Combining DCE and TTO into a single value function

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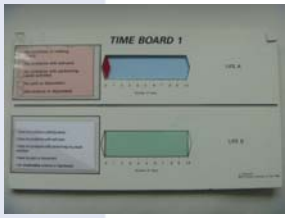
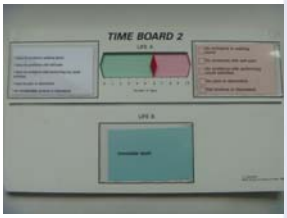
TTO





The TTO estimation procedure

- Have say 1000 people value 43 states
- Estimate a model
- Derive a value function

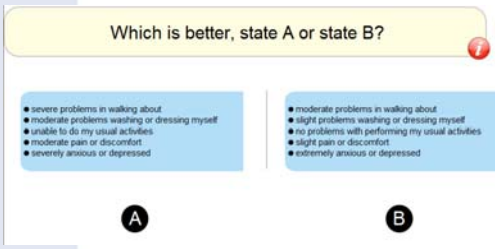
TTO may

- be difficult
- be time consuming
- lead to inconsistencies
- lead to non traders

So, we might need something else

DCE

Discrete Choice Task



The DCE estimation procedure

- Have say 1000 people value 100 pairs
- Hope that people make errors or disagree
- Estimate a model
- Derive a tariff (a value function)
  - Where is dead?
  - Where is the PITS?

Anchoring

- Assuming worst state = zero Silly
- Anchoring the worst state using TTO Silly
  ß = DCE ß * (TTO PITS/DCE PITS)
- Using the DCE dead dummy Silly
- Mapping DCE onto TTO Silly
- A hybrid model

A Hybrid

The likelihood

TTO

$$v_i = \alpha + \sum_{j=1}^{nd} \beta_j d_{ij} + e_i = \alpha + \beta' d + e_i$$

$$e_i \sim N(0, \sigma^2)$$

$$f(v_i) = \frac{1}{\sqrt{2\pi\sigma^2}} \exp\left[-\frac{\left(v_i - \sum_{j=1}^{nd} \beta_j d_{ij}\right)^2}{2\sigma^2} \right]$$

DCE

$$P(left > right) = P(v_i) > P(v_r)$$

$$v_l = \sum_{j=1}^{nd} \beta_j d_{lj} + e_l; \quad v_r = \sum_{j=1}^{nd} \beta_j d_{rj} + e_r$$

$$P(left > right) = = \frac{1}{\left(1 + \exp\left(-\sum_{j=1}^{nd} \beta_j \left(d_{lj} - d_{rj}\right)\right)\right)}$$

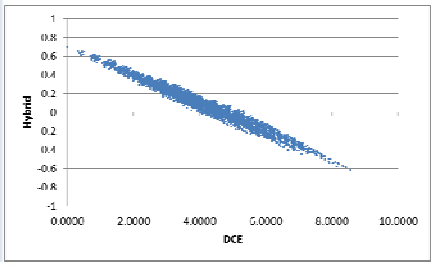
$$P(right > left) = \frac{\exp\left(-\sum_{j=1}^{nd} \beta_j \left(d_{lj} - d_{rj}\right)\right)}{\left(1 + \exp\left(-\sum_{j=1}^{nd} \beta_j \left(d_{lj} - d_{rj}\right)\right)\right)}$$

$$Loglik = \sum_{i=1}^{Nquest} N^i_{acts} \log\left(\frac{1}{(1+\exp(-\beta'\Delta d_i))}\right) + \sum_{i=1}^{Nquest} N^i_{acts} \log\left(\frac{\exp(-\beta'\Delta d_i)}{(1+\exp(-\beta'\Delta d_i))}\right)$$

Results form the UK

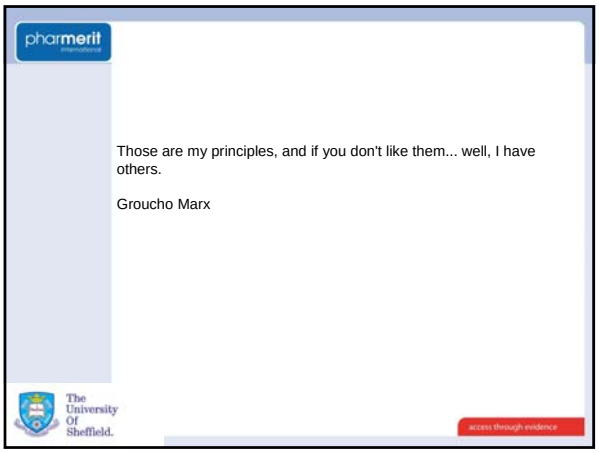
	DCE		Lead time TTO		Hybrid	
	Estimate	Std. error	Estimate	Std. error	Estimate	Std. error
constant			13.4030	0.27053	13.4818	0.126704
mobility 2	0.4112	0.08	-0.1681	0.37	-0.2912	0.07
mobility 3	0.4577	0.10	-0.2645	0.54	-0.2670	0.08
mobility 4	1.1246	0.09	-0.4478	0.23	-0.9471	0.08
mobility 5	1.7683	0.11	-1.5469	0.41	-1.5611	0.08
self care 2	0.3799	0.09	0.1932	0.41	-0.3144	0.07
self care 3	0.4031	0.09	-0.7641	0.52	-0.4721	0.08
self care 4	1.1260	0.10	-0.9483	0.24	-1.0041	0.08
self care 5	1.2589	0.09	-1.0230	0.44	-1.1585	0.07
usual activities 2	0.4367	0.08	0.0978	0.34	-0.2852	0.07
usual activities 3	0.5163	0.09	0.8174	0.42	-0.2445	0.08
usual activities 4	1.1030	0.09	-0.7454	0.24	-0.8287	0.08
usual activities 5	1.3296	0.10	-0.7618	0.37	-1.0071	0.08
pain and discomfort 2	0.3262	0.09	-0.1128	0.37	-0.1750	0.07
pain and discomfort 3	0.4487	0.09	-0.4162	0.46	-0.2325	0.08
pain and discomfort 4	1.5837	0.10	-1.8588	0.23	-1.0896	0.08
pain and discomfort 5	1.9897	0.11	-1.8163	0.40	-1.2916	0.08
anxiety and depression 2	0.4758	0.09	0.4798	0.40	-0.3644	0.08
anxiety and depression 3	0.7269	0.09	-0.5986	0.23	-0.4725	0.08
anxiety and depression 4	1.9669	0.11	-2.3537	0.44	-1.3075	0.08
anxiety and depression 5	2.2077	0.11	-1.7912	0.17	-1.5575	0.08

DCE, TTO and hybrid



Conclusions

1. There is no technical limitation to combining DCE and TTO in a likelihood function
2. It leads to plausible results
3. One may need monotonic transformations


pharmerit
Those are my principles, and if you don't like them... well, I have others.
Groucho Marx
The University Of Sheffield.
access through evidence