

Appendix G: Discrete choice experiment

Survey as provided to market research firm for online programming

This project is part of a wider study by Monash University on residential energy efficiency. The purpose is to understand how costs and subsidies affect the purchases of energy efficient hot water systems. It is expected that this questionnaire will take no longer than 20 minutes.

The questionnaire asks about the upfront and running costs of hot water systems. The results may be published, and participants will be given the option to see a summary report of the study.

No personally identifying details will be requested or obtained by anyone at Monash and all data will be kept confidentially on password-protected computers. Participation is strictly voluntary, and participants may withdraw at any time up to the final stage of the analysis of the results.

This research operates under the research ethics protocol of the University, and any questions or complaints can be forwarded to:

Dr. Souheir Houssami
Executive Officer – Human Ethics
Monash University
[phone and email details supplied]

Thank you for your help with this research. If you have further questions please do not hesitate to contact me at [email supplied]:

Kind regards,
Dr. Daniel Brent

The questionnaire is divided into 4 sections:

Section 1: Questions about you

Section 2: Questions about energy use

Section 3: Questions about purchasing hot water systems

Section 4: Questions about decisions over time and risk

In this section you can earn extra panel points and one person will receive at least \$1000 cash.

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Section 1: Questions about you

Q1. What is your living situation?

1. Own a detached house
2. Own a townhouse/duplex
3. Own a flat
4. Renting/sharing accommodation

(Auto-forward (move respondent forward without requiring them to click 'Next'))

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Q2. Are you usually involved in major purchase decisions for your household?

1. Yes
2. No

(Auto-forward)

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Q3. What is your sex?

1. Male
2. Female

(Auto-forward)

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Q4. How old are you?

1. _____
2. Prefer not to answer

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Q5. Do you hold either a Pensioner Concession Card, a Health Care Card, or a DVA Gold Card?

1. Yes
2. No

(Auto-forward)

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Q6. How much is your monthly mortgage payment?

1. _____
2. No mortgage
3. Prefer not to answer

(Auto-forward if answer is 2 or 3)

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Q7. Is English the primary language spoken in your household?

1. Yes
2. No, specify _____

(Auto-forward if yes)

(START NEW PAGE)

Q8. Do you support government placing a price on carbon in Australia?

1. Yes
2. No
3. Don't know

(Auto-forward)

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Section 2: Questions about your household's energy use

Q9. Do you have a gas connection?

1. Yes
2. No

Q10. What do you use gas for?

(select all that apply)

1. Heating
2. Cooking
3. Hot water
4. Other (please specify) _____

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Q11. What type of hot water system do you have?

1. Gas storage
2. Gas instantaneous
3. Electric
4. Solar
5. Heat pump
6. Other (please specify) _____
7. Don't know

Q12. How many hot water systems have you purchased (not part of a house sale)?

(if none enter '0')

1. In this home ____
2. In other homes ____

(START NEW PAGE)

Q13. What would be the four most important factors to you in choosing a new hot water system?

Select exactly 4 answers

1. Plumbers recommendation
2. Fuel type (electricity, gas, solar, heat pump)
3. Flow rate
4. Lifetime
5. Noise/quietness
6. Upfront cost
7. Simple installation process
8. Sitting position (e.g. indoor/outdoor, roof/ground)
9. Temperature control
10. Least chance of running out of water

11. Tank material (e.g. stainless steel)
12. Low running cost
13. Environmental friendliness
14. Warranty
15. Brand
16. Other (please specify) _____

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Q14. Also, what would be the three least important factors in choosing a new hot water system?

(remove top four choices)

Select exactly 3 answers

1. Plumbers recommendation
2. Fuel type (electricity, gas, solar, heat pump)
3. Flow rate
4. Lifetime
5. Noise/quietness
6. Upfront cost
7. Simple installation process
8. Sitting position (e.g. indoor/outdoor, roof/ground)
9. Temperature control
10. Least chance of running out of water
11. Tank material (e.g. stainless steel)
12. Low running cost
13. Environmental friendliness
14. Warranty
15. Brand
16. Other (please specify) _____

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Q15. How old is your current hot water system?

1. 1-2 years
2. 3-5 years
3. 6-10 years
4. More than 10 years
5. Don't know

Q16. Are you considering replacing your current hot water system?

1. Yes
2. No
3. If Yes, why? _____

(START NEW PAGE)

Q17. Without looking up your energy bill, what is your best guess of how much money you spend on energy each month?

1. \$_____ (gas)
2. \$_____ (electricity)
3. Don't know

Q18. Many energy providers offer an opportunity to pay extra (roughly \$1/week) to increase the use of renewable energy resources. Do you participate in such a 'green energy' program?

1. Yes
2. No
3. Don't know

(START NEW PAGE)

Q19. How much do you expect electricity prices to change over the next 10 years?

1. No significant change (same as inflation)
2. Decrease by 5% or more
3. Increase by less than 10%
4. Increase between 10-25%
5. Increase by more than 25%
6. Don't know

Q20. How much do you expect gas prices to change over the next 10 years?

1. No significant change (same as inflation)
2. Decrease by 5% or more
3. Increase by less than 10%
4. Increase between 10-25%
5. Increase by more than 25%
6. Don't know

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Q21. Did you participate in any of the following energy or water rebate programs?

1. Rainwater tank
2. Other water efficiency rebate
3. Home Energy Saver Scheme (Commonwealth program)
4. Victorian Energy Efficiency Target scheme
5. Other (please specify) _____

Q22. If you received a letter from a non-profit offering a rebate of up to \$____ for a gas hot water system or up to \$____ for a solar hot water system would you call the listed number to find out more information?

1. Yes
2. No, I don't need a new hot water system
3. No, other reason, please specify _____

(We will vary the '\$____'s with several numbers in different survey versions. Skip pattern to next question if 'No, I don't need a new hot water system'.)

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Q23. If you need to replace your system in the next __ years, would you call to find out more about the rebate?

1. Yes
2. No

(We will vary the '____' with several numbers in different survey versions.)

(START NEW PAGE)

Section 3: Questions about purchasing hot water systems

Next we will ask you some questions about choosing a new hot water system. These questions are hypothetical, and we have observed that sometimes people give different answers to hypothetical questions than when faced with a real decision. This survey will inform energy efficiency policy so please answer as though you were actually purchasing a new hot water system.

Consider the following scenario. You noticed signs that your hot water system was not working properly. Your plumber informed you that you need to replace your hot water system soon. A consultant from a non-profit was able to provide estimates of the unsubsidized upfront costs and running costs customized for your home. The options displayed are all based on calculations of the cost of various systems for real households. In some choice sets the running costs may be systematically higher because that household had more occupants. Please answer each choice set as if these were the numbers the consultant provided **your** household.

You need to read and understand the following points in order to answer the next set of questions.

There are several models that you can choose from. They have different upfront costs and annual running costs.

- Installation costs are included in upfront costs, which can vary depending on the particular layout of the house, as well as the technology used.
- Annual costs are estimates based on current energy prices.
- All the models have similar quality and reliability and only vary based on the listed attributes.
- All the models are under warranty for 10 years.
- You have access to a zero interest loan up to \$2000 and a 5% interest loan for amounts greater than \$2000. All loans need to be repaid in equal amounts over 3 years.
- There are two certificate programs, Small-scale Technology Certificates (STC) and Victorian Energy Efficiency Certificates (VEEC) available for some hot water systems. The upfront costs account for these certificate programs. These programs are well established and are expected to continue after one year.

In contrast to STC and VEEC, there is a separate **temporary** government rebate program to specifically subsidize certain energy efficient hot water systems. This program is run by a non-profit that also assists in the purchase and installation process. The program will expire in one year.

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Tests for understanding

Q24. How many years is each system under warranty?

1. _____

Q25. Does the upfront cost include installation costs?

1. Yes
2. No

Please select your preferred model given the information. You will see 5 versions of this decision where we vary the costs and rebates to reflect different options available in the market and differences in installation costs.

To help you make this decision we calculate the payback period relative to the system with the lowest upfront cost. The payback period is the number of years it will take to pay back higher upfront costs through savings in running costs. To find out the payback periods for the systems with higher upfront costs click the 'Payback Period' button for each option.

(If answer to Q24 does not equal '10' make them go back to previous page. And if the answer to Q25 does not equal 'Yes' make them go back to previous page.)

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Choice Experiment 1	Payback Period		Payback Period	
	New system A	New system B	New system C	
Upfront cost	1300	2900	5500	
Rebate amount	0	400	2300	
Upfront cost after rebate	1300	2500	3200	
Annual running cost	400	275	175	
Preferred option	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

(Please visually set apart (minimize the emphasis) the upfront cost row since it is actually redundant, but we want the information there. Please number these questions CE1-CE5.

If the respondent clicks the 'Payback Period' button please show a pop up box with the follow text and calculation (where 'XX' is either A, B or C, and 'YY' is the New System with the lowest upfront cost):

'Payback period for New system XX relative to New system YY is (annual running cost of 'New system YY' – annual running cost of 'New system XX') /(Upfront cost of 'New system XX' - Upfront cost of 'New system YY') years.'

Please store whether a respondent clicked on the 'Payback Period' button in a questions PP1a-PP5a with the following codes:

- Only A = 1
- Only B = 2
- Only C = 3
- A + B = 12
- B + C = 23
- A + B + C = 123)

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Questions about purchasing specific types of hot water systems

Previously we asked you to decide between three generic hot water systems. Now we will provide a selection of six different technologies and you have the option to keep your current system. We ask for your first and second most preferred options. Please recall some of the features of the decision.

Consider the following scenario. A non-profit organization informed you about a temporary rebate program for hot water systems, and your hot water system is **two years away from the rated service life**. A consultant from the non-profit was able to provide estimates of the unsubsidized upfront costs and running costs customized for your home. The options displayed are all based on calculations of the cost of various systems for real households. In some choice sets the running costs may be systematically higher because that household had more occupants. Please answer each choice set as if these were the numbers the consultant provided **your** household.

You need to read and understand the following points in order to answer the next set of questions.

There are several models that you can choose from. They have different upfront costs and annual running costs.

- Installation costs are included in upfront costs, which can vary depending on the particular layout of the house, as well as the technology used.
- Annual costs are estimates based on current energy prices.
- All the models are under warranty for 10 years.
- You have access to a zero interest loan up to \$2000 and a 5% interest loan for amounts greater than \$2000. All loans need to be repaid in equal amounts over 3 years.
- There are two certificate programs, Small-scale Technology Certificates (STC) and Victorian Energy Efficiency Certificates (VEEC) available for some hot water systems. The upfront costs account for these certificate programs. These programs are well established and are expected to continue after one year.

In contrast to STC and VEEC, there is a separate **temporary** government rebate program to specifically subsidize certain energy efficient hot water systems. This program is run by a non-profit that also assists in the purchase and installation process. The program will expire in one year. If you choose to keep your current system the subsidy may not be available when purchasing your next hot water system.

The payback period is calculated for all systems relative to electric storage. There is not a standard method to calculate the payback period relative to your current system since it will need to be replaced in the next several years.

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Choice Experiment 6

	Keep current system (2 years away from rated service life)	Electric storage	Gas storage	Gas instantaneous	Solar gas	Solar electric	Heat pump
			Payback	Payback	Payback	Payback	Payback
Upfront cost	0	1000	1100	2400	5300	5400	3300
Rebate amount	0	0	0	300	2200	2000	800

Net cost	0	1000	1100	2100	3100	3400	2500
Annual running cost	800	400	325	275	200	150	250
Most preferred option	<input type="checkbox"/>						
Second-most preferred option	<input type="checkbox"/>						

(Please visually set apart (minimize the emphasis) the upfront cost row since it is actually redundant, but we want the information there. Please number these questions CE6-CE10.

If the respondent clicks the 'Payback Period' button please show a pop up box with the follow text and calculation (where 'XX' is either gas storage, gas instantaneous, solar electric, solar gas, or heat pump):

'Payback period for the 'XX' system relative to the electric system is $(\text{annual running cost of electric} - \text{annual running cost of 'New system XX'}) / (\text{Upfront cost of 'New system XX'} - \text{Upfront cost of electric})$ years.'

Please store whether a respondent clicked on the 'Payback Period' button in a questions PP6-PP10 with the following codes:

- Clicked 'Payback Period' button = 1
- Clicked 'Payback Period' buttons = 2
- Clicked 'Payback Period' buttons = 3
- Clicked 'Payback Period' buttons = 4
- Clicked 'Payback Period' buttons = 5)

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Section 4: Questions about decisions over time and risk

Thank you for your participation so far; you're almost done. In these last few questions you can earn some extra rewards.

A hot water system is a large purchase for a household that will impact energy bills for 10 years or more. Households need to decide whether to pay more money now in order to save money in the future. There are also risks involved with the purchase decision such as future energy prices and deciding whether to delay the replacement of an old hot water system.

Now we will ask you to make decisions in three separate tasks. These tasks will measure your attitudes towards money in the future, risk, and investment decisions.

For Tasks 1 and 2 one participant will be randomly selected to earn the money explained in each task, which may exceed \$1,000. Treat these as real choices because you may actually receive your chosen option in cash.

In Task 3 you will be able to earn extra panel points based on your answers in these tasks. The three tasks are as follows:

Task 1: Decisions about money now or money later

Task 2: Decisions about risk

Task 3: Decisions about investments

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Instructions for Task 1

- This task will ask you to make decision about having money now or money later.
- On the next screen you will be asked whether you prefer \$1000 in one month or some amount more than \$1000 in seven months. You will be given several such options where we gradually increase the amount of extra money you receive in seven months.
- For each row choose whether you prefer the \$1000 now (Choice A) or the \$1000 plus some extra (Choice B) in seven months, or indicate that you are indifferent between the two options.

How you will be paid:

- We will randomly choose one respondent who will earn money based on their decision.
- If you are selected the money will be mailed to you either in one month or seven months.
- To determine your earnings we will randomly choose a number from 1-12 with equal probability that selects which of the 12 decision rows will determine your payoff.

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Task 1

Row number	Credit A (in 1 month)	Credit B (in 7 months)	Decision (buttons)		
			I prefer A	I prefer B	I am indifferent
1	\$1,000	\$1,010			
2	\$1,000	\$1,025			
3	\$1,000	\$1,038			
4	\$1,000	\$1,051			
5	\$1,000	\$1,064			
6	\$1,000	\$1,077			
7	\$1,000	\$1,091			
8	\$1,000	\$1,104			
9	\$1,000	\$1,132			
10	\$1,000	\$1,160			

11	\$1,000	\$1,217			
12	\$1,000	\$1,278			

(Must select one of the last three columns (I prefer A, I prefer B, or I am indifferent) for each of the 12 rows. Should select one of three buttons for each row.)

(START NEW PAGE)

Instructions for Task 2

- Task 2 will help us understand your attitudes towards risky decisions.
- In this part of the study you will select from among seven different lotteries the one lottery you would like to play. The seven different lotteries are listed on the next screen. You must select one and only one of these lotteries. Each lottery has two possible monetary rewards that are equally likely. If you are selected your compensation for this part of the study will be determined by: 1) which of the seven lotteries you select; and 2) which of the two possible rewards are drawn.

How you will be paid:

- We will randomly choose one respondent who will earn money based on their decision. The selection of a respondent will be separate from Task 1.
- If you are selected we will base your payment on your preferred lottery.
- For example: if are chosen and you select Lottery 4 and Outcome A occurs, you will be paid \$150. If Outcome B occurs, you will be paid \$600.
- For every lottery each event has a 50% chance of occurring.

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Task 2 (alternate with 7 options)

Lottery	Outcome A (50%)	Outcome B (50%)	Decision (select one row for your preferred lottery)
Lottery 1	\$300	\$300	
Lottery 2	\$250	\$375	
Lottery 3	\$200	\$475	
Lottery 4	\$150	\$600	
Lottery 5	\$100	\$725	
Lottery 6	\$50	\$800	
Lottery 7	\$0	\$850	

(Last columns should be a button where they must select only one of the rows.)

(START NEW PAGE)

Instructions for Task 3

- The final task asks factual questions about several investment decisions.
- In all the prior tasks there were no correct or incorrect answers, but in this task there are correct answers.
- These questions are intended to be straightforward; there are no hidden tricks.

How you will be paid: (Slightly different wording for external sample – ‘Kindly note that the standard panel reward scheme will apply for the survey and an additional token will be provided based on the following:’)

- You will earn 25c in panel points for each correct answer.
- Please select the ‘Don’t know’ option if you do not know how to answer the question.
- In order to discourage completely random guessing we will pay 5c panel points if you select the ‘Don’t know’ option.
- The total number of panel points you can earn will range from \$0-\$1.50. You will earn zero if you answer all questions incorrectly, and you will earn \$1.50 panel points if you answer all answers correctly.

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Task 3

Q28. Suppose you had \$100 in a free savings account and the interest rate was 2% per year. After 5 years, how much do you think you would have in the account if you left the money to grow:

1. More than \$102
2. Exactly \$102
3. Less than \$102
4. Do not know

Q29. Suppose that the interest rate on your free savings account was 1% per year and inflation was 2% per year. After 1 year, with the money in this account would you be able to buy:

1. More than today
2. Exactly the same as today
3. Less than today
4. Do not know

Q30. Do you think that the following statement is true or false? ‘Buying a single company stock usually provides a safer return than a stock mutual fund.’

1. True
2. False
3. Do not know

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Q31. A hot water system has an upfront cost of \$1500 and annual running costs of \$400. If the hot water system lasts 10 years which costs are larger in total dollar terms over the full 10 years?

1. Upfront cost
2. Running costs
3. Do not know

Q32. Hot water system A that has an upfront cost of \$1500 and annual running costs of \$400. Hot water system B has an upfront cost of \$3500 and annual running costs of \$200. How long

**will it take to pay back the extra upfront costs of system B through savings in running costs?
Assume a 0% interest rate for this question.**

1. 1-2 years
2. 3-4 years
3. 5-6 years
4. 7-8 years
5. 9-10 years
6. More than 10 years
7. Do not know

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Q33. You have \$5000 dollars in your savings account. You need to purchase a hot water system, and all the remaining money will purchase a risk-free government bond that earns 10% interest per year. Hot water system A that has an upfront cost of \$1500 and annual running costs of \$400. Hot water system B has an upfront cost of \$3500 and annual running costs of \$200. Which system should you buy in order to earn the most money possible after accounting for purchasing the system, running costs, and interest payments?

1. System A
2. System B
3. Do not know

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Q34. Comments:

Please write down any comments you have in the section below.

This is the end of the survey. Thank you for your participation.