Online Appendix: Valuing Safety and Privacy in Retail Central Bank Digital Currency

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1. Credibility Safeguards

We registered a pre-analysis plan (PAP) detailing how we would process and analyse the data, on the Open Science Framework website (available at <https://osf.io/3bce9/>). This was done before all but one author had viewed the data. Where possible, we conducted the analysis as planned. However, some aspects of our final analysis of the discrete choice experiment (DCE) deviated from the plan. The main departures related to a change of modelling approach for Model 2, where we replaced dummy variables representing quartiles for demographics with continuous variables (full details in Table A1 below). Section 3 of this online appendix contains the analysis that we committed to but was not included in the final paper.

Table A1: Checklist of Commitments in the Pre-analysis Plan

Commitment	Followed	Notes
Final analysis sample was 999	✗	When writing the plan, we were not aware of two missing responses for the DCE question from respondents who filled paper-based surveys. The final sample was 997.
Conduct donkey voting tests for all models using significance tests for intercepts	✓	Discussed in main paper.
Test for non-random attrition on age, income and gender	✓	Discussed in Appendix A of main paper.
Use the most restrictive sample across all regressions	✓	No missing values for variables aside from two missing responses for DCE question, which applied to all regressions.
Test for balance between treatment groups based on mean age, income and gender	✓	Discussed in main paper.
Model 1 specified as described in PAP	✓	We switched the variable $\Delta RbaAcct_{iAB}$ for $\Delta CommercialAcct_{iAB}$, which is its inverse, for consistency of presentation. This changes the sign of the parameter estimate but otherwise does not affect our results.
Model 2 specified as described in PAP	✗	We changed age and household income quartile dummy variables to single continuous age and household income variables. We made this change to improve statistical precision, given the large number of regressors when using the quartile method. We include the results from the originally proposed specification in Online Appendix Section 3.
Estimate Models 1 and 2 using maximum likelihood estimation as a probit, with no clustered standard errors, and population weights included in all models	✓	No changes.
Estimate willingness to pay (WTP) using formulas in the PAP	✗	We had to change our approach to estimating WTP for demographic groups, due to the changed set-up for the extension model. To calculate WTP across demographic groups, we multiplied the demographic parameter interaction estimates with specific points in the distribution (e.g. the mean), instead of quartiles being switched on or off with ones/zeros. For example, we would estimate WTP for safety at an age that is 20 years above the mean, holding income at its mean, with the following formula: $-5\times\dfrac{\hat{\beta}_{RbaAcct}+20\cdot\hat{\beta}_{RbaAcct\times Age-\overline{Age}}}{\hat{\beta}_{HighFee}+20\cdot\hat{\beta}_{HighFee\times Age-\overline{Age}}}$
Estimate WTP confidence intervals using the delta method via nlcom in Stata	✓	No changes.
Regression tables for all models included	✓	No changes.
Code files and a read me file are published	✓	Program files for replication are available to readers in the Supplementary Information. However, we are unable to include the raw CPS data due to confidentiality.
Model 3 as specified in the PAP	✗	Model 3, the extended model where cash use variables are interacted with the main variables, was not pre-specified. We conducted the cash use exercise in response to seminar feedback, and explored it in a separate model to age and income because it is a bad control for the age effects we intended to capture.

2. Demographic Variable Construction

In our extension models, we included age, household income and cash use variables. However, some respondents only supplied answers to range-based age and household income questions (e.g. Are you aged between 18–24, …). For those respondents, we imputed specific age or household income values from the underlying range-based variables.

For our age variable, we relied on imputed values for 17 respondents, or around 2 per cent of the sample, by taking the midpoint of the range variable we had available (Table A2). For the other respondents, we have a specific numeric age variable. None of the imputed ages were for bottom- or top-coded ranges.

Table A2: Age Variable Imputations

Numeric age available?	Age range supplemented	Numeric age imputed	Respondents	Share of sample (%)
Yes	na	na	982	98.3
No	18–24	21.0	2	0.2
	25–34	29.5	2	0.2
	35–44	39.5	7	0.7
	45–54	49.5	2	0.2
	55–64	59.5	1	0.1
	65–69	67.0	1	0.1
	70–79	74.5	2	0.2

Source: RBA calculations, based on data from Ipsos.

For household income, we did not have a numeric household income variable and relied on imputed values for all respondents, using two separate range-based variables (Table A3):

- Primarily, we used a detailed household income variable for 935 respondents (94 per cent of the sample), which grouped respondents by income brackets of around \$10,000. We took the midpoint for the ranges, assumed zero for those who responded that they had no income, and assumed \$250,000 a year for the \$250,000+ range.

- For the 64 respondents (6 per cent of the sample) that chose not to answer the more detailed household income question, we relied on a less granular quartile variable that all respondents had to answer. For the bottom three quartiles, we took the midpoint of the quartile range. For the top quartile (\$160,000+), we assumed the mean household income from the more granular variable's midpoints for all respondents above \$160,000, which was \$219,320.

Our final household income variable is top-coded for 96 respondents (10 per cent of the sample), and potentially bottom-coded for 36 respondents (4 per cent of the sample) as we are not able to observe whether any had negative income.

The cash use variable is defined as the share of transactions that respondents reported making in cash during the period of the payments diary. The cash use share variable has 14 missing observations for respondents who did not record any in-person transactions in the week of the payments diary; we did not attempt to impute these values, and dropped the observations from the cash use model.

Table A3: Household Income Variable Imputations

Income range supplemented ($)		Numeric household income imputed	Censored range used?	Respondents	Share of sample (%)
Variable 1	Variable 2				
0[(a)]		0.0	Yes	4	0.4
1–7,799		3,900.0	No	5	0.5
7,800–19,999		13,899.5	No	22	2.2
20,000–29,999		24,999.5	No	82	8.2
30,000–39,999		34,999.5	No	64	6.4
40,000–49,999		44,999.5	No	48	4.8
50,000–59,999		54,999.5	No	42	4.2
60,000–69,999		64,999.5	No	53	5.3
70,000–79,999		74,999.5	No	39	3.9
80,000–89,999		84,999.5	No	55	5.5
90,000–99,999		94,999.5	No	41	4.1
100,000–109,999		104,999.5	No	42	4.2
110,000–119,999		114,999.5	No	35	3.5
120,000–129,999		124,999.5	No	46	4.6
130,000–159,999		144,999.5	No	107	10.7
160,000–199,999		179,999.5	No	81	8.1
200,000–249,999		224,999.5	No	80	8.0
250,000+		250,000.0	Yes	89	8.9
	<50,000[(a)]	25,000.0	Yes	32	3.2
	50,000–99,999	75,000.0	No	18	1.8
	100,000–159,999	130,000.0	No	7	0.7
	160,000+	219,319.0[(b)]	Yes	7	0.7

Notes: (a) Potentially includes negative income.
(b) The mean household income from the more granular variable for respondents above $160,000 was used to impute this value.

Source: RBA calculations, based on data from Ipsos.

3. Regression Results from Quartile Model

Table A4: Extension Probit Model Regression Results

Originally proposed extension model with demographic quartile dummy variables

(*continued next page*)

Variable	Estimate	Variable	Estimate
$\Delta HighFee_{iAB}$	–0.53 (–0.79, –0.27)	$AgeQ2_i \times \Delta AustracCommercialVis_{iAB}$	–0.13 (–0.86, 0.59)
$\Delta RbaAcct_{iAB}$	0.12 (–0.40, 0.64)	$AgeQ3_i \times \Delta AustracCommercialVis_{iAB}$	0.05 (–0.67, 0.77)
$\Delta RbaVis_{iAB}$	–0.74 (–1.56, 0.08)	$AgeQ4_i \times \Delta AustracCommercialVis_{iAB}$	0.07 (–0.74, 0.88)
$\Delta CommercialVis_{iAB}$	–0.63 (–1.33, 0.07)	$HhIncQ2_i \times \Delta HighFee_{iAB}$	–0.18 (–0.44, 0.08)
$\Delta AustracVis_{iAB}$	–0.55 (–1.00, –0.11)	$HhIncQ3_i \times \Delta HighFee_{iAB}$	–0.03 (–0.31, 0.25)
$\Delta AustracRbaVis_{iAB}$	–0.84 (–1.57, –0.10)	$HhIncQ4_i \times \Delta HighFee_{iAB}$	–0.02 (–0.30, 0.26)
$\Delta AustracCommercialVis_{iAB}$	–0.77 (–1.58, 0.03)	$HhIncQ2_i \times \Delta RbaAcct_{iAB}$	0.13 (–0.41, 0.67)
$AgeQ2_i \times \Delta HighFee_{iAB}$	0.09 (–0.17, 0.35)	$HhIncQ3_i \times \Delta RbaAcct_{iAB}$	–0.04 (–0.59, 0.51)
$AgeQ3_i \times \Delta HighFee_{iAB}$	0.05 (–0.21, 0.30)	$HhIncQ4_i \times \Delta RbaAcct_{iAB}$	–0.08 (–0.63, 0.47)
$AgeQ4_i \times \Delta HighFee_{iAB}$	0.18 (–0.09, 0.45)	$HhIncQ2_i \times \Delta RbaVis_{iAB}$	–0.37 (–1.16, 0.42)
$AgeQ2_i \times \Delta RbaAcct_{iAB}$	–0.32 (–0.80, 0.15)	$HhIncQ3_i \times \Delta RbaVis_{iAB}$	0.05 (–0.79, 0.88)
$AgeQ3_i \times \Delta RbaAcct_{iAB}$	–0.08 (–0.58, 0.43)	$HhIncQ4_i \times \Delta RbaVis_{iAB}$	–0.20 (–1.01, 0.61)
$AgeQ4_i \times \Delta RbaAcct_{iAB}$	–0.06 (–0.58, 0.46)	$HhIncQ2_i \times \Delta CommercialVis_{iAB}$	0.53 (–0.21, 1.26)
$AgeQ2_i \times \Delta RbaVis_{iAB}$	0.43 (–0.28, 1.14)	$HhIncQ3_i \times \Delta CommercialVis_{iAB}$	–0.03 (–0.79, 0.72)
$AgeQ3_i \times \Delta RbaVis_{iAB}$	0.35 (–0.38, 1.09)	$HhIncQ4_i \times \Delta CommercialVis_{iAB}$	0.28 (–0.48, 1.03)
$AgeQ4_i \times \Delta RbaVis_{iAB}$	0.53 (–0.28, 1.34)		

Table A4: Extension Probit Model Regression Results

Originally proposed extension model with demographic quartile dummy variables (*continued*)

Variable	Estimate	Variable	Estimate
$AgeQ2_i \times \Delta CommercialVis_{iAB}$	–0.44	$HhIncQ2_i \times \Delta AustracVis_{iAB}$	0.21
	(–1.10, 0.22)		(–0.25, 0.67)
$AgeQ3_i \times \Delta CommercialVis_{iAB}$	–0.16	$HhIncQ3_i \times \Delta AustracVis_{iAB}$	–0.29
	(–0.88, 0.56)		(–0.76, 0.18)
$AgeQ4_i \times \Delta CommercialVis_{iAB}$	0.09	$HhIncQ4_i \times \Delta AustracVis_{iAB}$	–0.13
	(–0.62, 0.80)		(–0.62, 0.35)
$AgeQ2_i \times \Delta AustracVis_{iAB}$	0.26	$HhIncQ2_i \times \Delta AustracRbaVis_{iAB}$	0.15
	(–0.17, 0.69)		(–0.54, 0.84)
$AgeQ3_i \times \Delta AustracVis_{iAB}$	0.27	$HhIncQ3_i \times \Delta AustracRbaVis_{iAB}$	0.39
	(–0.17, 0.70)		(–0.41, 1.18)
$AgeQ4_i \times \Delta AustracVis_{iAB}$	0.27	$HhIncQ4_i \times \Delta AustracRbaVis_{iAB}$	0.09
	(–0.18, 0.72)		(–0.69, 0.88)
$AgeQ2_i \times \Delta AustracRbaVis_{iAB}$	0.30	$HhIncQ2_i \times \Delta AustracCommercialVis_{iAB}$	–0.13
	(–0.42, 1.02)		(–0.92, 0.67)
$AgeQ3_i \times \Delta AustracRbaVis_{iAB}$	0.19	$HhIncQ3_i \times \Delta AustracCommercialVis_{iAB}$	–0.19
	(–0.52, 0.90)		(–1.01, 0.63)
$AgeQ4_i \times \Delta AustracRbaVis_{iAB}$	0.40	$HhIncQ4_i \times \Delta AustracCommercialVis_{iAB}$	–0.27
	(–0.38, 1.17)		(–1.09, 0.54)
Constant	–0.07		
	(–0.17, 0.03)		

Notes: 95 per cent confidence intervals are in parentheses. The delta symbol 'Δ' represents a difference between dummy variables for accounts A and B, e.g. $\Delta HighFee_i = HighFee_{iA} - HighFee_{iB}$. The income interactions should be treated as approximations, since respondents only report income ranges and 10 per cent of the sample has its income top-coded. Base quartile = Q1.

Source: RBA calculations, based on data from Ipsos.