

## Consumer Responsive Health Care

### Using discrete choice experiments to elicit consumer preferences

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### What are discrete choice experiments?

- A technique for eliciting (consumer) preferences
- Commonly used in marketing and increasingly by economists in transport, health, environmental applications
- Based on stated choices



### What does this have to do with consumer responsive health care?

- One of many tools in the economist's tool kit for contributing to policy analysis
- Consumer responsive health care requires an understanding of consumer (and provider) preferences
- Theoretical framework is from microeconomics and econometrics
- Potential to be applied widely in design of health care policies and programs to meet consumer needs



### What does economics have to offer?

- Economic evaluation of programs and policies
  - ensuring value for money, effective programs
- Measurement of welfare
  - what option provides the most benefit to society?
  - what are the welfare impacts of policies?
- Analysing and predicting behaviour
  - how will consumers and providers respond to policies/programs?
- Understand the impacts of programs/interventions
  - beyond the health impacts
  - behind the health impacts
- Design programs/policies to maximise uptake by understanding behaviour



### Economics approach

- Make assumptions about behaviour
- Individuals assumed to choose the best of the available options.
  - Maximise well-being (utility) subject to constraints (available opportunities)
- Choices depend on
  - Available goods/services.
  - Prices and incomes.
  - Preferences – willingness to trade-off one good or service with another.



### Economics approach

- We cannot directly observe utility
  - make inferences about utility based on observed choices
  - Assume utility maximisation
- Typical empirical approach is to estimate demand
  - use information about observed choices (expenditure), prices, income, demographics
  - make inferences about welfare impacts by linking demand and utility
  - predict how choices will change in response to policy and other factors



## Lancaster's characteristics approach

- Utility is derived from the characteristics or attributes of goods rather than the goods *per se*.
- Examples come from all fields:
  - Housing – living space, no. beds, land area, access to services
  - Transport – comfort, travel time, waiting time, proximity
  - Health – process of care, health state, side-effects, waiting time, cost, location (each of these could have many aspects)



## Stated preference or revealed preference?

- Economists typically use revealed preference data
  - Preferences inferred from observed choices, observed prices, observed characteristics
  - Possibly reflects the innate scepticism of most economists
- Problems with revealed preference data
  - May not be sufficient variability
  - Does not readily apply to new products, programs, policies
  - May not provide the information about what drives the choice
  - Particular issues pertinent in health because of the consumer-provider interaction
- Stated preference data not new to health contexts
  - Different analysis methods used in DCEs
- Data collection brings additional responsibilities



## Discrete choice experiments:

- Stated preferences
  - what people say they would do
- Discrete choices
  - when they are asked to choose among discrete alternatives (often relevant in health)
- Experiments
  - that are presented in a controlled design covering the range of alternatives
- Modelling
  - to allow for quantitative predictions



## Stated preference surveys

- Present individuals a series of *hypothetical* but *realistic* choice sets
- Choice set
  - One or more option
  - May have an "opt-out" option
- Each alternative described in terms of attributes
- Attribute levels varied over plausible & policy relevant ranges
- Context attributes may be important
- Repeated choices from each individual



Compare the characteristics of options A B & C then answer the questions below

	A	B	C
<b>Product</b>	Mini Pill	Intra-uterine Hormonal Device	Mini Pill
<b>Effect on Acne</b>	In some women, this product improves acne symptoms	In some women this product worsens acne symptoms	In some women this product worsens acne symptoms
<b>Effect on Weight</b>	This product has no effect on weight	Some women using this product may gain up to 1 kg in weight	Some women using this product may lose up to 1 kg in weight
<b>Frequency of Administration</b>	1 per day	Once every 5 years	1 per day within interval
<b>Contraceptive Effectiveness</b>	10/100 women using this product get pregnant in a 12 mth period	1/500 women using this product get pregnant in a 12 mth period	1/100 women using this product get pregnant in a 12 mth period
<b>Doctor's Recommendation</b>	Your doctor says this may not be a good method for you	Your doctor makes no recommendation	Your doctor says this is a suitable method for you
<b>Effect on Periods</b>	Most women using this method experience heavy periods with less pain	Most women using this method experience heavy periods with less pain	Most women using this method experience heavy periods with less pain
<b>Cost</b>	\$7 per month	\$20 per month	\$20 per month
<b>Of the options presented above, which do you like the most?</b>			
<b>Of the options presented above, which do you like the least?</b>			

If you had to choose from the option above that you like the most, or your current method of contraception which would you choose?



## Experimental design

- Attributes, levels quickly explode
  - Eg, 4 x 2-level attributes + 3 x 4-level attributes =  $2^4 \times 4^3 = 1024$  alternatives
- How many alternatives in a choice set?
- Experimental design principles used to choose choice sets to allow for efficient estimation
  - Fractional factorial design
  - Orthogonality
  - Main effects only or do interactions matter?
- Trade-off between respondent and statistical efficiency
  - plausible options and choice sets
  - realistic contexts



## Contraceptive example

- Labelled experiment
  - 8 labelled products
  - 3 products seen per choice set
    - Woman cannot express product preference at every choice set
- Some attributes specific to a product (alternative specific)
  - Eg: mode of administration and return to fertility
- Some attribute levels nested within subgroups of products
  - Allow plausible levels for each product (eg frequency)
- Some attributes with levels common to all products
- Constructed experimental design to allow independent main effects and 2-factor interactions between product and other attributes



## Cervical screening example – context matters

WOMEN	GPs
• Cost to woman (4 levels)	Cost to woman (4 levels)
Accuracy – False Pos (4 levels)	Accuracy – False Pos (4 levels)
Accuracy – False Neg (4 levels)	Accuracy – False Neg (4 levels)
Recommended screening interval (4 levels)	Recommended screening interval (4 levels)
HPV test cost (4 levels)	HPV test cost (4 levels)
• Time since Pap test (4 levels)	*Time since Pap test (4 levels)
Usual GP (2 levels)	Regular patient (4 levels)
• Incentive for GP (2 levels)	PIP payment (4 levels)
Sex of GP (2 levels)	Why consulting (4 levels)
GP's recommendation (4 levels)	Age of woman (5 levels)
HPV recommendation (2 levels)	Perceived h/hold income (4 levels)



## Sample woman choice task

This GP is	your regular GP who you usually see for most care, including Pap tests	
This GP is	Female	
This GP's practice will receive a special incentive payment if you have a Pap test at this visit	No	
<b>About the tests available:</b>		
	Standard Pap test	Liquid based Pap test
The out of pocket costs to you for this test will be	\$0	\$20
The chance that this test will give you a false negative result is	1 in 20	1 in 33
The chance that this test will give you a false positive result is	1 in 1000	1 in 500
<b>Other information the GP gives you about cervical screening:</b>		
The GP tells you that you had your last Pap test	about 1 year ago	
The national recommendation is that women should have a Pap test	every 1 year	
If you have either Pap test you can at the same time have an HPV test at an additional out-of-pocket cost to you of	\$50	
The GP recommends that	you do not have a Pap test at this visit	
The GP recommends that you	do not have the HPV test	
<b>Three choices: 1) I would not have a cervical cancer screening test, 2) I would have a standard Pap test, 3) I would have the liquid based Pap test</b>		



## Analysis

- Random utility theory framework
  - Choose the alternative that provides the most utility
  - Utility cannot be observed but can be modelled as a function of attributes of interest based on observed choices
  - Assume utility has a systematic (explainable) and random component
  - Random component reflects measurement error, missing variables
- Discrete choice modelling methods to estimate parameters of interest
  - Eg Probit, Logit, Mixed logit
- Increasingly sophisticated modelling techniques
  - Exploiting the repeated choices in the data to model individual heterogeneity



## Interpretation

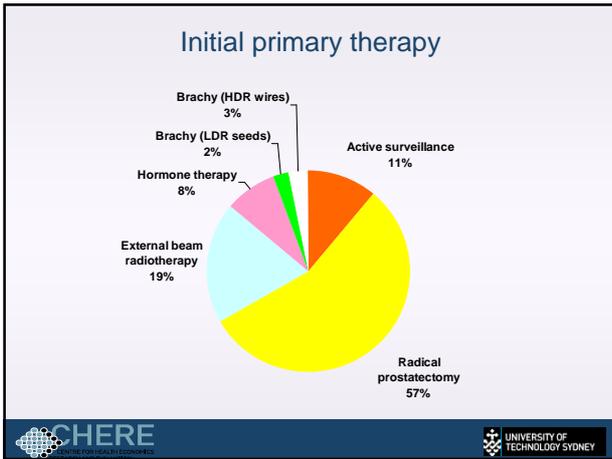
- Explore trade-offs between attributes of health care interventions
- Provide monetary valuations of health care interventions
- Predict uptake of new programs
- Design of programs



## Application: Prostate cancer and outcomes study (PCOS)

- Patient preference should be an important factor in treatment decisions
- Observational study of outcomes of treatment over time
  - Providing information about quality of life, health services utilisation associated with different treatments
  - Men's preferences for treatment and the trade-offs they may be willing to make (DCE)
- Focus of the DCE
  - relative tolerability of side effects
  - survival gains needed to make treatment side-effects worthwhile
  - attributes were survival & side-effects





Option A With this treatment option you will experience the following:	Option B With this treatment option you will experience the following:
Never able to achieve an erection when you want one	No problems achieving an erection when you want one
Less sexual desire	Less sexual desire
Severe problems with leaking urine (no urinary control whatsoever)	Occasional problems with leaking urine
Some problems with urine blockage (have a weak urine stream but get some relief or comfort afterwards)	Some problems with urine blockage (have a weak urine stream but get some relief or comfort afterwards)
No bowel problems	Occasional loose bowel movements with discomfort/pain
Severe tiredness and loss of energy	Some tiredness and loss of energy
Severe hot flushes and moodiness	No hot flushes or moodiness
Most people who have this option live between 3 and 21 years, but on average for 12 years	Most people who have this option live between 3 and 5 years, but on average for 4 years

Would you choose option A or B?

Option A  OR Option B

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### Results – relative tolerability of side-effects

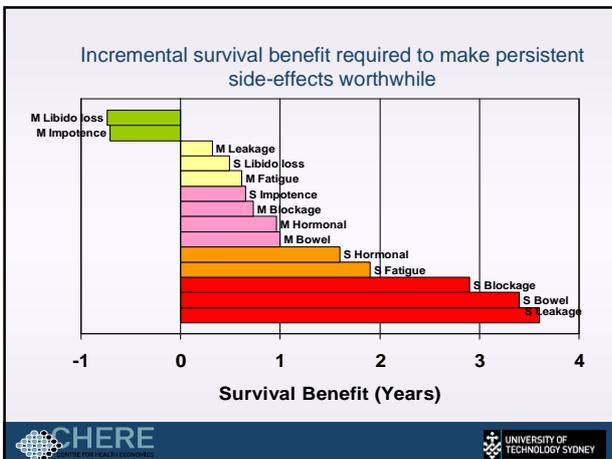
Rank	Side-Effect & Severity	Model estimate	(SE - 0.04)
1.	Severe Urinary Leakage	-0.79	
2.	Severe Bowel symptoms	-0.73	
3.	Severe Urinary Blockage	-0.62	
4.	Severe Fatigue	-0.40	
5.	Severe Hormonal effects	-0.33	
6.	Mild Bowel symptoms	-0.22	
7.	Mild Hormonal effects	-0.20	
8.	Mild Urinary Blockage	-0.15	
9.	Severe Impotence	-0.14	
10.	Mild Fatigue	-0.13	
11.	Severe Libido loss	-0.10	
12.	Mild Leakage	-0.07	
13.	Mild Impotence	0.14	
14.	Mild Libido loss	0.15	

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### Use these data to estimate trade-offs

- Severe urinary leakage
  - $\beta_{SevUL} = -0.79, \beta_{Surviv} = 0.1845 \rightarrow CV = 3.6 \text{ years}$
  - A man with an average life expectancy of 8 years would need an additional 3.6 years of survival to be compensated for persistent, severe problems, ie no urinary control
  - He would be indifferent between 8 years with no problems with leaking urine and 11.6 years with severe problems with leakage

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- ### Providers preferences: Which of the following severe side-effects do you think is WORST ...from your patients' perspective?
- 9% 1. Impotence – never able to achieve an erection when you want
  - 7% 2. Loss of libido – complete loss of sexual desire
  - 33% 3. Urinary leakage – severe problems with leaking urine – no urinary control whatsoever
  - 9% 4. Urinary blockage – continually feeling the need to urinate but passing very little with no relief afterwards
  - 37% 5. Bowel symptoms – very frequent loose bowel movements with discomfort/pain & leakage
  - 0% 6. Fatigue – severe tiredness & loss of energy
  - 5% 7. Hormonal effects – severe hot flushes & moodiness
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### Application: Contraceptive choices

- New methods entering the Australian market over the past 5 years
- Potential new products are now available overseas
  - offer potentially relevant new features that may trade-off against each other
  - greater convenience, flexibility, less prone to “user error”, non-invasiveness
  - unknown side effects or complexity of administration
- Greater choice →
  - increased complexity of choices
  - greater need for understanding by women of choices & trade-offs
  - need for providers to deliver balanced comprehensive information
- No data about how decisions are made

### Contraceptive products in DCE

- Prescribed products currently available in Australia
  - Contraceptive pill (combination)
  - Progestogen only pill
  - Hormonal implant (eg Implanon)
  - Intra-uterine hormonal device (eg Mirena)
  - Depo Provera Injection
  - IUD
- Potential new products
  - Hormonal Skin Patch
  - Hormonal Vaginal Ring

### Women's survey

- Sample frame
  - on-line panel
  - women of reproductive age (18-50)
  - currently using contraception or expecting to within the next 5 years
- Context
  - visiting the doctor to discuss contraception
  - doctor provides information about options and their attributes

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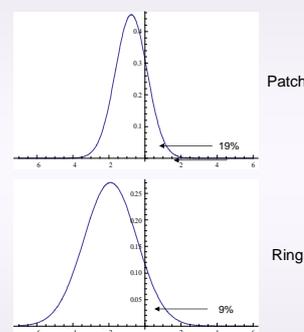
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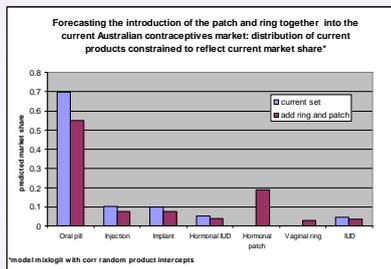
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### Coefficients for random product intercepts for model with combined pill fitted as the base product

	Mean coeff.	P-value	SD coeff.	P-value
Minipill	-0.36	0.175	0.04	0.74
Injection	-0.58	0.248	1.65	<.001
Implant	-1.33	0.011	1.76	<.001
Hormonal IUD	-1.41	0.014	1.86	<.001
Patch	-0.76	0.029	0.88	<.001
Ring	-1.91	<.001	1.47	<.001
IUD	-1.53	0.012	2.03	<.001

### Women's preferences for patch and ring relative to the combined pill





## Conclusions

- Potential for DCEs to explore preferences
  - Prediction of uptake of programs
  - Understand preferences
- Interpretation and policy implications
  - Depend on the design of the experiment
  - Rich source of data
    - Capacity to explore factors not usually observed
    - But the responsibility of the researcher
- Developing area
  - New methods, still considerably contested
  - Relatively few direct applications to policy

## Applications - examples

- Genetic screening
  - What aspects are important in determining participation in screening?
- Asthma treatments in context of an RCT
  - How do patients value the trade-offs between admin, side-effects and outcomes?
- Cervical screening
  - How would providers and women respond to changes in policy?
- Informal care
  - What package of care support is most valuable to carers? What trade-offs do they make?
- Prostate cancer
  - How do patients trade-off between side-effects and outcomes?
- Contraceptive products
  - What attributes of products are most important to women? How do doctors provide useful advice?
- Valuation of health outcomes
  - What value is placed on different health states? (cf time trade-off and standard gamble approaches)