport VoSL survey in 1997/98, and work by BERL (2007) on behalf of the New Zealand Fire Service suggests that the official value established in 1991 for the Transport Sector may not be appropriate for other injury areas, nor even appropriate for road safety today.

Wren & Barrell (2010)

Bouquets



Jagadish Guria, Chief Economic Advisor, LTSA & MoT, 1993-2007

- 1989/90 survey) still the basis of NZ VoSL now
 - innovative, 3rd in world re willingness-to-pay
- 1998/99 led improved survey
- Later: continued to argue for updated/better VoSL

Matt Boyd, Michael Baker et al
(2017)

- Estimated costs and benefits of complete border closure re new pandemic
 - “For a new pandemic equivalent to the 1918 influenza pandemic (albeit with half the mortality rate, “Scenario A”), it was estimated that successful border closure for 26 weeks provided a net societal benefit (e.g., of NZ\$11.0 billion, USD\$7.3 billion).”

Perspectives on VoSL



SAVE THE KRILL



KILL THE WHALES!

Perspective 1: Australian VoSLs

Source	VoSL (AUD)	Basis
Transport & Infrastructure Council/ATAP (2016)	2.2m	Human capital approach (2013 values). 2.07m 'human' cost + vehicle and general costs (e.g. travel delays). Original work by Bureau of Transport Economics in 2000 based on 1996 values.
Transport for NSW (2022)	8.1m	Willingness-to-pay (choice modelling method). Survey by Hensher-PwC in 2007 ($n = 213$). But Douglas (2022) raises serious concerns about validity of the 2007 valuations.
DPMC (2021)	5.1m	Willingness-to-pay. Review of international values (and the few Australian ones) by Abelson (2007); VoSL = \$3.5m then.
... and others		

Reactions to perspective 1?

- ▣ Australia has:
 - ▣ Some big **differences** in VoSL values
 - ▣ Big differences in values associated with different **methods**
 - ▣ Serious **error** by highly skilled economists
- ▣ Implications for us:
 - ▣ some worrying things in our VoSL history not peculiar to NZ
 - ▣ if review of international values good enough for DPMC (Australia), why not good enough for NZ?

Perspective 2: Philosophy of science – is VoSL a failed research programme?

NZ VoSL history & painpoints fit phases Elvik (2016) describes internationally using Lakatos theory of science:

- 'Progressive', then 'struggle'
- Last phase is 'hard core in dissolution'.
 - Next step for NZ??

Reasons to consider VoSL a failed research programme:

- Estimates vary too much (up to 44,000x)
- Variation in estimates not diminishing over time
- Reasons for variation in estimates not reassuring
- No consensus about best method to estimate WTP to prevent a fatality



Empirical studies of the value of saving a life have not produced estimates that can be trusted and applied in cost-benefit analysis... unlikely that future research applying the methods that have been used so far will produce trustworthy and sufficiently precise values.

Elvik (2016, p199)



Moving forward: Implications of perspectives 1,2 for NZ

- Don't interpret NZ non-use of the 1997/98 VoSL survey and the 100x risk error in the 2018 pilot survey as isolated glitches. Part of a broader scientific challenge.
- A new WTP survey in NZ for VoSL unlikely to be worth the investment

Perspective 3: Data collection & the respondent view

Background

- ▣ Research question: material differences in VoSL for road vs cancer vs fire vs drowning?
- ▣ NZ Fire Service commissioned a fire-related VoSL for use in Regulatory Impact Statements
- ▣ Telephone survey, $n = 750$
- ▣ BERL (2007) did not generate a new estimate VoSL, estimated a fire VoSL **relative to** the existing road VoSL

Warm-up question in survey:

- ▣ Do you think that you have a higher risk of dying in a car accident or a residential fire?

Main survey question

- Suppose that the Government could increase funding to safety programmes, which would result in 20 accidental deaths being averted per year. How many of these 20 lives would you prefer to be saved from reduced car accidents and from reduced residential fire accidents?

How valid is BERL interpretation of the results?

Results:

- 12.4 of those lives saved should be from car accidents and 7.6 from residential fire accidents, on average
- $7.6 \div 12.4 = 61\%$

Interpretation:

- “the value of an additional life saved from fire causes is perceived by the New Zealand public to be worth 56.6% to 66.2% of an additional life saved from road causes” (BERL, 2007, p7)

Interpretation seems fatally flawed because:

- Respondents have other sensible reasons for preferring to save more car fatalities
 - E.g. many more road fatalities than residential fire fatalities
- UK research used as a starting point warned of misconceptions that could affect answers if one type of hazard had a higher baseline risk
 - car risk is clearly higher than fire
 - Q1 of the survey brings this to mind for respondents.
 - “Do you think that you have a higher risk of dying in a car accident or a residential fire?”
 - 95% said car was higher risk.

Misinterpretation: UK question wording may help us see the problem

- “Suppose that there were some extra money available to spend on safety improvements, and suppose this money could either be spent in a way that would prevent 10 deaths from cause X during the next few years, or else could be spent in a way that would prevent 10 deaths from cause Y during the same period.”
- “Given that there is only enough extra money at present to undertake one of those programs, do you have a preference about where the money should go? And if so, how many deaths would the other program have to prevent in order for you to consider both programs to merit **equal priority**?”
(Chilton et al. 2002, p213, emphasis added)

L (left), R (right), or H (Hard to choose)?

Table 1: Car death versus fire death table (shortened and adapted)

LEFT	RIGHT	L, R, H?
Prevent 10 CAR deaths	Prevent 100 FIRE deaths	
...		
Prevent 10 CAR deaths	Prevent 11 FIRE deaths	
Prevent 10 CAR deaths	Prevent 10 FIRE deaths	
Prevent 11 CAR deaths	Prevent 10 FIRE deaths	
...		
Prevent 100 CAR deaths	Prevent 10 FIRE deaths	

E.g. Consider an answer of 100 fire deaths matched with 10 car deaths. Explicitly indicates that 100 lives lost from fire have 'equal priority' to 10 from car crashes. Hence more valid to interpret as valuing the lives lost differently (unlike NZ question).

Moving forward:

Practical implications of perspective 3

- NZ should stop using the 2007 valuation of lives lost due to fire
- Reflect
 - Why would NZ publish a misleading valuation?
 - Why was it quoted respectfully by several in later years?
- Non-economist skills can change VoSLs

Perspective 4: VoSL focus is misplaced because total injury cost is larger?

Background

- Total social cost of road crashes in 2019 (pre-Covid) \$5.5b
- But fatalities account for less than **1/3** of that total
- Worse yet (?), valuations per injury not independent of VoSL, but derived from it
 - serious injury 10% of VoSL
 - minor injury 0.4% of VoSL
- A very recent transport conference paper, Douglas (2022), expands this argument forcefully

Moving forward:

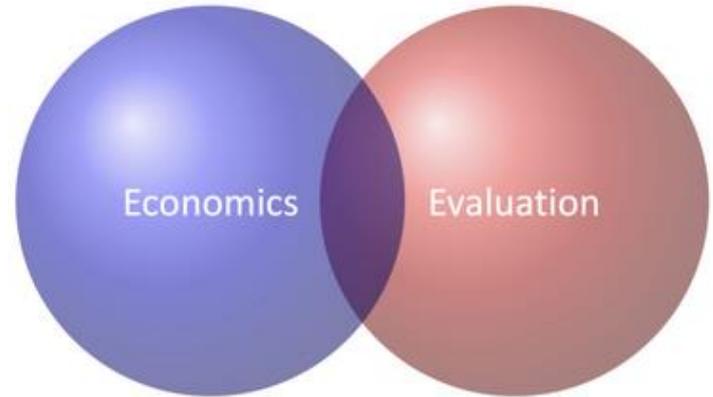
Practical implications of perspective 4

- ▣ Analysis building on the NZ Injury Prevention Strategy approach more likely to prove worthwhile than further willingness-to-pay surveys focusing on car drivers

End of perspectives

Take-home messages

- ▣ Value of Statistical Life (VoSL) is useful but very hard to value in \$
- ▣ Non-economists (you?) can contribute to establishing such values



Source: www.julianking.co.nz/vfi/

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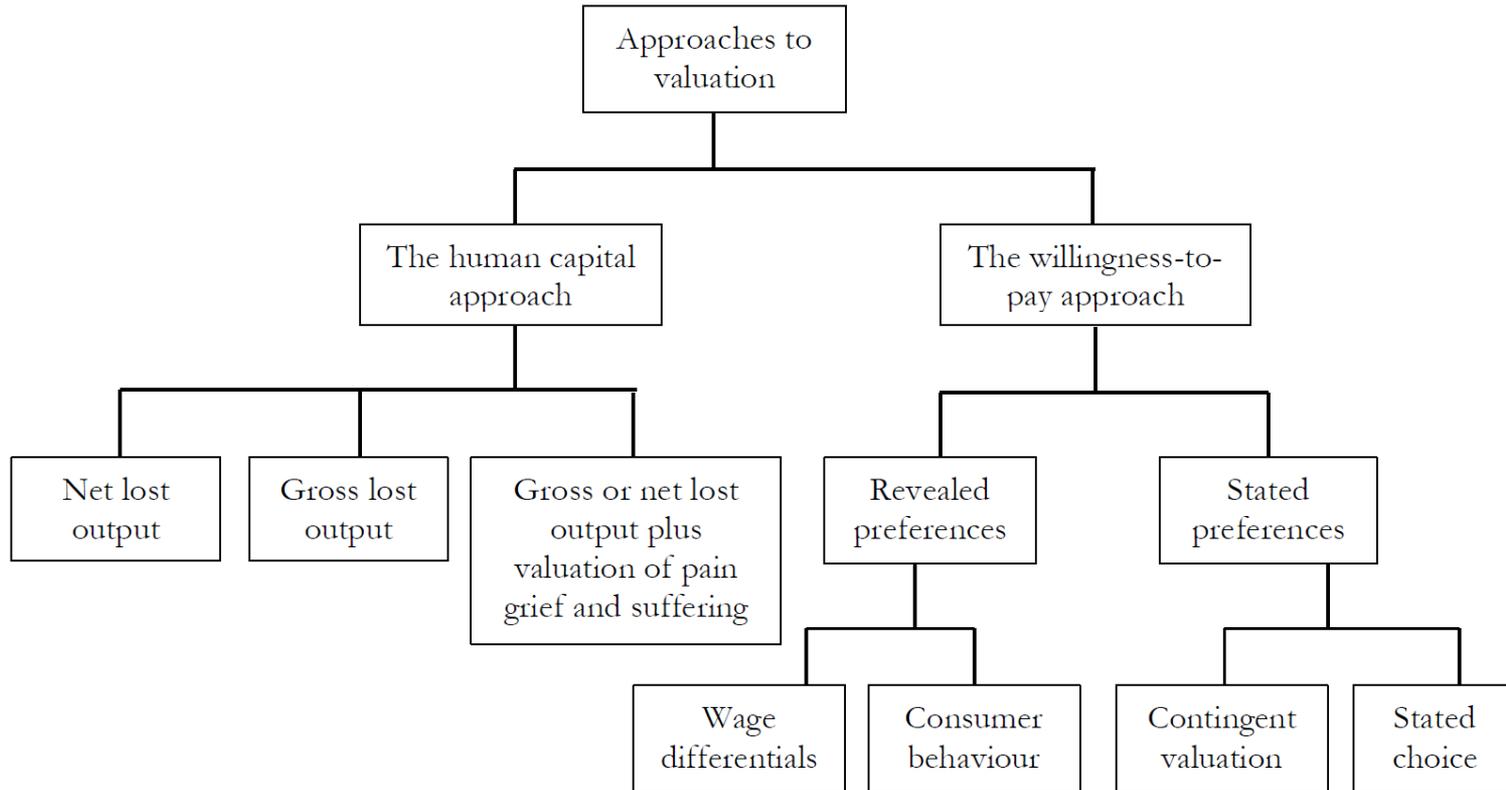
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**Spare slides for
questions**

Approaches to economic valuation of accidental death



Willingness to pay? (simpler stated choice example)

	ROUTE A	ROUTE B
ERP (cents)	<input type="text" value="325"/>	<input type="text" value="200"/>
 Travel Time in Busy Conditions (mins)	<input type="text" value="20"/>	<input type="text" value="28"/>
Number of Fatalities per Year	<input type="text" value="3"/>	<input type="text" value="2"/>
Given this choice I would choose:	<input type="radio"/> A	<input type="radio"/> B