The Impact of Mortgage Broker Use on Borrower Confusion and Preferences

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Abstract

We examine how mortgage brokers affect borrower confusion about key mortgage features and assess whether brokers mitigate confusion by educating borrowers. Draw-

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ing from two lab-in-the-field experiments, we first show a correlation between the attributes borrowers find most confusing and those they find least important. Second, we show that borrowers who secure loans directly from lenders demonstrate lower confusion levels compared to those using brokers, even after accounting for self-selection bias. Despite this, broker users exhibit higher decision satisfaction and confidence after taking a loan. Third, using responses from discrete choice experiments to implement a causal mediation analysis with a single IV, we evaluate the influence of broker use, financial literacy, and subjective confusion on borrowers' willingness to pay for specific mortgage attributes. Our findings reveal that broker users are willing to pay more for attributes that increase the value and duration of loans, increasing broker commissions.

JEL codes: G51; G21; G41

Keywords: Mortgage, Mortgage Broker, Financial Education, Financial Literacy, Choice Experiment, Stated Preferences

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1. Introduction

Conventional economic theory posits that the variety of loan products available in the mortgage market should increase borrower welfare by allowing people to find the loan that best fits their needs. Yet, the vast number of loan contracts on offer, and the high cost to borrowers of acquiring the information and skill they need to distinguish between alternatives, make it highly unlikely that everyone will choose the ideal option (Lee & Hogarth, 2000). Consumers can instead be overwhelmed when offered such a large number of possibilities, become demotivated, and ultimately reluctant to choose (Iyengar & Lepper, 2000). It follows that if people choose a home loan that they later find hard to justify to themselves, or that leads to mortgage stress, they may become dissatisfied (Botti & Iyengar, 2006; Walsh et al., 2007; Wang & Shukla, 2013; Li, 2017), experiencing lower financial wellbeing (Consumer Financial Protection Bureau (CFPB), 2017).[2]

Many potential borrowers turn to expert advisers such as mortgage brokers for help.[3] Expert advice from mortgage brokers can reduce search costs (Conklin, 2017), help navigate the administrative process (ASIC, 2019), educate clients (ASIC, 2020) and give marginal borrowers access to loans (Conklin, 2017, Agarwal et al., 2021).[4]

[2]For 401(k) plans, see Agnew & Szykman (2005), for telecommunications, Harrison et al. (2011), for the electricity market, Wilson & Price (2005), and for the wine market, Drummond & Rule (2005).

[3]In the U.S., for example, upwards of a third of residential mortgages are brokered (Alexandrov & Koulayev, 2018). In Australia, brokers originate over 65% of all new residential mortgages (MFAA, 2021), while in the U.K. over 71% use brokers (Mysliwski & Rostom, 2022). In Canada, around 50% of first time home buyers opt for brokers (Mortgage Professionals Canada, 2021).

[4]Other research positions financial advice as a complement to, rather than a substitute for, objective financial literacy (Calcagno & Monticone, 2015; Hackethal et al., 2012; Van Rooij et al., 2011). See Kramer (2016) for the reverse relation with subjective financial literacy.

However, as with other forms of financial advice, guidance from mortgage brokers can be affected by agency problems (Hackethal et al., 2012; Mullainathan et al., 2012; Hoechle et al., 2017). Brokers are linked to mis-selling, higher fees (LaCour-Little, 2009; Robles-Garcia, 2020; Woodward & Hall, 2012; Van Ooijen & van Rooij, 2016), larger, more readily securitized and riskier loans (Sedgwick, 2017; Agarwal et al., 2021; Allen et al., 2023), and an increased likelihood of default (Alexander et al., 2002; Elul et al., 2010; Jiang et al., 2014). These agency problems can be aggravated by consumer confusion, adding to a reluctance to shop around, and to mistaken judgements about the quality of broker advice (Woodward & Hall, 2012).

Financial market regulators addressing such agency problems must balance the benefits of improving incentive alignment and ensuring that brokers act in the best interests of clients with the potential costs of restricted competition (Agarwal et al., 2021, Mysliwski & Rostom, 2022).[5] Brokers' 'best interests' duty includes the expectation that they will educate clients, giving them a better grasp of mortgage product features (e.g., ASIC, 2020). Research has already demonstrated that borrowers commonly misunderstand basic and important mortgage features and terms, such as interest rates (Worthington, 2009; Bucks & Pence, 2008; Woodward & Hall, 2012; Coen et al., 2021). Initial focus group research we conducted in urban and rural areas in Australia in 2019 reveals that confusion about home loans was a dominant reason to engage a broker, both to delegate a complex decision and for personalized education about mortgages and the process. Most clients envisage that education will be

[5]Brokers are legally required to act in the best interests of clients, for example, in the U.S. under Mortgage Loan Originator Rules, and in Australia, under similar legislation (ASIC, 2020)

an essential component of their broker's advice service. This raises the question of whether brokers effectively educate clients.

In this study, we investigate confusion about mortgage attributes among borrowers in three stages. First, we document borrower confusion about attributes and reveal the association between this confusion and the importance borrowers give to these attributes. Second, we assess whether brokers mitigate confusion through client education. Third, we test the influence of brokers, and confusion mediated by brokers, on borrowers' preferences for mortgage attributes. In the spirit of Keane et al. (2021), we argue that the confusion borrowers feel about different mortgage attributes is inversely related to the importance they place on those attributes when choosing a loan. We use instrumental variables methods to identify the causal impact of brokers on borrower confusion and preferences, and then estimate a mediation model with a single instrumental variable (IV) (Dippel et al., 2022) to decompose the total, direct and indirect effect of brokers on borrower preferences.

We use two rounds of stated preference surveys conducted in 2019 and 2023, excluding the COVID-19 pandemic period. We collected over 3,000 responses to lab-in-the-field experiments among past, present and future Australian mortgage borrowers. Survey 1 (N=1,990, September 2019) identifies how borrowers' subjective confusion varies across typical mortgage attributes, and how that confusion is — with a few exceptions — almost always inversely related to the subjective importance of these attributes.[6] Consumers faced with confusion and uncertainty about certain

[6]Studies have found this inverse relation in contexts other than mortgage choice. See Wise & Burke (2009), Brown & Carpenter (2000) and Hsee (1996).

attributes tend to prefer other attributes more, particularly those attributes that are easily justified and cognitively available. To our knowledge, we show this inverse relation for the first time in a study of mortgage choice. Since brokers are often the main channel for securing mortgages and important sources of information about mortgage attributes, our finding raises two competing possibilities. On one hand, our finding implies that brokers have the potential to help clients make better choices by reducing their confusion about objectively important loan attributes. On the other hand, it implies that brokers could strategically reduce clients' confusion about the attributes that ensure higher broker remuneration but are not necessarily in the best interests of clients.

Survey 2 (N=1,200, September 2023) focuses on differences in confusion across consumers, distinguishing broker users from borrowers who do not consult brokers (i.e., borrowers who only interact with loan officers from lending institutions). Survey 2 results address the question of how confusion varies across participants by experience in the mortgage process and by broker engagement. Our results show that brokers do not reduce client confusion as much as do loan officers from lending institutions. We find that, after applying for a mortgage, both objectively and subjectively measured attribute confusion is significantly higher among broker users than among other borrowers, and that this result is robust to identification strategies to control for participant selection into broker use. Moreover, the broker users are *ex post* more likely to rate their loan choice as satisfactory, while having significantly more often adjusted their preferences in ways that align with higher broker remuneration.

Using a discrete choice experiment, Survey 2 also collects participants' preferences for attributes when these are combined into realistic bundles, resembling typical mortgage contracts. We use responses to the discrete choice experiment to estimate borrower preferences for mortgage attributes, making several findings. We confirm that 1) confusion changes borrowers' willingness to pay (WTP) for particular mortgage attributes; 2) brokers steer clients towards loans that increase broker remuneration; and 3) the impact of brokers on borrower preferences is partly mediated by borrower confusion. On average, participants are willing to pay more for some attributes, including for loans from major lenders, shorter-term loans and principal-and-interest versus interest-only repayment plans. However, we also find that broker users assign significantly less importance to lower establishment fees, and value principal-and-interest repayment plans and the option to repay the loan early, less than non-broker users. These findings are consistent with brokers' incentives to push features that boost loan value and duration, and consequently, trail commissions. Further, mediation model results show that attribute-by-attribute confusion matters for willingness to pay for loan term (more confused participants are willing to pay less for longer loan terms), loan fees (more confused participants place less value on lower fees) and principal-and-interest repayments (more confused participants are willing to pay less for principal-and-interest versus interest-only repayments). We also confirm that brokers steer clients towards longer loan terms.

From a policy perspective, if education offered through brokers can reduce confusion about significant mortgage attributes, so borrowers give those features more consideration, then policymakers would have another way to nudge borrowers to-

wards choosing suitable loans. However our results are not encouraging for such a policy goal. On the contrary, borrowers who arrange a loan directly through a lending institution get a better grasp of mortgage attributes than those who use a broker, perhaps because direct interaction with lenders involves delegating less of the information gathering task than does interacting with a broker. In addition, the broker remuneration model of up-front and continuing trail commissions does appear to support brokers steering borrowers towards loans that are repaid more slowly.

Related literature: Our work is motivated by studies showing costly housing-related mistakes made by borrowers, including overpaying for mortgages through use of points (Agarwal et al., 2017), failing to refinance at the right time resulting in lost cost savings (Agarwal et al., 2016; Andersen et al., 2020; Keys et al., 2016), lack of awareness of product contract terms (Davidoff et al., 2017), and reluctance to price shop for the best deal (Bhutta et al., 2024). Recent research also shows that borrowers may pay more for their mortgages due to price discrimination by the lender (Coen et al., 2023) and/or price steering (Guiso et al., 2022). In more restrictive markets, there is the additional barrier of access to housing finance for some households (Whitehead & Williams, 2017; Cui et al., 2023). Our paper suggests that even if barriers to access are removed, borrowers may be further harmed via steering.

We provide new insights into how borrowers actually choose home loans by requiring experiment participants to choose between realistic combinations of multiple product features informed by actual choice menus. Previous research typically examines consumers' choices among a limited subset of mortgage attributes, such as

the choice between an adjustable-rate or a fixed-rate mortgage (Campbell & Cocco, 2003; Coulibaly & Li, 2009; Dungey et al., 2015; Sa-Aadu & Sirmans, 1995) or the option to refinance a mortgage (Agarwal et al., 2013; Campbell, 2006). We also build on studies of broker effects in mortgage choice, confirming earlier findings that brokers steer clients (Allen et al., 2023; Guiso et al., 2022; Mysliwski & Rostom, 2022; Robles-Garcia, 2020) while also showing that broker users come through the loan process more confused and more satisfied than borrowers who take loans directly from lenders.

Our findings add to understanding of choice overload. Chernev et al. (2015) have identified choice set complexity, decision task difficulty, preference uncertainty, and the degree to which consumers aim to minimize the cognitive effort as moderators of choice overload: these also feature strongly in mortgage choice. While our findings reveal that broker engagement leads to higher confusion, which should lead to higher choice overload, we also find that broker users report higher satisfaction with their chosen mortgage, and higher confidence in going through the mortgage process again. As such, while brokers make choice overload more pronounced (by failing to address confusion around mortgage attributes) and thus increase borrowers' dependency on them, they also offer a way out of the associated negative emotions, probably by limiting the number of options for borrowers, consistent with findings from the financial advice literature (Agnew et al., 2018; Mullainathan et al., 2012).

In Section 2, we set the context by describing key mortgage attributes and products, and the role of mortgage brokers in Australia. Section 3 details the data collection and Section 4 presents the results on consumer confusion, its inverse re-

lationship with preferences, as well as its association with broker use. Section 5 documents the impact of broker use on preferences both directly, and indirectly via consumer confusion. The final section concludes and discusses implications.

2. Mortgage market context

In the U.S., more than 4,300 financial institutions originate a range of home loans (CFPB, 2022). Similarly, in Australia, borrowers can choose from 4,000 mortgage products offered by over 140 mortgage providers (Productivity Commission 2018). Most households do take a mortgage at least once, with home ownership rates in the range of 65% to 70% of households in Australia, Canada, the U.K. and the U.S. (ABS, 2022b; Wilson et al., 2021; U.S. Census Bureau, 2022; Statistics Canada, 2022a). Home loans are also financially important, with mortgage debt accounting for over 50% of total household debt in Australia (ABS, 2022a), over 85% in the U.K. (Bank of England, 2022) and around 70% in the U.S. (Federal Reserve Bank of New York, 2022) and Canada (Statistics Canada, 2022b).

In Australia, borrowers have two options when applying for a mortgage. First, they may apply for a loan directly from banks or other lenders (such as credit unions and building societies) and use internal loan officers to guide them through the process. Second, they may consult a mortgage broker to intermediate between them and a lender. Brokers on-sell mortgage products to borrowers via mortgage aggregators – platforms that "aggregate" mortgage products from various lenders. Mortgage brokers must hold Professional Indemnity insurance.

The share of Australian mortgage sales by brokers has grown rapidly in recent

years to around 65% of new residential loans (MFAA, 2021). Whereas loan officers in banks and other lending institutions do not receive commissions (Sedgwick, 2017), brokers are paid commissions by the lender (usually via the aggregator) on settlement: they do not charge borrowers directly for loan services or advice (ASIC, 2017). Broker commissions follow a two-part structure comprising an upfront commission (related to mortgage value and type) of around 0.6–0.7% of loan value, and a trail commission (an ongoing fee) of 0.18–0.19% of the remaining balance until the loan is fully paid out. If brokers use, or are employed by, an aggregator, brokers take their commissions net of deductions by the aggregator, although the sharing arrangements between aggregators and brokers are usually not publicly disclosed (Commonwealth of Australia, 2019a), raising doubts about their efficiency (Commonwealth of Australia, 2019b). From mid-2021, new legislation gave brokers a duty to pursue their clients' best interests (ASIC, 2020) but did not reform remuneration practices. The new legislation requires brokers to inquire into the needs of clients, consider a range of possible products, make recommendations of three or four products chosen in clients' best interests, educate clients to make informed decisions and help clients apply for loans (ASIC, 2020). Similarly, in the U.S., best interests duties of loan originators, including mortgage brokers, are set by U.S. Mortgage Loan Originator rules[7] that prohibit compensation based on the terms of a mortgage and aim to impede steering practices that do not benefit borrowers.

Altogether, the structure of mortgage supply via lenders and aggregators, and

[7] https://www.consumerfinance.gov/compliance/compliance-resources/mortgage-resources/loan-origination-rule/

the low transparency around commissions, create a set of incentives for mortgage brokers that may be at odds with clients' financial welfare. Mortgage brokers 1) need to attract clients; 2) need to settle a loan to earn commissions; 3) depend on arrangements with aggregators; 4) earn higher commissions on higher value loans; 5) earn higher commissions on loans with longer terms; and 6) have an obligation to act in clients' best interest and educate clients. The extent to which brokers meet 'best interest' obligations and educate clients can be hard to assess.

3. Data collection

Informed by discussions with focus groups[8], we conducted two lab-in-the-field experiments in September 2019 and September 2023.[9] Survey 1 aimed to document differences in relative confusion and importance *across attributes* and investigate the relation between subjective confusion and importance. Survey 2 aimed to investigate differences in confusion and preferences *between participants*. As such, our overall focus was on identifying the causal link between broker use and confusion, as well as the mediating impact of broker use on borrower preferences.

[8]We conducted focus groups in April and May 2019 that explored borrowers' confusion in the home loan choice process as well as strategies borrowers adapt to overcome this confusion. The focus group materials and report are available in Online Appendix A.

[9]Screenshots of Survey 1 and Survey 2 are provided in Appendix B. While the world economy in general, and the real estate market in particular, underwent major changes between the two surveys, our analyses (see Section 5) show that borrower preferences remained rather stable. Conditioning on the same screening questions in both surveys further ensures comparability.

3.1. Survey 1: Method and Sample

For both surveys, we recruited participants from *Dynata*, a large commercial online panel provider with a nationally representative membership. The panel provider ensured that different participants answered each survey. Dynata e-mailed an invitation to take the survey to potential participants, provided information about the survey that met Human Ethics Committee requirements and asked for their consent. We then restricted participation to people who have a mortgage, had a mortgage in the past or who plan to take out a mortgage in the near future, who were aged between 25 and 65 years, and who had an annual household income of over $45,000 (Australian dollars). The sample was approximately evenly distributed by gender, age cohorts and household income.[10] Participants received a small payment in cash or points for completing the survey.

A total of 1,990 participants completed Survey 1. Of these, 108 participants failed the attention check question and another did not identify as male or female,[11] and hence 1,881 participants are the basis of our empirical analysis.[12] The proportion of females in the sample is close to Census data for the same age range (50.9%).

[10]According to the Survey of Household Income and Housing Australia 2017-2018 (Australian Bureau of Statistics (ABS), 2019), the mean weekly income of middle income households was $A902 ($A46,904 annually) and that of high income households was $A2,142 ($A111,384 annually). Hence, we divide participants into middle and high income brackets based on the household income question in our survey.

[11]Since only one participant did not chose a gender, we could not include them in models that conditioned on gender categories.

[12]The attention check question is "Do you currently have a home loan (residential mortgage or investment mortgage)?" (Yes/No). We asked this question in the first part of survey and last part of the survey and checked for consistency.

Table 1: **Survey Samples Descriptive Statistics**

This table presents descriptive statistics for Survey 1 (N=1,881, September 2019) and Survey 2 (N=1,125, September 2023). Population statistics are from the 2021 Australian census.

	Survey 1 (%)	**Survey 2** (%)	**25-64 yrs Aust'n pop'n** (%)
Gender			
Female	51.2	47.9	50.9
Male	48.7	51.8	
Partnered or single			
Married or de facto	72.6	67.8	61.9
Age group			
Age: 25-54 years	66.5	66.3	77.5
Age: 55-65 years	33.6	33.7	22.5
Household income (p.a.)			
High ($104,000+)	48.9	50.4	46.6
Middle ($45,000 - $103,999)	51.1	49.7	53.4
Education			
Bachelor's degree or higher	55.5	56.5	33.4
Preferences and financial literacy			
Risk aversion: Average or higher	45.2	47.3	-
Patience: Average or higher	68.7	56.6	-
Impulsivity: Median or higher		55.6	-
Financial literacy: High (All three correct)	47.1	44.4	42.9[a]
Numeracy: High (Two or three correct)	54.0	53.3	-
Main household decision maker	61.7	66.0	-
Mortgage and broker experience			
Previous mortgages: one or more	75.2	83.8	-
Current mortgage	62.5	58.6	-
Past use of mortgage broker	50.9	56.6	55.7[b]
Intention to use broker in future:		50.6	-
Have previously and will in future		35.3	-
Have not previously but will in future		15.4	-
Number of participants	1,881	1,125	

[a]Source: Agnew et al. (2013); [b]Source: Deloitte (2018)

3.1.1. Survey 1 Task 1: Confusion and importance of attributes

In the survey, we asked participants to read definitions of 13 typical mortgage attributes and then to review a series of comparison sets, choosing from each set the attribute they rated as most, and the attribute they rated as least, *confusing* or *important*. We employed a most-least (Best-Worst Scaling Case 1) structure to rank participants' subjective attribute confusion and importance (see Table 2).[13] By design, every attribute appeared an equal number of times, and appeared against all other attributes at least once (Christensen, 2013). The survey randomized the order of 'confusing' and 'important' sets. Each participant rated 13 choice sets per sequence, with 4 attributes per set (see Figure 1(a) and Figure 1(b)). We score each attribute relative to the other 12 by assigning the 'most' attributes a '1', and the 'least' attributes '-1'. The aggregate score of each attribute is thus the number of times the attribute was chosen as the most confusing (important) less the number of times the attribute was chosen as the least confusing (important) across all choice tasks and survey participants (Cohen, 2009; Flynn et al., 2007; Louviere & Flynn, 2010). We then divide the aggregated score by the number of participants (1,881) and the frequency (4) that each attribute appears in 13 choice sets to get the final average most-least score of confusion (importance).

3.1.2. Survey 1 Task 2: Choice of mortgages

The next task in the survey was a discrete choice experiment (DCE) (Hall et al., 2006; Hole, 2008; Lancsar & Louviere, 2008) designed to collect participants' pref-

[13] A best-worst, or in our case a most-least, task is generally used for measuring the prioritization of different product attributes (Finn & Louviere, 1992; Marley & Louviere, 2005).

erences for mortgage attributes when they are realistically bundled together. This task relates to focus group findings that confusion is compounded by the combination of attributes in mortgage contracts. We asked participants to report which of three mortgages they would be most likely and least likely to choose. We reduced the number of attributes from the 13 used in the 'most-least' tasks to 7 to make the choice easier, and to reflect the focus group finding that people tended to focus on a smaller group of attributes when choosing between loans. The survey script told participants that the other attributes (Loan to Value Ratio (LVR), Lenders' Mortgage Insurance (LMI), offset account, redraw facility, portability and bundled services in a mortgage package) were the same for all the alternative mortgages in each choice set. Table 2 shows the attribute levels, calibrated to mortgage market conditions at the time. We designed 12 choice sets each showing three mortgages[14] and asked participants to choose their most and least preferred options (see Figure 2). Variation in attribute levels and random assignment of participants to blocks of choice sets identifies (stated) borrower preferences for mortgage attributes over the ranges of attribute levels in the design.

[14]We used Stata to create the choice sets in a D-efficient design. A D-efficient design aims to maximise the precision of the estimated parameters given a set number of choice tasks. The efficient design optimizes the expected variance-covariance matrix given prior information about the parameters (i.e., smallest variance values between attributes). In our DCE, we assumed that all attribute-level prior-parameters were zero. For Survey 1 we randomly blocked 12 choice sets into three versions of four choice sets. We gave each participant four choice sets in accordance with the block design.

Table 2: **Mortgage Attributes**

This table defines mortgage attributes used in the survey tasks. Attributes are typical of mortgage contracts in Australia. Confusion and importance rating tasks used attributes 1-13. The Discrete Choice tasks (DCE) used attributes 1-7 varied over the levels shown in column 3. The remaining attributes (8-13) were held constant in the DCE. Participants could access reminders of the definitions of the attributes via pop-ups in all tasks.

No.	Attribute	Attribute levels in DCE	Description
1	Type of mortgage lender	i. Major ('big four') bank ii. Other domestic bank iii. Foreign bank iv. Credit union or building society	Loan originating institution. Major ('big four') banks supply over 75% of mortgage loans (Australian Prudential Regulation Authority (APRA), 2021).
2	Loan term	i. 10 years ii. 20 years iii. 30 years	Maximum duration of loan.
3	Interest Rate (% p.a.)	i. 3.5% ii. 4.0% iii. 4.5% iv. 5.0%	The charge for borrowing, usually calculated daily and expressed as a percentage of the remaining balance per year.
4	Type of Interest Rate	i. 'Fixed rate' ii. 'Variable rate' iii. 'Hybrid rate'	Fixed interest rates remain constant for a set period (usually one to five years) at the start of a loan and automatically switch to a variable rates after the fixed period. A variable rate changes with lending costs and usually fluctuate with official cash rates. Hybrid rate loans can have fixed and variable rate components simultaneously.
5	Establishment Fee ($)	i. $0 ii. $400 iii. $800 iv. $1,200	An establishment fee is a one-off charge for preparing and setting up a mortgage.
6	Repayment Type	i. Principal and Interest (P&I) ii. Interest-only (IO)	A P&I mortgage requires borrowers to pay part of the amount borrowed (principal) and the interest it accrues at the same time. An IO mortgage requires borrowers to pay only the interest during an agreed period of time.

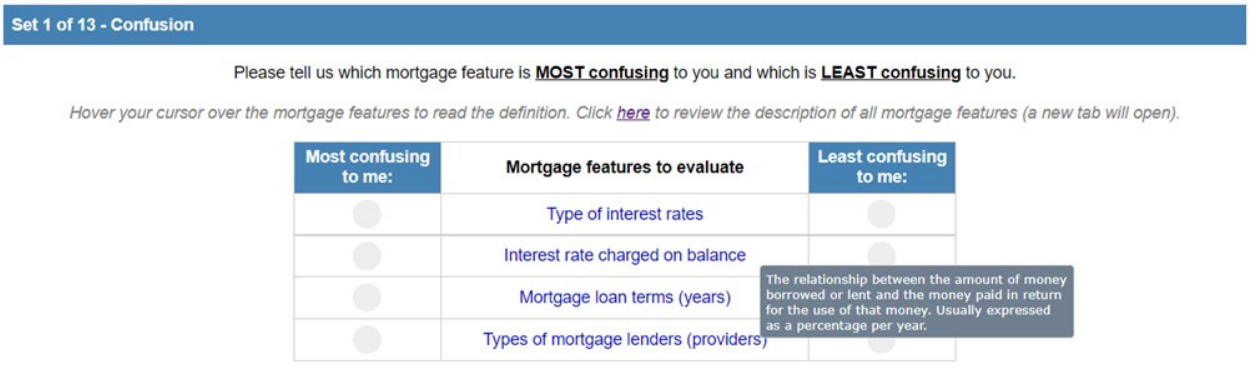
Continued

Table 2 – *Continued*

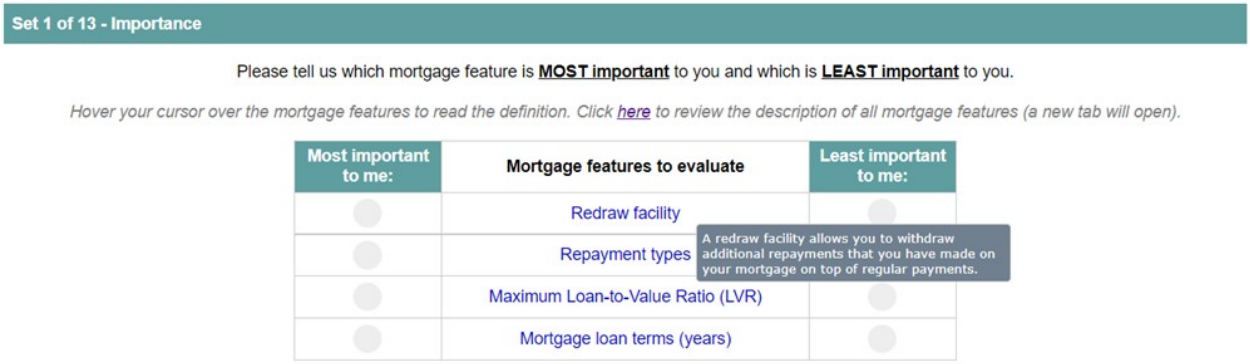
No.	Attribute	Attribute levels in DCE	Description
7	Ability to Make Extra Repayments	i. No ii. Yes	This facility allows borrowers to make payments in advance of the scheduled minimum to pay the loan off faster and provide a buffer against interest rate changes.
8	Maximum Loan-to-Value Ratio (LVR) (%)	constant	Max. LVR is the maximum amount of a mortgage as a percentage of the value of the property it was used to buy. The LVR is calculated by dividing the mortgage amount by the value of the property.
9	Lenders Mortgage Insurance (LMI)	constant	LMI insures mortgagees against borrower default. It is usually a one-off cost to borrowers charged when the amount borrowed exceeds 80% of the value of the property.
10	Offset Account	constant	An offset account is a separate deposit account that sits alongside the borrower's mortgage account. The balance in the offset account 'offsets' the principal of the loan so that overall mortgage interest is calculated on the principal less the offset account balance.
11	Redraw Facility	constant	A redraw facility allows borrowers to take out extra repayments they have made over and above the minimum repayments on their loan.
12	Portability	constant	A portable mortgage product allows borrowers to transfer their current mortgage from one house to another without the need to cancel and apply for a new loan.
13	Mortgage Package	constant	Mortgage packages are bundles of financial services often including credit card and transaction accounts offered by loan originators or mortgage brokers as add-ons to mortgages.

Figure 1. Screenshot of choice sets in the confusion and importance rating task of Survey 1, Task 1

These figures show examples of most-least choice sets for confusion and for importance. Each participant was randomly given these sets of questions 13 times, each time with 4 attributes to compare. The same attribute is shown an equal number of times in the sets and appears against each other attribute at least once.



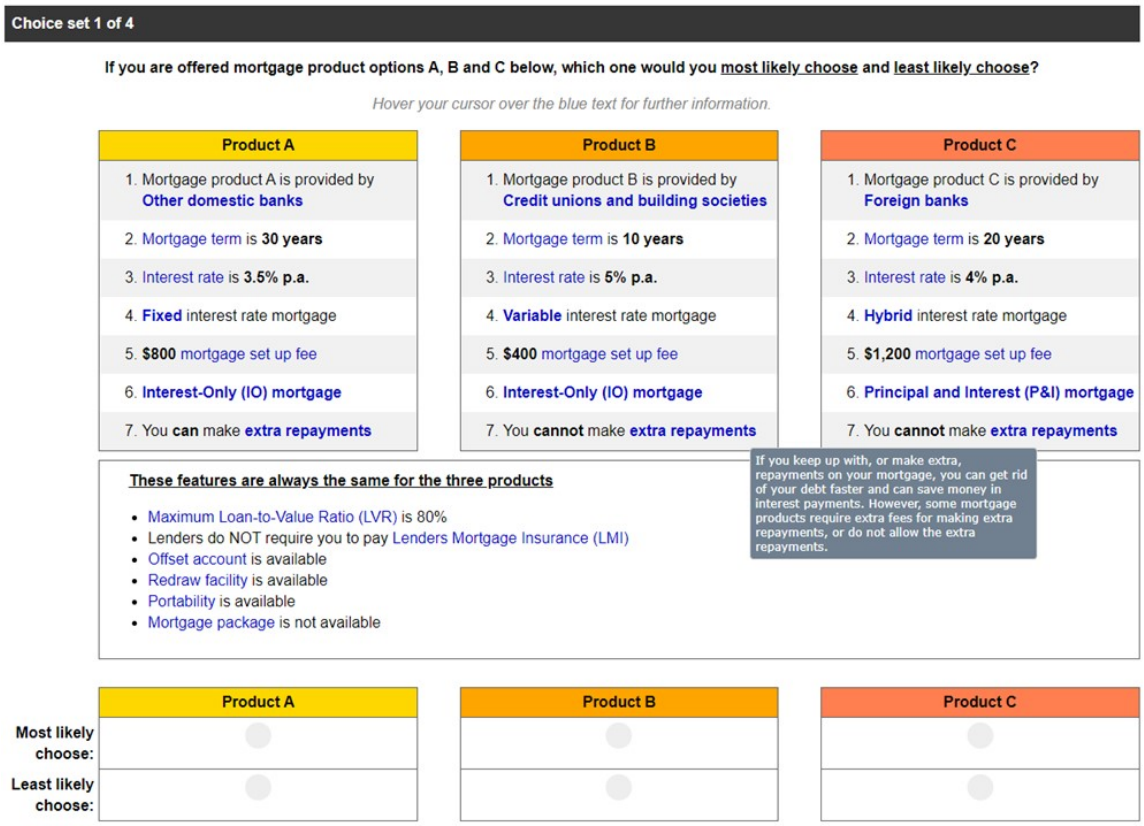
(a) Most-Least: Confusion



(b) Most-Least: Importance

Figure 2. Screenshot of a choice set in the mortgage choice task of Surveys 1 and 2, Task 2

This figure shows an example DCE choice set from Task 2 in Survey 1 and Survey 2. In Survey 1, each participant was given a total of 4 of 12 choice sets. In Survey 2, each participant answered 8 choice sets. In each choice set, each option consists of a particular combination of levels of 7 attributes. Other attributes were held constant across alternatives. The participants could check the definition of any attribute at any time during the task by hovering the pointer over the attribute.



3.2. Survey 2: Method and Sample

We conducted the second online survey in September 2023. Participants were again recruited by the panel provider, Dynata, so we could exclude participants who had completed Survey 1. A total of 1,200 participants completed Survey 2. Of these, 75 participants failed the attention check questions, and hence 1,125 participants are the basis of our empirical analysis.[15] Table 1 reports sample descriptive statistics for the Survey 2 participants.

Survey 2 began with a series of questions about participants' past experience with home loans and mortgage brokers, impressions of mortgage brokers, intentions to use mortgage brokers in the future, satisfaction with the mortgage process and advice services (for those who had applied for a mortgage), understanding of mortgage broker fees and confidence to undertake a similar decision in the future. From these questions, we could identify groups of participants by their past experience with applying for, and obtaining a mortgage, by their past consultation with mortgage brokers, and by their intention to use a broker in the future.

3.2.1. Survey 2 Task 1: Confusion and importance of attributes

The strength of the most-least task in Survey 1 is that it assesses relative confusion (importance) by forcing participants to discriminate between attributes. However, a drawback is that it does not provide absolute measures of subjective confusion (importance). It does not support inference on how confusing (important) partici-

[15]We used two attention check questions in this round. The first was the same as for Survey 1 and 68 participants failed this check. The second dropped 7 participants who said they had never applied for a home loan and then stated that they had taken a home loan in response to a later question.

pants perceive a particular attribute to be which makes comparing participants – the focus of Survey 2 – significantly more difficult. Task 1 in Survey 2 therefore used a different assessment of participants' confusion and importance by presenting each of the 13 mortgage attributes in Table 2 (in randomized order) and asking participants to rate these as 'not confusing', 'somewhat confusing' or 'very confusing' (similar for importance). Participants also completed a "mortgage literacy" quiz of 13 multiple choice questions, one on each of the mortgage attributes we evaluated in both surveys, scored by number of correct answers.[16]

3.2.2. Survey 2 Task 2: Choice of mortgages

Task 2 repeated the discrete choice experiment from Survey 1 while asking all participants to make 8 choices among mortgage bundles. Having a higher number of observations per participant in the experiment allows us to pursue the aim of Survey 2, and study differences between participants when they make realistically complex mortgage choices. Otherwise, the design, attributes and attribute levels were the same as in Survey 1.

4. Results: Confusion, importance and broker use

4.1. Confusion and importance across attributes

The Survey 1 Task 1 results reveal that participants do rate some attributes as much more confusing than others and, on average, assign relatively less importance

[16]Not all quiz questions were equally difficult and some had low rates of correct answers, so we report aggregate scores for the 13 attributes in Table 3. Online Appendix C reports the quiz questions.

to relatively more confusing features. Figure 3 shows the average 'most versus least' scores for relative confusion about, and importance of, mortgage attributes. Participants chose the attribute 'maximum loan-to-value ratio (Max. LVR)' most frequently (4,044 times) as most confusing and least frequently (719 times) as least confusing, giving an aggregated most minus least score of 3,325 and an average of 0.44. The most important attribute was the 'interest rate', rated most important 3,725 times and least important 586 times.

Figure 3. Comparisons of average most minus least scores (Survey 1, Task 1): Confusion and Importance.

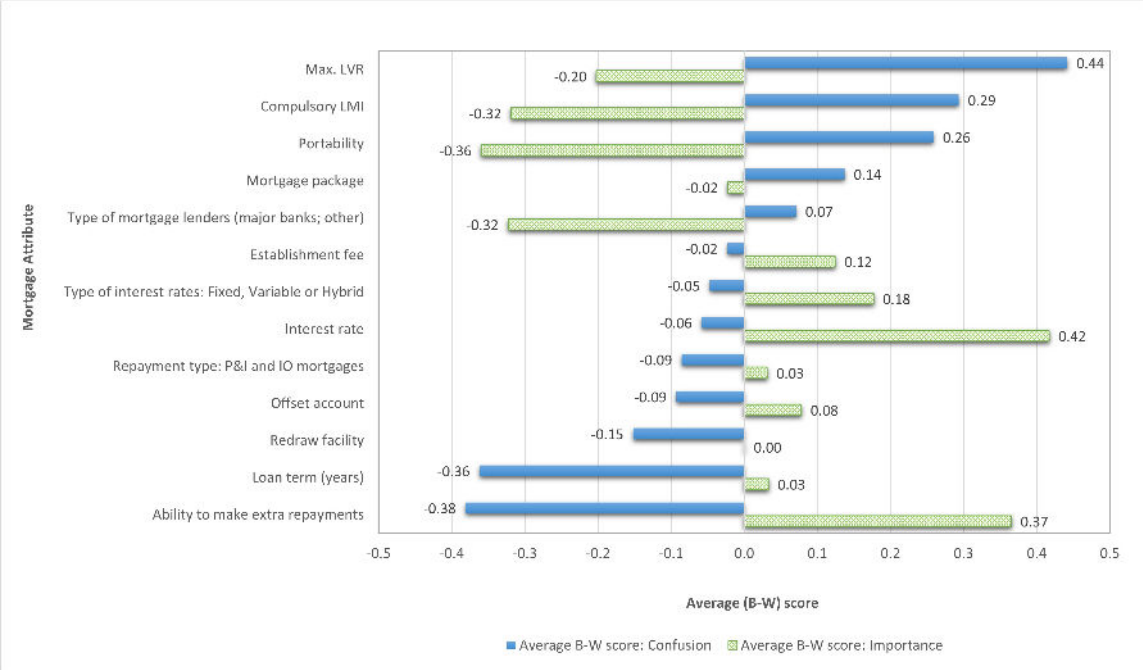


Figure 3 shows that relative confusion and importance are generally inversely related. Except for 'Redraw facility', the attributes that participants rated the most confusing, they also rated the least important, and vice versa. It is concerning that borrowers rate contract features linked to high leverage, including loan-to-value

ratios and the associated lender's mortgage insurance, as both relatively confusing and unimportant.

Survey 1 also provides some insights into differences between participants. At the beginning of Survey 1, we asked participants "Have you ever consulted a mortgage broker about a home loan?" (Y/N). Of the 1,881 participants, 958 participants have consulted a mortgage broker and 923 participants have never consulted a broker, a rate consistent with other surveys in Australia (see Table 1). Comparing the relative confusion and importance scores of the group of participants who have consulted a broker with those who have not, we find that the range across attributes of average 'most-least' scores for participants who use brokers is smaller.[17]

4.2. Confusion across participants

We use data from Survey 2 to investigate differences in confusion between broker users and other participants focusing on the two measures of confusion collected in this survey: the objective confusion assessed via a 'mortgage literacy' quiz, and the ratings of the 13 mortgage attributes as 'not', 'somewhat', or 'very' confusing.[18]

4.2.1. Associations between broker use and confusion

Overall, participants answered less than half of the attribute quiz questions correctly (45.8%, see Table 3). Participants who had applied for a mortgage in the past answered correctly more often than those who had not applied (6 percentage points

[17]Online Appendix D.1 reports tables and estimation results that support this inference.

[18]Note that we also assessed absolute levels of importance this way. Importance ratings show less variation than confusion ratings and most participants rated a majority of attributes as very important.

higher), and conditioning on having applied for a mortgage, participants who had not consulted a broker in the past (i.e., those that directly went through a loan officer) answered correctly more than broker users (5 percentage points higher). Among those who had not yet applied for a mortgage, there was no significant difference between people who planned to consult a broker in the future, not having done so in the past, and those who did not plan to consult a broker. These patterns of objectively measured knowledge of mortgage attributes show two preliminary associations in the data. First, that, on average, making an application for a mortgage is associated with less objective confusion about mortgage attributes; and second, that having consulted a broker conditional on having applied for a mortgage is associated with more objective confusion.

Table 3 also reports the percentage of participants who rated each attribute as 'very confusing' averaged over all 13 attributes. On average, over all participants and attributes, 'very confusing' was chosen 10.55% of the time. Attributes were rated 'very confusing' significantly more often by broker users and people who had not applied for a mortgage. Participants who had applied and had not consulted a broker chose 'very confusing' only half as often as the overall average for the sample.

The last measure in Table 3 shows group-wise comparisons of standardized confusion ratings. For each participant, we compute their mean confusion rating ('not' = 1, 'somewhat' = 2, 'very' = 3) across the 13 attributes, then standardize these into z-scores for all participants. The differences between standardized means for each group confirm higher overall subjective confusion of people who have not applied for a mortgage, and of broker users, while the standardized confusion scores

Table 3: **Confusion Ratings: Mortgage experience and broker consultation (Survey 2, Task 1)**

This table reports mean scores for three measures of mortgage attribute confusion for all survey participants and for groups distinguished by having consulted a broker and having applied for a mortgage. 'Quiz score' is the average percentage of correct answers to a quiz testing participants' objective knowledge of the 13 mortgage attributes shown in Table 2. (Online Appendix C reports the quiz questions.) 'Very Confusing' reports the average over 13 attributes of the number of participants who rated the attribute as very confusing (alternatives 'not' or 'somewhat' confusing). 'Std confusion score' is the average over 13 attributes of the standardized (mean=0; std dev =1) confusion score (not=1; somewhat=2; very=3) for participants in each group. p-values relate to tests for equal means of groups within adjacent rows.

	No. of participants	Quiz score average		Very confusing average		Std confusion score	
		(%)	p-value	(%)	p-value	z-score	p-value
All participants	1,125	45.80		10.55		0.000	
Has consulted broker	639	45.00		12.34		0.770	
Has not consulted broker	486	46.80	0.810	8.20	0.000	-0.101	0.003
Has applied for a mortgage	949	46.75		9.95		-0.067	
Has not applied for a mortgage	176	40.56	0.000	13.77	0.017	0.364	0.000
Has applied for a mortgage							
Has consulted a broker	600	45.06		12.45		0.067	
Has not consulted a broker	349	49.64	0.000	5.66	0.000	-0.299	0.000
Has not applied for a mortgage							
Will consult a broker	110	40.70		14.69		0.402	
Will not consult a broker	27	35.33	0.122	14.53	0.976	0.400	0.994

of people who intend to consult a broker in the future, and those who do not, are not significantly different from each other. These subjective ratings of confusion about mortgage attributes are consistent with the quiz scores: before applying for a mortgage, the confusion of people who intend to consult brokers is indistinguishable from people who do not plan to go to brokers; confusion is significantly lower after applying for a mortgage compared with before; and confusion is significantly lower for those who do not consult brokers than for those who do.

4.2.2. Identification of broker effects on confusion

Previous studies (including our focus groups) show that certain types of borrowers are likely to choose to go to brokers instead of directly to lending institutions, including people with less experience (ASIC, 2019) or confidence (Deloitte, 2018), who want 'peace of mind' (Gennaioli et al., 2015, Thorp et al., 2023), who think the broker can help with loan approval or who rely on past personal experience or recommendations (ASIC, 2017). As such, the question arises about which of the differences in the previous section stem from differences between the type of borrowers who consult brokers, creating selection bias, and which stem from differences that can be attributed to using a broker. [19]

To disentangle these two effects and account for the possible bias resulting from self-selection into broker use, we focus on a subsample of Survey 2 participants, namely those who applied for their first mortgage in the year prior to the survey. This group has not been 'treated' previously and has been through the application

[19]Online Appendix D.2 reports results of a logit estimation of broker use by participant characteristics.

recently and around the same time. While this selection of participants allows us to control at least partly for differences in confusion that arise from having taken a mortgage very recently versus a long time ago, we still face the issue that broker users have chosen to engage brokers. We correct for this selection bias by instrumental variables estimation using just this subsample (N=134).

OLS and IV estimation: Table 4 reports OLS and IV estimates of the effect of broker use (vs. loan officer use) on attribute quiz scores and subjective mortgage attribute confusion and importance, using the confusion and importance scores of participants who have applied for a mortgage in the past year (N=134), and either have consulted a broker or taken a loan via a financial institution directly. We instrument for broker use with a variable that captures the number of participants from a separate survey who reside in the same postcode as the participant and who report having previously consulted a mortgage broker. The intuition underlying this instrument is that a participant's likelihood of consulting a broker is higher if people in their neighborhood do so, but this is unlikely to be correlated with individual mortgage attribute confusion or importance.[20]

Both OLS and IV estimates in Table 4 reveal a significant treatment effect where consulting a broker rather than a loan officer is associated with an 83% (=1.312/1.548) decrease in the average attribute quiz score relative to the baseline of non-broker users. The effect on subjective average confusion is also large and

[20]The separate survey was collected April 2021 (n=1601) from a different panel provider, again screening on having taken, or intending to take, a mortgage, the same age filters, and very similar income filters. We also tested an alternative instrument, that measured the number of registered financial advisers in a participant's postcode. This instrument is slightly weaker than the other and estimates are similar.

significant. These results show that making a mortgage application via a broker causes more attribute confusion (or reduces it less) than via direct interaction with a loan officer from a lending institution.[21]

5. Attribute preferences, confusion and broker use

The impact of broker use on confusion documented in Section 4.2 as well as the association between confusion and importance discussed in Section 4.1 raise questions about the degree to which broker use may impact preferences for mortgage attributes and thus choices between mortgages. A first snapshot of this impact is given in Table 5. In Survey 2 we asked participants who had taken mortgages about whether and how they had revised their plans while choosing a mortgage. Table 5 shows percentages of participants who chose a mortgage with different attributes than they had in mind before applying. Changes of planned mortgage features were more common for broker users. Notably, 22.67% of broker users reported taking a bigger loan than they had anticipated, compared with 4.87% of non-broker users, and almost one quarter of broker users said they took a longer loan term, double the percentage of non-broker users. While more than 10% of broker users also said they took smaller loans and shorter terms, the effect of changes among broker users

[21]We make two robustness checks of this hypothesis. First, we re-estimate the models in Table 4 using a larger sample that includes all participants who have ever applied for a mortgage. This larger sample test confirms the findings. Second, we supplement the subsample used to estimate models in Table 4 with observations from those participants who have not applied for a mortgage in the past year, but intend to do so in the future (total N=324) distinguished by those who do and do not intend to engage a broker. We compare the confusion of broker users before and after taking a mortgage with non-broker users before and after taking a mortgage. Bias due to selection on unobservables is mitigated by using pre-mortgage intention to engage a broker as the baseline for changes in confusion. See Online Appendix D3.

Table 4: **Impact of broker on confusion: OLS and IV estimations (Survey 2, Task 1)**

This table reports OLS and 2SLS estimates of the effect of broker use on objective and subjective confusion about mortgage attributes. The sample (N=134) are survey participants who report that they have applied for a mortgage in the year prior to the survey. 'Quiz Score' is the individual participant percentage of correct answers to a quiz of objective knowledge of the 13 mortgage attributes shown in Table 2. (Online Appendix C reports the quiz questions.) 'Confusion' is the average over 13 attributes of the individual participant's ratings (not=1; somewhat=2; very=3). 'Broker use' is an indicator equal to 1 if the participant reports having consulted a mortgage broker in the past; 0 otherwise. The instrument 'prevalence of broker use' is the number of respondents to an earlier survey who live in the postcode of the participant and who report having consulted a mortgage broker. Statistics are robust to heteroscedasticity.

	Quiz Score All attributes		Confusion Average rating	
	OLS	2SLS	OLS	2SLS
Broker use	-0.102**	-1.312***	0.374***	4.431***
	(0.046)	(0.480)	(0.123)	(1.711)
Constant	0.456***	1.548***	1.574***	-2.090
	(0.044)	(0.456)	(0.110)	(1.621)
First stage estimates Instrumented variable: Broker use				
Prevalence of broker use		0.0027***		0.0027***
KP rk LM statistic		6.654		6.654
p-value (Underidentification)		0.010		0.0109
KP rk Wald F statistic		9.612		9.612
Observations	134	134	134	134

is towards mortgage features that increase broker remuneration.

Table 5: **Borrowers' changes to planned mortgage: broker-users and non-broker users (Survey 2)**

This table reports the percentage of participants' responses to the question: 'Did you make any changes to the type of mortgage you took out as a result of 'meeting with your mortgage broker' (or 'your mortgage research' for participants who had not consulted brokers), by loan size, interest rate type (fixed or variable) and loan term.

	Applied for a mortgage (%)			
	All	Broker	No Broker	p-value br v. no br
Changes from planned mortgage:				
Bigger loan size	16.12	22.67	4.87	0.000
Smaller loan size	10.01	11.67	7.16	0.026
Same loan size	62.07	55.17	73.93	0.000
No size in mind	11.08	14.04	10.5	0.103
Changed to variable from fixed rate	19.28	25.17	9.17	0.000
Changed to fixed from variable rate	12.96	16.50	6.88	0.000
Same rate type	50.69	44.17	61.89	0.000
No rate type in mind	17.07	14.17	22.06	0.002
Longer term	19.81	24.50	11.75	0.000
Shorter term	11.80	14.17	7.74	0.003
Same term	56.69	50.33	67.62	0.000
No term in mind	11.70	11.00	12.89	0.382
Participants	**949**	**600**	**349**	

5.1. Willingness to pay within a hierarchical model with IV

To gain more insights into the relationship between broker use and preferences, we now turn to the results of the choice experiments, where participants had to choose between mortgages with attributes bundled together. We first estimated mixed logit models in preference space using the data from the choice tasks in Surveys 1 and 2. Results (see Online Appendix D.4) show significant heterogeneity in preferences

across participants. This result motivates a deeper exploration of preferences by allowing variation by participants' characteristics, including absolute levels of confusion and broker use. The mixed logit estimates also show that preferences for the mortgage interest rate are close to linear. Close-to-linear preferences for interest rates facilitate estimation of the mixed logit model in willingness-to-pay space with interest rate points as the numeraire. The willingness-to-pay estimates can help interpret differences in preferences between otherwise non-comparable attributes.

5.1.1. Model specification

We assume that the utility u_{ijt} of alternative j in choice set t for participant i is a function of the attribute levels X_{kjt}, $k \in \{1, ..., K\}$ of the alternative as well as the preferences β_{ik} that the participant has for these attributes, and impose the restriction that utility is linear in interest rate:

$$u_{ijt} = \alpha_i \text{Interest Rate}_{ijt} + \sum_{k=1}^{\tilde{K}} \beta_{ik} X_{kjt} + \varepsilon_{ijt}, \tag{1}$$

where α_i measures preferences for the interest rate and $\tilde{K}$ is the number of remaining attribute levels of the alternatives. $\varepsilon_{ijt} \sim i.i.d. Gumbel(0, 1)$ is the error term which captures unobservable (to the researcher) factors that impact participants' choices.

Willingness to pay for an attribute in terms of changes in interest rates can be expressed as the ratio of the marginal utility of that attribute and the marginal (dis)utility of a higher interest rate $\gamma_{ik} = -\beta_{ik}/\alpha_i$. Thus we can rewrite equation (1) as:

$$u^*_{ijt} = \left(-\text{Interest Rate}_{jt} + \sum_{k=1}^{\tilde{K}} \gamma_{ik} X_{kjt} \right) + \varepsilon^*_{ijt} = v^*_{ijt} + \varepsilon^*_{ijt}, \tag{2}$$

where $\varepsilon^*_{ijt} = -\varepsilon_{ijt}/\alpha_i$ and $u^*_{ijt} = -u_{ijt}/\alpha_i$.

Equation (2) results again in logit choice probabilities and represents the mixed logit in WTP space.

Assuming γ_{ik} to be normal distributed with diagonal covariance and using simulated maximum likelihood estimation to obtain its mean and standard deviation[22], we first estimate this model for all participants, without distinguishing by participant characteristics. We then regress the resulting predicted individual (participant) level WTPs for each attribute ($\hat{\gamma_{ik}}$, see Huber & Train, 2001) on participant characteristics:

$$\hat{\gamma_{ik}} = \sum_{l=1}^{L} \delta_{kl} P_{il} + e_{ik}, \tag{3}$$

where $P_{il}, l \in \{1, ..., L\}$ are characteristics of the participant (here financial literacy, subjective attribute confusion scores and broker use), and e_{ik} are normally distributed error terms. We instrument for broker use with the same instrument used in section 4, that is, prevalence of broker use by postcode, and estimate 2SLS models that distinguish between participants by broker use and financial literacy.

[22]By estimating the model directly with distributional assumptions for γ_{ik}, we avoid problems associated with non-finite variances when calculating the ratios of parameters from the mixed logit model (see also Hole & Kolstad, 2012).

5.1.2. Model estimation results

Table 6 reports the results for the model where the dependent variable, participant i's WTP γ_{ik} for each attribute k is explained by a set of observable participant-specific characteristics, past experience of using a mortgage broker and financial literacy. The reference level for major banks is other lenders; for fixed interest rate it is hybrid rates; for variable rates it is hybrid rates; for P&I repayment option it is interest-only repayments; and for the ability to make extra repayments it is not having the ability to make extra repayments.

Table 6, Panel A, shows the sample average of individual WTP for each attribute from the second stage regression of the 2SLS models. Participants, on average, are willing to pay more for mortgages offered by one of the major banks, shorter loan terms, variable rate loans over hybrid rate contracts, lower establishment fees, P&I repayment options relative to IO repayments and the flexibility of early repayments. On average, participants are willing to pay an interest rate 0.136 percentage points higher for a mortgage from a major bank and 0.001 percentage points higher to reduce the loan term by one year. Also, participants are willing to pay an interest rate 0.835 percentage points higher to avoid \$1,000 establishment fees[23] and willing to pay 1.451 percentage points for the option to pre-pay the mortgage.

To help interpretation, we calculate the dollar impact of the changes in interest rates implied by the estimated average willingness to pay using a benchmark mortgage contract (see Panel A, row 4). We set the benchmark mortgage size at \$500,000, with a reference fixed interest rate of 3.5% p.a. for a 20-year loan term.

[23]In the model, the establishment fees are measured in units of \$1,000.

Hence, the benchmark's baseline monthly payment is $2,900. Against this benchmark, we estimate that participants are willing to pay an interest rate of 3.64% p.a. (3.5 + 1.36) for a mortgage from a major bank, resulting in a total impact over 20 years of $5,974 in present value terms. Participants are also willing to pay 4.95% p.a. (1.451% p.a. more than the 3.5% benchmark) for a mortgage with an option to repay early, resulting in a significantly larger total 20-year impact of $58,800 in present value.

Table 6, Panel B, reports each attribute's WTP after controlling for selection bias from Equation 3. These estimates show that, compared to participants who have not consulted brokers in the past, broker users are willing to pay higher establishment fees (0.679), place less value on P&I repayments relative to interest-only repayments (-1.047) and place less value on the option to make extra repayments (-2.238). Broker users are willing to pay more for attributes that align with higher broker remuneration, such as longer loan terms and high volume arising from interest-only repayment. By contrast, highly financially literate participants have higher WTP for P&I versus IO repayment (0.253) compared to less literate participants. More financially literate borrowers will pay less for a loan from a major bank versus a loan from another lender (-0.046).

Table 6: **The effect of broker use and financial literacy on willingness to pay for mortgage attributes (Survey 2, Task 2)**

This table shows the estimation results for the mixed logit models in WTP space where the coefficient on interest rates is set equal to 1 and its standard deviation is 0. Panel A, row 1, reports the sample average individual WTP relative to base level, measured in interest rate points. Row 4 shows the estimated present value dollar impact for each mortgage attribute and its level, assuming a $500,000 mortgage with a reference fixed rate of 3.50% p.a. for 20-year loan term. Panel B reports second stage estimates from a 2SLS model where the dependent variable is participant-level WTP (predicted from equation 2), broker use is the instrumented variable, the excluded instrument is number of broker users in participant postcode from a separate data collection, and the included instrument is an indicator for high financial literacy. Panel C reports first stage estimation of 2SLS. Standard errors are in parentheses. *** $p < 0.01$; **$p < 0.05$; *$p < 0.1$.

Panel A: Sample average WTP for each attribute - 2SLS estimation

	Major banks	Loan term	Fixed rate	Variable rate	Est. fee	P&I	Extra repay.
Sample Average WTP	0.136	-0.001	-0.106	0.019	-0.835	1.143	1.451
95% CI: Lower Bound	0.130	-0.002	-0.108	0.018	-0.855	1.111	1.385
95% CI: Upper Bound	0.142	0.001	-0.105	0.019	-0.815	1.175	1.517
$ amount impact in 20 years in PV	$5,974	-$44	-$4,727	$841	-$39,018	$47,186	$58,800

Panel B: Parameter estimates

Explanatory variables:	Dependent variable (WTP for each attribute):						
	Major banks	Loan term	Fixed rate	Variable rate	Est. fee	P&I	Extra repay.
Use broker	-0.194	-0.048	0.053	-0.012	0.679**	-1.047**	-2.238***
	(0.125)	(0.030)	(0.055)	(0.008)	(0.341)	(0.452)	(0.687)
Financial literacy	-0.046***	-0.003	-0.004	-0.001	0.006	0.253***	0.06
	(0.017)	(0.004)	(0.006)	(0.001)	(0.043)	(0.061)	(0.100)

Panel C: First stage estimates

Instrumented variable:	Use Broker
Prevalence of broker use by postcode	0.005***
	(0.001)
Financial literacy	-0.067**
	(0.030)
KP rk LM statistic	14.36
KP rk Wald F statistic	16.38
Observations	1,125

5.2. Decomposing the Effects of Broker Use and Subjective Confusion on WTP for Attributes

The results in Table 3 showed that, before applying for a mortgage, the confusion of borrowers who intend to consult brokers and that of those who do not intend to consult brokers is similar. The results also showed that after applying for a mortgage, borrowers who have used brokers are objectively and subjectively more confused about mortgage attributes than borrowers who have gone directly to lenders. This relation between brokers and confusion suggests a mediation model for mortgage preferences, where broker use can affect attribute preferences directly (e.g., brokers may stress the benefits of an attribute) as well as indirectly via attribute confusion (e.g., brokers may provide more information on one attribute versus another). To account for self-selection into broker use, we implement the method of Dippel et al. (2022) and conduct a causal mediation analysis to find the direct and indirect effects (via confusion) of broker use using a single instrumental variable.

Dippel et al. (2022) use a three stage approach to estimate the direct and indirect effects of a treatment on an outcome that is mediated by another variable. Following their labels, the treatment variable in our mediation model, T, is consulting a mortgage broker (vs. taking out a mortgage directly via a loan officer), the outcomes Y are the willingness to pay for mortgage attributes, and the mediating variables M are subjective confusion ratings for mortgage attributes. The total effect of consulting a broker T on attribute willingness to pay, Y, can be decomposed into an indirect effect from T to Y mediation by M and a direct effect from T to Y. We employ the same instrument Z as in Section 4, i.e., the prevalence of broker use by postcode, for

IV analysis in the mediation model.

The model consists of four equations (Dippel et al., 2022, p.209):

$$Z = \epsilon_Z \tag{4}$$

$$T = \beta_T^Z \cdot Z + \epsilon_T \tag{5}$$

$$M = \beta_M^T \cdot T + \epsilon_M \tag{6}$$

$$Y = \beta_Y^T \cdot T + \beta_Y^M \cdot M + \epsilon_Y \tag{7}$$

where $\epsilon_Z, \epsilon_T, \epsilon_M$ and ϵ_Y are error terms. The model is identified with a single IV, Z, if ϵ_T is independent of ϵ_Y conditional on ϵ_M and observable variables.[24] The mediation analysis defines the direct effect of broker use on attribute preferences as $DE = \beta_Y^T$; the indirect effect of confusion on preferences is $IE = \beta_M^T \cdot \beta_Y^M$ and the total effect, either measured as $TE = \beta_Y^T + \beta_M^T \cdot \beta_Y^M$ or by the effect of the coefficient on broker use in Table 6.[25]

Estimation of the mediation model proceeds in three stages. The first stage (Model I) measures the total effect of consulting a broker T on WTP for each attribute Y, i.e., it equals the 2SLS WTP model in Equation 2 reported in Table 6. (We also include a participant's financial literacy score as a control variable P.)[26]

[24]For this restriction to be rejected there must be an unobserved variable that, in our case, is orthogonal to confusion and that causes both broker use and borrower attribute willingness to pay.

[25]Dippel et al. (2022) note that these two methods for calculating the total effect are equivalent in the case of a single IV, as we have here.

[26]We chose financial literacy after investigating a larger set of controls that included demographics, risk aversion, patience and responsibility for household financial decisions. However we excluded these as not relevant and to increase efficiency in the estimation.

In the second stage (Model II, Equation 6), we estimate for each attribute the impact of broker use on the respective attribute's subjective confusion scores (ratings of the attribute as 'not', 'somewhat', or 'very' confusing) via 2SLS, where the instrumented variable is the participant's past broker use, the excluded instrument is the number of broker users in the participant's postcode, and the included instrument is the participant level indicator for high financial literacy. The third stage (Model III, Equation 7) conducts a 2SLS estimation where the dependent variables are individual willingness to pay for the mortgage attributes in the DCE, the instrumented variable is the participant level subjective confusion rating for the attribute, the excluded instrument is the number of broker users in the participant's postcode, and the included instruments are the participant level indicators for broker use and high financial literacy. Table 7 reports the estimations results and the related mediation analysis.

Table 7: **Effects of broker use, attribute confusion and financial literacy on willingness-to-pay for mortgage attributes.**

Panel A reports estimates of Equation 6, i.e., 2SLS estimates of impact of broker use on participants' attribute confusion using the single IV of the prevalence of broker use by postcode to instrument for broker use. Confusion is measured by ratings of attributes as 'not'=1, 'somewhat'=2, or 'very'=3 confusing. 'Used broker' is an indicator when the participant has consulted a mortgage broker in the past. The lower section of Panel A reports first stage results. Panel B reports 2SLS estimates of Equation 7, where the effect of broker use is treated as mediated by attribute confusion, using the single IV of broker use by postcode to instrument for confusion. The lower part of Panel B reports first stage estimation results. Panel C reports estimates of total and direct effects and calculations of indirect effects and indirect effects over total effects of broker use on WTP for attributes. Standard errors in parentheses. *** $p < 0.01$; **$p < 0.05$; *$p < 0.1$.

Panel A	Model II						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Confusion	Major bank	Loan Term	Rate Type	-	Est. fee	P&I	Extra Repay.
Used broker	1.542***	1.470***	1.293**	-	1.060**	0.779*	0.653*
	(0.525)	(0.567)	(0.514)	-	(0.470)	(0.403)	(0.396)
High fin. lit.	-0.178**	-0.236***	-0.217***	-	-0.222***	-0.241***	-0.268***
	(0.071)	(0.070)	(0.066)	-	(0.060)	(0.053)	(0.052)
First-stage estimates							
Instrumented variables:			Use broker				
Broker use by postcode			0.005***				
			(0.001)				
High fin. lit.			-0.067**				
			(0.030)				
KP rk LM statistic			14.36				
KP rk Wald F statistic			16.38				

Panel B	Model III						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
WTP:	Major bank	Loan Term	Fixed Rate	Variable Rate	Est. fee	P&I	Extra Repay.
Used broker	0.008	0.010***	0.001	0.001	0.017	0.076	0.119
	(0.014)	(0.004)	(0.007)	(0.001)	(0.038)	(0.083)	(0.271)
High fin. lit.	-0.069**	-0.012	0.004	-0.004	0.145	-0.094	-0.906
	(0.027)	(0.009)	(0.015)	(0.003)	(0.112)	(0.240)	(0.803)
Confusion							
Lender	-0.131						
	(0.083)						

Continued

Table 7 - *Continued*

Panel B	Model III						
WTP:	(1) Major bank	(2) Loan Term	(3) Fixed Rate	(4) Variable Rate	(5) Est. fee	(6) P&I	(7) Extra Repay.
Loan Term		-0.039* (0.023)					
Rate Type			0.040 (0.048)	-0.010 (0.007)			
Est. Fee					0.625* (0.368)		
P&I						-1.441* (0.789)	
Extra Repay.							-3.608 (2.559)
First-stage estimates Instrumented variable:	Confusion Lender	Confusion Loan Term		Confusion Rate Type	Confusion Est. Fee	Confusion P&I	Confusion Extra Repay.
Broker use by postcode	0.008*** (0.002)	0.007*** (0.002)		0.006*** (0.002)	0.005** (0.002)	0.004* (0.002)	0.003 (0.002)
Broker use	0.040 (0.037)	0.039 (0.039)		0.083** (0.039)	0.016 (0.039)	0.051 (0.039)	0.081** (0.040)
High fin. lit.	-0.278*** (0.037)	-0.332*** (0.038)		-0.298*** (0.039)	-0.292*** (0.038)	-0.289*** (0.039)	-0.306*** (0.039)
KP rk LM statistic	12.58	9.72		7.78	5.83	3.74	2.11
KP rk Wald F statistic	14.21	10.98		8.39	6.12	3.74	2.10
Panel C	Decomposition						
Total effect (Tab 6, Pnl B) $(\beta_Y^T + \beta_M^T \cdot \beta_Y^M)$	-0.194	-0.048	0.053	-0.012	0.679**	-1.047**	-2.238***
Direct effect (Tab 7, Pnl B) (β_Y^T)	0.008	0.010***	0.001	0.001	0.017	0.076	0.119
Indirect effect (calculated) $(\beta_M^T \cdot \beta_Y^M)$	-0.202	-0.057	0.052	-0.013	0.663	-1.123	-2.356
Indirect /Total (calculated)	1.0412	1.1944	0.9758	1.0775	0.9757	1.0721	1.0527

First, in line with the results from Section 4, which showed that broker use increases average confusion across all attributes for a participant, the results in Table 7, Panel A row 1, confirm that broker use also causes higher subjective confusion scores for all attributes individually, with all coefficients on the broker user indicator positive and significant (at 10% or lower level of significance). High financial literacy consistently lowers subjective confusion (Panel A row 2) while the net effect for broker users who are also highly literate is still an increase in subjective confusion. Panel B shows that attribute-specific confusion matters for willingness to pay for loan term (participants who are more confused about loan terms are willing to pay less for a longer term; in other words, they are more comfortable with shorter terms than the less confused, all else equal), establishment fees (participants who are more confused about establishment fees are willing to pay more for them; in other words, they are more comfortable with paying these fees than the less confused, all else equal) and principal-and-interest repayments (participants who are more confused about P&I mortgages are willing to pay less for them). Conditioning on attribute-specific confusion, highly financially literate borrowers discount the value of major bank lenders. Notably, broker users will pay more for longer loan terms.

Table 7 reveals interesting insights into the mechanisms by which broker use influences willingness to pay for attributes. For loan term, the ratio of indirect to total effect suggests that the indirect effect is larger than the total effect by a factor of 1.2, which implies an opposing direct effect. In fact, while broker use leads to higher confusion about loan term which in turn leads to lower willingness to pay for a longer loan term, the direct effect of broker use on willingness to pay for a longer loan is

positive. This suggests that counteracting the decrease in willingness to pay due to increased confusion, brokers directly steer participants towards longer loan terms. We observe similar opposing direct factors for willingness to pay for P&I and for extra repayments. For both of these attributes, broker use leads to higher confusion which in turn leads to lower willingness to pay for these attributes, whereas the direct effect of broker use is positive and relatively small in comparison. In these instances, the interest of brokers in moving clients towards loans with a longer duration and higher remaining balance (via choosing an interest-only schedule and giving up the option to make extra repayments) is served by confusion.

The impact of brokers on establishment fees needs to be understood in context. Considering that, on average, participants are highly opposed to paying establishment fees (to save $1,000 in establishment fees participants are willing to accept a loss of $39,018 in present value over a 20-year loan, see Table 6), broker users here benefit, as their willingness to pay for avoiding $1,000 in establishment fees is much lower than the average (at a loss of $6,995 in present value over a 20-year loan[27]). Most of this effect is driven by the indirect mediation effect via confusion (broker use leads to more confusion) and a very minor direct broker impact. Since brokers are paid only for successful loan applications, brokers may have an interest in helping clients tolerate up front fees so as to close the deal.

In summary, our results show that, while brokers can influence borrowers' prefer-

[27]To calculate the dollar amount impact for broker users here, we take -0.835, the sample average WTP for establishment fees in Panel A, Table 6, and add to it 0.679, the coefficient of User Broker on WTP for establishment fee from Panel B; the resulting WTP for establishment fee for broker users is -0.156. We then estimate the present value dollar impact of -0.156 using the same method as in Panel A, Table 6.

ences both directly as well as indirectly via their impact on borrower confusion, the impact of the broker is dominated by the indirect effect.

6. Conclusion

Borrowers choosing residential mortgages enter a large and complex market where the costs and benefits of decisions, in terms of lifetime utility and financial wellbeing, can be high. Our analysis confirms findings of earlier studies that a substantial proportion of households do not understand typical mortgage contract features and are unsure that they have made a satisfactory choice after taking out a loan. If borrowers turn to expert advisers, in this case mortgage brokers, for help and education, they face a trade-off between the possible benefits of accessing and acquiring expertise, and the possible costs of misdirection if brokers steer them towards towards riskier or more costly products. In many countries, policymakers have directed mortgage brokers to act in the best interest of their clients, including by educating clients about mortgage features. At the same time, brokers' steering of clients can be motivated by prevailing commission arrangements that pay brokers by loan value and duration, creating a tension with broker obligations to act in clients' best interests.

Our study shows that borrower confusion about mortgage attributes is a significant influence on borrower preferences and that confusion is markedly impacted by interaction with brokers. Across attributes, we show that borrowers rank relatively confusing attributes as relatively unimportant. This inverse relation is a concern when borrowers treat objectively important, risk-related attributes such as loan-to-value ratios as most confusing and least important, relative to other attributes.

Comparing between borrowers, we also find significant differences in objective and subjective confusion. Participants in the sample who have applied for a mortgage were less confused than those who have not made an application and intend to in the future. However, somewhat surprisingly, borrowers who have gone directly to a lender to make their application come through the process much less confused than borrowers who have engaged brokers. We show that this higher *ex post* confusion among broker users is robust to controlling for selection into broker use. Contrary to the expectations of regulators and policymakers, the experience of engaging a mortgage broker does not educate clients or mitigate confusion as effectively as the experience of engaging directly with a lender.

The next stage of our analysis showed that broker engagement and confusion interact to affect borrowers' willingness to pay for mortgage attributes, potentially changing financial outcomes. We decomposed the direct and indirect effects of brokers and confusion in a three stage model that relies on a single IV. On the basis of this identification strategy, we do find evidence of steering. This occurs directly – with brokers moving client preferences towards longer loan terms, and indirectly – with confusion leading borrowers away from pre-payment options that reduce ongoing loan balances (and thus broker commissions). By contrast, financial literacy ameliorates confusion effects and supports willingness to pay for less risky products.

Despite the higher attribute confusion of broker users, our survey shows that they also express both higher satisfaction and higher confidence than borrowers who took loans directly from lending institutions.[28] This positive assessment of advice

[28]See Online Appendix D.5: 80% of broker users were confident they chose the best loan compared

and advisers by broker users aligns with earlier research into persistent satisfaction in other advice settings (Agnew et al., 2018; Mullainathan et al., 2012).

Our results support calls for interventions to reduce consumer confusion by effective education in this type of high-stakes household financial decision. Our analysis shows that financially literate participants and broker users do not have the same preferences. Moreover, we verify that brokers, contrary to expectations of regulators (ASIC, 2020), are not conduits to financial literacy. Brokers following regulator guidance to offer a few, well chosen options to their clients probably simplify choices for confused borrowers. This simplification may help by reducing choice overload, and raising satisfaction, while not adding to borrowers' mortgage knowledge.

Our results motivate a multi-strand approach to public policy and regulatory reform. First, standard mortgage product disclosures (e.g., fact sheets) should explain both the definition of product attributes and the implications of the various options on total repayments. Second, there should be increased effort to improve population-wide financial literacy and the ability of potential borrowers to understand mortgage product features and their importance in a loan contract (Kaiser et al., 2022; Guiso et al., 2022; Lusardi & Mitchell, 2023). Our results suggest that a stronger focus on (simulated) experience based learning (see Bradbury et al., 2015) to mimic the knowledge gained from a mortgage application process might be worthwhile. This should enhance the ability of borrowers to assess mortgage products recommended by brokers. Third, financial institutions should proactively manage their service qual-

with 65% of non-broker users; 82% (versus 77%) were satisfied with the service of their broker (loan officer); and 54% (versus 30%) were confident about going through the process again.

ity to increase satisfaction in their services (e.g., Lymperopoulos et al., 2006) and thus reduce brokers' appeal. Lastly, given the strong influence of mortgage brokers on borrower preferences, policymakers should review mortgage broker regulation to better align incentives for mortgage brokers and the potentially confused borrowers they advise.

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