The problem with Structured Expert Elicitation (and referendums)

ISPOR Barcelona 2018
Neil Hawkins PhD, CStat
University of Glasgow

"the problem with referendums is that you know which question you are asking, but not which question the public are answering"

Anon

Case study 1: elicitation of economic parameters

Energy Policy 61 (2013) 811–821

Contents lists available at ScienceDirect

Energy Policy

journal homepage: www.elsevier.com/locate/enpol

An expert elicitation of climate, energy and economic uncertainties ☆

Will Usher*, Neil Strachan

UCL Energy Institute, University College London, Central House, 14 Upper Woburn Place, London WC1H 0NN, United Kingdom

HIGHLIGHTS

- We conduct an expert elicitation of 25 UK energy experts from academia, industry and government.
- We obtained expert beliefs for six national and international drivers of energy demand.
- A linear pool of expert beliefs on oil price in 2030 is insensitive to correlation between the experts.
- Experts agree on dependence structure of energy uncertainties, but individual assessments of future values exhibit variation.

Uncertain parameters

Table 1
Selected uncertain parameters.

Key input	Units
UK population in 2030[a]	Million
Average annual change in UK GDP 2010–2030[b]	Average annual % change
International GHG price in 2030[c]	(2010) $/t$CO_2$e
Long-term oil price in 2030[c]	(2010) $/barrel
Average levelised cost of UK low carbon electricity system in 2030[b]	(2010) US cents/kWh
Average main room temperature during heating season in UK domestic dwellings[a]	°C

[a] National parameter.
[b] National parameter, but indicative of international situation.
[c] International parameter.

Methods of Elicitation

Experts were asked to estimate:

- Lowest plausible value
- Highest plausible value
- Median value
- Quartiles

Sources of expert knowledge

Table 3
Data sources used by experts during elicitation.

ID	Affiliation	Pop	GDP	GHG
1	Acad.	T	T	T
2	Acad.	IHM		T, IHM
3	Ind.	UN	IHM	
4	Ind.	A	OBS	CPF
5	Ind.	T		Scenarios
6	Acad.	ONS, SRES	SRES	IHM

A – anecdotal evidence, Carb – CARB heat project, CE – Cambridge econom
(Department of Energy and Climate Change, 2010), E – empirical data, EIA –
Department, GOD – Sorrell et al. (2010), IEA – international energy agency, IH
climate change, MM – Mott MacDonald (2010), NG – national grid, NR – no
national statistics, OPP – office of population projections, PB – PB power, S
(2010), UN – United Nations (population projections), WB – World Bank.

Calibration question

What is the length of the underground network in Km?

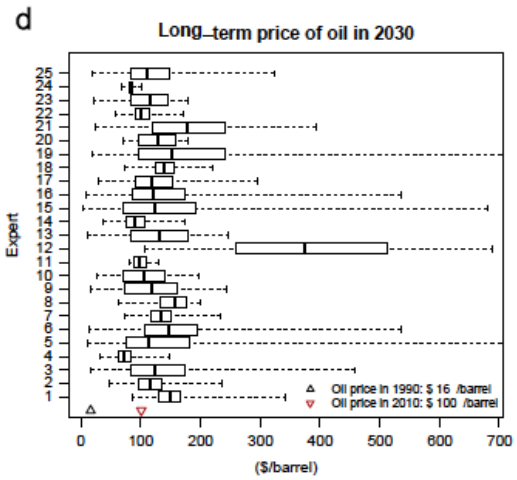
Ans: 301.2 km

Experts estimates were weighted

According to:

- Judgement of probabilities
- Selection of data sources
- Both

Results



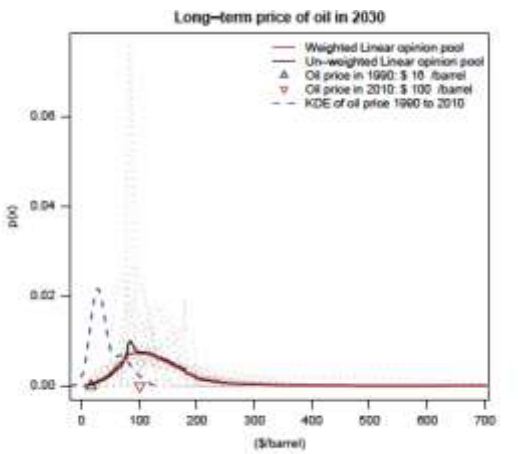


Fig. 3. The weighted and un-weighted linear opinion pool for oil price, and a kernel density estimate showing historical oil prices, all inflated to 2010$.

Case study 2: elicitation for missing outcomes

Article

CLINICAL TRIALS

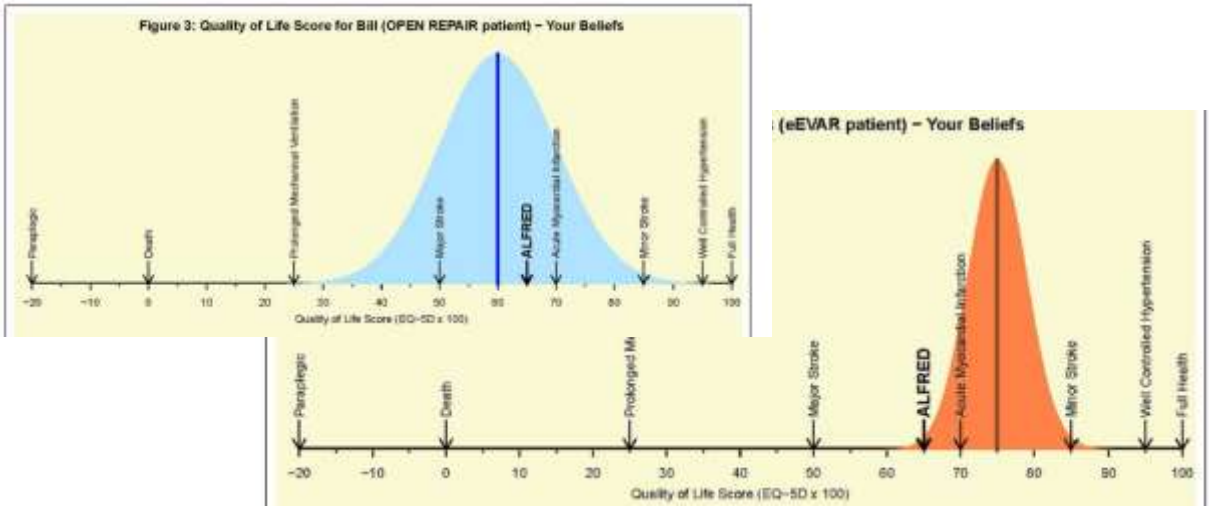
Clinical Trials
2017, Vol. 14(4) 357–367

DOI: 10.1177/1740774517711442
journals.sagepub.com/home/ctj
SAGE

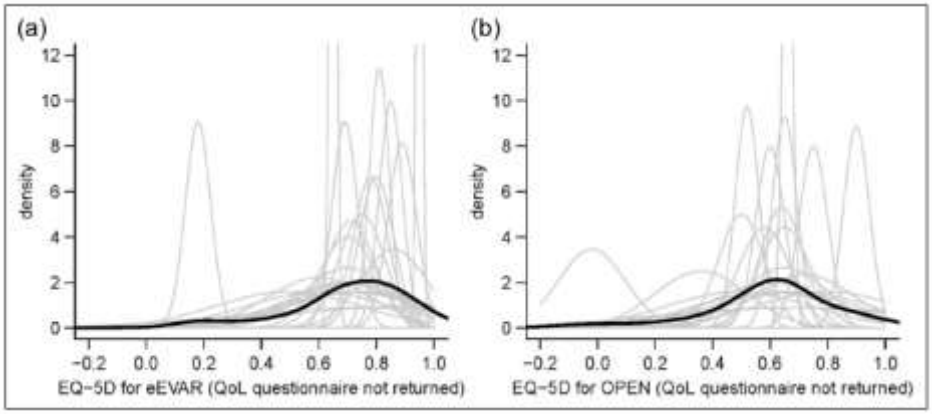
Development of a practical approach to expert elicitation for randomised controlled trials with missing health outcomes: Application to the IMPROVE trial

Alexina J Mason[1], Manuel Gomes[1], Richard Grieve[1], Pinar Ulug[2], Janet T Powell[2] and James Carpenter[3]

Values elicited for patients who did not receive questionnaire



Results of elicitation



Daniel F Heitjan: Commentary on Mason et al.

1. Do the experts understand the questions?
2. Why do doctors and nurses give different answers?

   "Nurses assigned modestly elevated scores to missing subjects in the open repair arm, the doctors believed that missing patients would have much lower scores than observed."
3. How much shall we credit individual priors?

   Sceptics vs. optimists
4. Was the sample of experts adequate?

   26 experts are the responding subset of an original 46 whose priors the authors solicited.
5. Were the priors correct?

   Was other relevant evidence considered, e.g. subsequent survival

1. Heitjan DF. Commentary on Mason et al. Clin Trials. 2017;14(4):368–9.

Mason et al: Rejoinder

Experts readily come to a view about the relative benefits of the intervention. In doing so they incorporate (often implicitly) an opinion about the missing data… we believe it is useful to capture and quantify these views

1. We do not accept that it follows that because experts' views differ markedly they did not understand the question. More likely, it represents markedly different, but quite strong, opinions.
2. Doctors and nurses have different perspectives. Thus, the finding that they give somewhat different answers could reflect alternative viewpoints and training.
3. Our anecdotal experience is that 'true believers' tend to be forthright and assertive. In our approach, their view (and that of the 'sceptic') is diluted, as it is combined with 'mainstream' views prior to analysis

1. Mason AJ, Gomes M, Grieve R, Carpenter J. Rejoinder. Clin Trials J Soc Clin Trials [Internet]. 2017;14(4):370–1. Available from: http://journals.sagepub.com/doi/10.1177/1740774517711444

Daniel F Heitjan: Summary

- Better role for experts in a situation like this is to suggest what types of data can shed light on the missing information
- If the experts know something that we don't know, let us gather and process that information in a systematic way … If the experts do not know something that we don't know, then what do we gain by asking their opinions?

In conclusion: An understanding of the basis of elicited opinions is essential

- What do our experts know that we (non-experts) do not?
  - Have they observed things that we have not
  - Do they have subject area knowledge that we have not
- Are they better able to synthesis this knowledge than we are?