NPV Neglect in Consumer Behavior for Multi-period Borrowing Decisions

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Both basic economics and popular wisdom imply that consumers should think about the net present value of a stream of payments, and thus be sensitive to interest rates, when making decisions about borrowing and saving. However, examples abound in which consumers appear to borrow at rates which seem inconsistent with rational behavior. Through a series of studies, I demonstrate that both understanding disclosed information and appropriate attention to NPV and interest rates are problematic for consumers, even among relatively well-educated groups of study respondents. Additional studies indicate that people choose between loans using cognitive heuristics not predicted by typical normative or behavioral models; specifically, choices appear to be based on attributes like total payment amount rather than interest rate. Consumers' sensitivity to NPV and interest rates can be exaggerated or muted by the extent to which a change in rates affects these other attributes.

"[Payday loan store] expansion has come despite the fact that most of the stores charge what amounts to an annual interest rate of more than 500 percent on their loans, which outrages some politicians and consumer groups." - *Chicago Tribune*, 11/18/99

"Stay away from…40 year loans. At 8.51 percent, your monthly payments on a 30-year, $100,000 loan would be $769. On a 40-year they'd be $36 less. But the amount of additional interest you'd pay over the life of the loan is roughly $75,000." - *Money Magazine*, 2/18/00

Both basic economics and popular wisdom imply that consumers should be sensitive to interest rates when making decisions about borrowing and saving since interest rates are a major determinant in the present value of the stream of future payments. Calculations of net present value (NPV) offer consumers a way to directly compare a borrowed amount to a loan's future payments, and loans with lower interest rates should imply a lower net present value, and thus a better deal for the consumer. Offers by lenders often reflect the importance of lower rates, as when credit cards compete for business by advertising that they charge interest rates below other cards that the consumer might currently hold. However, examples abound in which consumers choose loans with unreasonably high interest rates, such as the payday loans described in the opening quote. Public concern about this tendency for making unwise borrowing choices has resulted in Truth in Lending laws, which require lenders to explicitly state annual interest rates (APRs) for loans regardless of the length of the loan. Yet even with these corrective measures in place, consumers continue to borrow at rates which seem inconsistent with a rational assessment of a loan's NPV.

These inconsistencies may lead us to wonder 1) whether consumers understand the information provided on TILA forms, and 2) whether consumers really do pay attention to NPV and interest rates when making borrowing decisions. Although borrowers may believe that lower rates are better, their final loan choice may be inconsistent with this belief when other aspects of

the loan, such as time schedule and per period payment amount, are changed. One explanation for this inconsistency between beliefs and actual choice is that consumers choose between loans based on attributes other than NPV and interest rates, such as the total payment amount, the length of the loan, or the size of the individual payments. This could imply that consumers' sensitivity to interest rates can be exaggerated or muted by the extent to which a change in rates affects these other attributes (such as the total payment amount). The effect of such attribute-based decisions can lead to mortgage choices and rent-versus-buy decisions that are not financially optimal for the consumer (see, for example, Apgar 2004 and Woodward 2004).

In this paper, I begin by exploring the extent to which consumers can make sense of the information provided on typical Truth in Lending (TILA) disclosure forms. After establishing through several studies that even well-educated individuals have substantial difficulty understanding basic information, such as how much an interest rate can adjust or how rate changes relate to bank profits, I then turn to studies that offer respondents choices between hypothetical fixed rate loans that vary on length, monthly payment, annual percentage rate (APR), and/or upfront payments (points). I hypothesize that consumers often choose between loans in a way that is inconsistent with both normative present value based economic models and behavioral hyperbolic discounting models, and instead rely on cognitive heuristics that simplify the decision process. The first of these studies attempts to categorize subjects based on a set of possible choice heuristics, and finds that most subjects are consistently choosing the loan schedule with the lowest total payment amount. The next study is a ranking task, where subjects order a set of eight different loans; the results of this study offer insight into how the various attributes of each loan are traded off. The final study builds upon a documented relationship between interest rates and mortgage prepayments (points) to show that subjects increasingly

prefer mortgages with points when interest rates are high, consistent with a choice heuristic based on total payment amount. The implications of these results, and their relationship to previous findings, are then discussed. In addition, a theory of when consumers emphasize some attributes over others (e.g., an emphasis on total payment amount over monthly payment amount) is provided, which may provide direction for creating interventions that draw consumers' attention to appropriate attributes and improve their decisions. Before examining the details of the hypothesis and the studies, a review of both the normative and descriptive literature on consumers' choices for intertemporal outcomes is provided.

THEORIES OF LOAN CHOICE

Normative Utility Models. A long history of economic literature has led to the currently accepted definition of normative consumer behavior regarding intertemporal choices. In initial work on time preference, Jevrons (1871) preferred a normative model with zero rate of time preference, and felt that any desire to speed up consumption was due to a lack of self-control. Later life-cycle models developed by Ramsey (1928) and Fisher (1930) included a positive rate of time preference, recognizing that people do discount future income and consumption (also see Frederick, Loewenstein, and O'Donoghue 2002, Loewenstein 1992, or Deaton and Muellbauer 1980 for additional detail on the history of economic work on time preferences). Further development of the discounted utility model by Samuelson (1937), along with work on life-cycle models by Modigliani and Brumberg (1955), have resulted in an intertemporal model with consumer utility that includes a "pure" rate of time preference, ρ, for an individual, which does not change as the consumer's wealth fluctuates. According to this model, a consumer should borrow if his rate of time preference ρ is greater than the market interest rate r, and save when the market rate is larger than his rate of time preference, $\rho < r$.

Another way to assess the decision to borrow or save is to compare the consumer's net present value of a payment stream with the immediate benefit it provides. For example, consider a borrower who is evaluating a loan for an amount *L*, which will be paid back over *k* periods with pmt_t being defined as the size of each per period payment. The potential borrower compares the amount of the loan *L* to her present value of this loan payment schedule using her own rate of time preference. The present value is defined as:

$$PV_\rho = \sum_{t=1}^{k} \frac{pmt_t}{(1+\rho)^t}$$

This discounted utility (DU) model then predicts that the consumer will accept the loan only if her present value PV_ρ, as calculated using his individual rate of time preference, is less than the amount of the loan *L*, so that she is receiving a positive benefit from holding the loan.

Although the discounted utility model assumes that consumers exhibit a constant rate of time preference, experimental evidence has accumulated that puts this assumption in doubt. Both laboratory and field studies show a wide variation in consumer discount rates, ranging from negative discounting to rates above 200%. In addition, consumers appear to have different time preferences depending on the framing of choices, and exhibit dynamic inconsistencies in their intertemporal preferences (Thaler 1980, Benzion, Rapoport, and Yagil 1989, Loewenstein and Prelec 1992). To explain these anomalies, the utility model was changed by replacing the exponential discounting function used in the present value calculation with a hyperbolic discounting function, which heavily discounts future events relative to imminent ones (Ainslie and Haslam 1992). Later variations have improved the hyperbolic function with a more precise beta-delta model, which distinguishes between immediate and future outcomes (Laibson 1997). An important result of these models is that the present value of a far-future payment is typically

substantially smaller than it would be under a typical DU framework, resulting in myopic preferences for the decision maker.

The Use of Shortcuts in Loan Choices. One consistent aspect of all of these models, whether normative or behavioral, is that consumers are expected to use an internal rate of time preference to calculate their personal equivalent of a present value for a stream of cashflows. However, even individuals with training in economics and finance are unlikely to approach their personal loans and mortgages using purely present value calculations. Given the complexity of the exponential discounting function and consumers' inability to estimate this function in their heads, a more descriptive approach should recognize that people may not do any discounting at all, but might instead evaluate a long stream of cashflows based on other attributes altogether.

This paper's hypothesis is that, due to the complexity of the discounting function that characterizes both economic and behavioral models of intertemporal choice, people turn to alternate decision making strategies like cognitive heuristics or simplified linear models when choosing between multi-period borrowing options. Such heuristics or rules of thumb are used in an attempt to cope with what is otherwise a very difficult and complicated decision but they may also lead the consumer astray. For example, when making a borrowing decision that requires evaluating a loan schedule, one shortcut might be for the decision maker to estimate the total sum of the payments (i.e., number of payments x payment size) and look for a loan that minimizes this total. This heuristic would be consistent with finding the loan with the lowest interest rate if length of loan was held constant. Unfortunately, when the length of the loan changes, the loan with the lowest total payment amount may not be the loan with the lowest present value. As a result, actual borrowing choices may seem inconsistent with respect to NPVs and interest rates. The choices instead reflect the borrower's evaluation of how much total money

is being paid in interest in relation to the amount paid to principle. This focus on the absolute nominal amount of money paid in interest, relative to the amount of principle, could reflect consumers' ability to understand dollars more easily than a relatively intangible concept like NPV or interest rate, and/or a mistaken perception that the interest costs reflect a fixed "borrowing fee" by the lender rather than a time value of money determined by the broader market. This, in part, may explain why payday loans with interest rates in the hundreds of percents are still popular (the amount paid in interest is small compared to the loan amount), yet consumers also devote tremendous effort to saving an eighth of a percent on a mortgage (where interest costs often greatly exceed the actual cost of the home). Note that using a total payment amount heuristic is equivalent to using a discount rate of zero, since consumers are weighting the last payment as heavily as the first payment. Such a heuristic is inconsistent with the normative economic models and is also inconsistent with behavioral models in which the decision maker is myopic and future amounts are heavily discounted.

In addition to judging loans based on the total payment amount, there are other shortcuts available to a borrower when choosing between loans. For example, a debt averse borrower may always try to choose the shortest loan feasible, even if it has a present value higher than an alternative option. A borrower with liquidity constraints may choose the loan with the smallest per period payment, even if that loan carries an unreasonably high interest rate. A liquidity constrained borrower might also accept loans with a present value higher than the loan amount if his survival is dependent on doing so. Any effort to understand how consumers tradeoff loan options requires a way to separate these various influences.

Some previous studies have looked at choices between payment schemes in an attempt to understand rate of time preference and/or sequence effects. For example, Loewenstein and Prelec

(1992) describe a study in which participants are asked to choose between two payment plans (or equivalent rebate plans). Langer, Sarin, and Weber (2005) ask participants to retrospectively evaluate payment sequences that differ in peak and end effects. The studies in this paper differ from these earlier studies in several important ways. First, most behavioral studies on intertemporal choice have asked about a small number of different payments rather than a stream of many identical payments that extends over multiple years. In fact, Loewenstein and Prelec (1992) suggest that, because of assumptions about separable preferences, the behavioral intertemporal choice model does not necessarily apply to long sequences of outcomes such as salary contracts. Their work on long sequences focus on decision makers' concerns about global sequence properties (e.g., a sequence of increasing values) which do not apply to the loan schedules used here. Second, previous studies often tradeoff delayed or expedited payments within the same total timeframe (e.g., paying now vs. paying at a specific future date), rather than allowing choice between two streams with different total timeframes (e.g., paying over two years vs. paying over five years). Because the tradeoffs made by decision makers for the types of loans studied in this paper are more complex than those in previous research, individuals may be expected to have a more difficult time choosing in a consistent manner. For example, for options with a long series of many payments rather than one or two payments, the tradeoff between the size of a payment and a time delay is not as straightforward to assess as in previous intertemporal choice research.

STUDIES OF DISCLOSURE COMPREHENSION

Study 1: Adjustable Rate Mortgage Disclosure Comprehension

Before addressing the question of what shortcuts a potential borrower may use to choose a loan, Studies 1 and 2 were run to establish how much individuals understand the information

given them in a typical borrowing situation. There are two main questions regarding borrower comprehension: first, can individuals make enough sense of the information they receive to be able to make simple calculations about outcomes, and second, what is their perception of the meaning of the information they receive. Study 1 addresses the first of these two questions by exposing individuals to a typical loan disclosure form and asking them to answer questions about potential future outcomes – specifically, what will happen to loan payments as interest rates readjust over the life of the loan. To provide a stringent test of comprehension, a population was chosen that is of above-average performance on mathematics and reasoning; if this particular group of respondents fails to comprehend the information on a typical disclosure form, than we may expect that a more general population will also experience difficulty.

Method. Participants in this study were 43 undergraduate students at a competitive Western university. Students at this university enter with an average unweighted GPA of above 3.75 and average math SAT scores above 650, substantially above national averages. Students completed the study as part of a packet of unrelated studies on consumer behavior and were compensated for their time. Participants were told that they would be seeing a mortgage disclosure form required by the Truth in Lending Act (TILA) which is provided to all individuals who take out a mortgage for the purposes of purchasing a house. They were then given a copy of a Truth in Lending Disclosure Statement and a series of questions that asked them to estimate several pieces of information relevant to the loan described in the statement. Both the questions and the disclosure statement are provided in Appendix A.

Results and Discussion. For each question, a normatively correct answer can be calculated which can then be compared to the responses of the participants. Of the four questions in the survey, two (questions 1 and 2a) could be calculated relatively easily using information

provided in the disclosure form. In fact, the sample numbers provided in the typical TILA disclosure are designed to facilitate such calculations. For the remaining two questions (3b and 4), the calculations are more difficult; for these questions, it is more useful to examine whether participants' responses demonstrate consistency in magnitude relative to other information provided in the disclosure.

Question 1 addressed an outcome that happens frequently for homeowners with an adjustable rate mortgage: a rate adjustment (increase) after four years. Participants were asked what the monthly payment would be if the interest rate on the described loan adjusted by the maximum allowable amount in its 4th year. The disclosure form explicitly provides information used calculate the answer to this question ($2625.35). Allowing for math errors, only 8 participants (19%) were within $300 of the correct answer. Participants exhibited a large range of answers, with the overall mean significantly higher than the actual (6882 vs 2625, $t(42)=1.67$, $p=0.05$) Several participants gave an answer of $105, based on the generic $10,000 example in the disclosure statement but without adjusting for the actual amount of this particular mortgage. Overall responses for each question are shown in the histograms in Figure 1.

--- Insert figure 1 about here ---

The second question asked for a much simpler calculation, and again one that many homeowners with an adjustable rate mortgage could expect to encounter. Specifically, it asked what the interest rate would be if it adjusted by the maximum amount after the expiration of the two year teaser rate. The answer for this question is simply the starter rate (6.625%) plus the maximum allowable adjustment of 2%, resulting in 8.635%. Here, only 7 participants had the correct answer. Much more popular, with 12 participants, was the answer 12.625%, which is the maximum for the lifetime of the loan but would not happen until year 4.

The final two questions were more complicated, and participants would not be expected to get them right without a spreadsheet. However, the range of responses is still insightful as it mimics the situation real homeowners face when signing an adjustable rate mortgage. Question 2b asked participants to roughly estimate what the monthly payment would be after the first maximum interest rate adjustment in two years. The true answer for this question is $1927.43. Only 4 participants were within range of this number. As with Question 1, there was a large range of answers, with the overall mean significantly different from the correct answer (6014 vs. 1927, $t(42)=1.8$, $p=0.04$). At a minimum, we might hope that participants would recognize that the answer should be smaller than their answer to Question 1; only 20 participants (46.5%) demonstrated this consistency. Finally, Question 3 asked for a rough estimate of the total amount to be paid over the life of the mortgage. The question explicitly noted that the total payment amount without any increases in interest rates would be $576,279. A rough estimate can be done using information available in the disclosure, giving $905,400, very close to the true answer of $907,907. Allowing for rough estimates, only 5 respondents (12%) were within 10% of the correct answer. A more generous measure would be to ask how many provided an estimate above the $576K given in the disclosure; only 27 participants (63%) did so. Generally, participants significantly underestimated the amount they would pay over the life of such a loan (645K vs 907K, $t(42)=3.19$, $p=0.001$).

This study attempted to determine whether individuals with above average math reasoning skills would be able to understand TILA information to answer questions about future expected monthly payments, a highly relevant and important calculation for new homebuyers. The results suggest that a small number of participants were able to do so correctly; instead, many appeared to rely on surface information (such as the example numbers in the disclosure form) rather than

calculate the numbers directly. There are several significant implications of this behavior. First, it suggests that consumers who receive these types of disclosures are regularly mispredicting the monthly payments and total costs they will be responsible for with such a mortgage. Second, it offers some prescriptive advice for improving borrowers' comprehension: rather than using example calculations that consumers have to actively apply to their own situation, extreme outcomes specific to their loan (such as maximum interest rates and maximum payments) should be explicitly stated in the disclosure information.

Study 2: Evaluating Loans With and Without Rate Information

While Study 1 considered whether individuals simply understood the information on a typical disclosure form, Study 2 attempts to probe more deeply into how individuals interpret the information they do receive. For example, when individuals are presented with information on interest rates, do they perceive the rates to represent a time value of money, or do they perceive them as more of a "fee" collected by the bank? When choosing between two loans with different rates, how do they assess which loan is financially more appealing and/or more fair? Study 2 investigates these questions by presenting individuals with pairs of loans and then specifically asking for reactions along these dimensions.

Method. Participants in this study were 281 undergraduate students at a Western university. Students completed the study as part of a packet of unrelated studies on consumer behavior and were compensated for their time. The study included four conditions, which varied on size and length of loan (either a longer furniture loan of $5000 or a shorter book loan of $600) and on whether APR was explicitly provided, resulting in a 2x2 between subjects design.

In all four conditions, participants are asked to imagine that they are considering a major purchase and that a bank has provided them with a choice of financing plans. For the large loan, the options were 84 monthly payments of $75 each versus 60 monthly payments of $101 each. For the small loan, the options were 12 weekly payments of $51 each versus 8 weekly payments of $76 each. All information on length, number of payments, size of each payment, and total payment amount was provided in all four conditions, while APR was provided in two of the conditions and left out in the other two. The hypothesis was that the presence of APR information would increase attention to that information when evaluating the loans but would not affect overall perceptions of how interest rates relate to bank profits.

Once the two loans per condition were described, participants responded to a series of questions about the loans. The first four questions focused on financial advantage and fairness. Questions 1 and 2 asked participants to judge which loan was financially better for the consumer and which loan was financially better for the bank; respondents could identify a single loan or mark "both same". Questions 3 and 4 asked participants to judge which loan was more fair for the consumer and which was more fair for the bank; again, they could select a single loan for each answer or mark both. The next five questions asked participants to agree or disagree (measured on a 7-point Likert scale) with several statements about how the bank would profit on the loan under various circumstances, such as a change in interest rates.

Results and Discussion. Looking first at responses regarding which loan is financially better and more fair, the availability of APR information did affect consumers' perceptions of the loans. For the large loan conditions, a majority of participants felt that the shorter loan with the higher interest rate was both financially better (82%) and more or equally fair (89%) for the consumer, but this effect was attenuated (but not eliminated) when interest rates were clearly

visible (better: 70%, fair: 72%). Similarly, they felt that the longer loan with the lower interest

rate was financially best for the bank (61%), and even more so when interest rates were not given

(72%). For the shorter textbook loans, they again felt that the shorter loan with the higher rate

was financially better (52%) and more or equally fair (72%) for the consumer, and the longer

loan with the lower rate was financially better for the bank (60%), but for this loan these effects

were not significantly changed even when interest rates were available (better: 56%, fair: 57%,

better for bank: 67%). For all four conditions, participants generally believed that the two loans

were equally fair for the bank. This overall pattern of responses suggests that consumers appear

to value loan length and total payment amount over interest rate level when evaluating financial

advantage and fairness for the consumer and financial advantage for the bank, but also assume

that any loan offered is one that is fair for the bank. Note that these perceptions directly

contradict how interest rates are interpreted in financial markets, in which a higher rate loan is

judged as worse for the consumer and more profitable for the lender.

--- Insert table 1 about here ---

The responses to the statements about sources of profit for the bank are also insightful. With

the exception of the question about whether the loan with the higher total payment amount will

always have the higher APR, responses were consistent across the four conditions and will thus

be reported together. (All results are provided in Table 1.) The statement that received the

strongest agreement (mean = 5.2) was that the difference between the principal of the loan and

the total amount of payments represents the bank's profit on the loan. While this may be loosely

correct as a measure of profit, it does not take into account the bank's opportunity costs for the

money lent to the borrower. To see this more clearly, consider the statement "the difference

between each loan's APR and overall market interest rates represents the bank's profit on the

loan," which is normatively more accurate yet received significantly weaker agreement (4.5 vs 5.2, $t(280)=5.35$, $p<.001$). Participants also expressed strong support for the statement "the bank will make a profit on these loans regardless of what happens to overall interest rates" (4.7). Taken together, these responses provide additional insight into the financial advantage and fairness questions by demonstrating that the difference between nominal total payment amount and principal, which respondents perceive as profit, is the primary determinant of how they define an attractive loan for the bank (and conversely, a less attractive loan for the consumer).

As noted, the only question that received a significant difference between conditions was the statement, "when comparing between two loans, the loan with the higher total payment amount will always have a higher APR." Participants in conditions where APR was explicitly stated were less likely to agree with this statement than those in conditions where APR was not given (mean response for APR conditions was 4.26 vs 2.88 for non APR conditions, $t(278)=6.37$, $p<.001$). This is not surprising since participants in the APR conditions could directly see from the loan options given that the option with the higher total payment amount actually had the lower APR. What is surprising, however, is that participants in these conditions where APR was given did not disagree with the statement even more strongly.

While Study 1 established that individuals do not easily comprehend information given to them in loan disclosure forms, the results of Study 2 provide additional insight into how those individuals are interpreting the information they do see. Specifically, participants believe that the presented loans with shorter length, lower total payment amount, but higher interest rates are more financially attractive and more fair to them as consumers. The attractiveness of these loans may be partly due to their perception that the difference between the total payment amount and the principal represents profit for the bank, so a loan with a higher total payment amount

(regardless of length) must be benefitting the bank at the expense of the consumer. Given that consumers judge the attractiveness of loans based on these features, it seems likely that they will heavily weight attributes such as total payment amount in loan choices, even to the point of using a single attribute as a shortcut to evaluating the entire loan. The next three studies examine their use of such heuristics in choice contexts.

STUDIES OF HEURISTICS IN LOAN CHOICES

Study 3: Choices Between Loan Schedules

To determine which shortcuts a potential borrower might be using when choosing between loans, a task was devised that asked participants to repeatedly choose between pairs of loan schedules which differed in length, monthly payment, and annual percentage rate (APR). Since potential borrowers may be using one of several rules of thumb in choosing between loans (e.g., choosing based on total payment, timeframe, per period payment, or APR), pairs of choices were constructed to check for each alternative heuristic.

Method. Participants in this study were 93 full-time MBA students in a top-tier graduate school of business. Students completed the study as part of an in-class exercise in a course on managerial decision making. These students can be considered financially sophisticated since most have had several courses in economics and finance as part of their MBA studies. The study involved a within-subject design. Two separate versions of the study were used so that a variety of combinations of loan length and interest rates could be tested. Of the 93 participants, 54 completed version one and 39 completed version two. The duration of use of the item being purchased was established to be at least as long as the duration of the loans being considered, since earlier studies have shown that borrowers prefer to keep these durations consistent (Hirst, Joyce, and Schadewald 1992, Prelec and Loewenstein 1997). Participants were then given three

pairs of loan payment schedules and instructed to choose the preferred schedule from each pair. For each loan, per period payment and number of payments were explicitly given, but APR and total payment amount were not. A version of the questionnaire is included as appendix B, and loan option details are summarized in table 2.

--- Insert table 2 about here ---

By designing the study such that participants make decisions about three pairs of loans, the pattern of each person's choices can be analyzed to determine if one of the proposed choice heuristics is being used. There are three possible heuristics that can be distinguished in this way: choose the loan with the lowest APR [*APR*], choose the shortest loan [*Time*], or choose the loan with the smallest total payment amount [*Total*]. Note that the third pattern, the total payment amount heuristic, will display the same pattern of results as a heuristic based on choosing the loan with the smallest amount of total interest payments since the amount of principle is constant across all options. In addition, based on the particular set of loan pairs used in this study, the first pattern (*APR*) will display the same pattern as a heuristic based on choosing the loan with the smallest monthly payment; this pattern will be exactly opposite of the pattern that results from choosing the shortest loan (*Time*). It is also possible for participants to display a pattern of results that does not match any single heuristic, suggesting that they may be using some type of compensatory strategy instead.

Results and Discussion. In general, the results show that the majority of subjects choose the loan with the smallest total payment amount on each of the six different pairs of options. The percentage of participants choosing a given option is shown in table 2; the percentage choosing the smallest total payment amount ranges from 65% (version 1, question 3) to 83% (version 1, question 2). All results are significantly different from random choice at the 95% level (details

provided in table 2). These results seem to indicate that a heuristic of minimizing the total payment amount is widely used.

To better understand the actual tradeoff of the attributes by subjects in this study, the data was analyzed further. Based on the three choices made by each of the 93 participants, 279 separate observations were available for analysis. The dependent variable, choice, was coded as a binary variable, and dummy variables were created to reflect which option had the smallest timeframe, APR, or total payment amount. (Note that time and monthly payment dummy variables are not included since they are correlated with the APR dummy variable.) The results of this binary logistic regression indicate that total payment amount is highly significant as a predictor for choice ($p < .001$) while APR is only marginally significant ($p = .096$). Additional regressions using the ratio of the values and/or the difference in values (rather than the dummy variables) find that these variables are not significant, indicating that it is not the actual relationship between the variables that matters, but simply which is largest.

In addition to the analysis of each question as an independent data point, the pattern of the three answers could be analyzed per subject to determine if individual participants were using a consistent rule across their three choices. The three binary variables can be coded as one of eight possible patterns, and these patterns associated with the proposed choice heuristics outlined previously. Those coded as type *Total* answered all three questions consistent with using a total payment minimization strategy, those choosing based on the lowest APR are coded as type *APR*, participants choosing based on the shortest loan length are coded as type *Time*, and all five remaining patterns are grouped together and coded as type *Misc*. A summary of the percentage of respondents falling into each type is provided in table 3. Only the type *Total* results are

significantly different from random, which is consistent with respondents using a heuristic of choosing based on total payment amount.

--- Insert table 3 about here ---

Note that the use of a total payment heuristic is not necessarily inconsistent with a normative model; it simply implies that the discount rate being used is very small (or zero). In fact, with a discount rate of 0% (no discounting of future payments), the present value of each option will exactly equal the total payment amount for that option. To see this, the present value of each loan pair can be calculated for all possible discount rates between 0% and 100%; a plot of these values is shown in figure 2 for the loan pair described earlier. It is important to note, however, that a consumer with this low of a discount rate should not accept either one of the two loan options, under the normative rule that consumers will only borrow if $r_B < \rho$. Thus, if one assumes that they were willing to accept one of the loans at all, then they should always be choosing the option with the lowest interest rate. Another possibility is that participants are making choices consistent with a hyperbolic discounting function in which only initial payments are heavily weighted. To test for this, a smaller follow-up study was run in which loan payments did not start immediately (initial payment was delayed by three months). Results from this study were consistent with the results presented here, suggesting that the typical myopic behavior that characterizes hyperbolic discounting and beta-delta preferences (i.e., putting too much weight on a near-term payment) was not having an influence here.

--- Insert figure 2 about here ---

While inconsistent with most hyperbolic discounting models, Study 3's finding that consumers appear to focus on total payment amounts does appear in other intertemporal choice findings. Langer, Sarin, and Weber's (2005) work on retrospective evaluation of payment

sequences finds that participants in one of their studies also use the equivalent of a total payment amount heuristic to choose preferred payments, so long as they are undisturbed by other tasks. A study by Loewenstein and Prelec (1992) in which participants choose between two payment schemes with only two payment dates finds that a small majority choose the scheme with the highest total payments and concludes that, "the large, negative outcomes suffer less discounting, which causes people to decide on the basis of total payments."

One criticism of Study 3 is that multiplying the number of payments by the payment size is the easiest thing for participants to do under the circumstances, while an actual borrower will take time to calculate the precise discounted value of a stream of cashflows. However, this explanation is unlikely, as other work has demonstrated that consumers are not able to easily estimate discounted values when choosing investments or loans even when given the time to do so, due to the complexity of the exponential function (Benzion, Granot, and Yagil 1992, Eisenstein and Hoch 2005, and McKenzie and Liersch 2010) The implication of these findings for lengthy loans like mortgages is that any most estimates of present value by subjects are likely to be heavily biased. A second possible criticism is that consumers would choose the loan with the smallest APR if it was explicitly given to them; studies 4 and 5 thus provide a more difficult test by asking participants to make tradeoffs between loans for which APR is explicitly provided.

Study 4: Ranking Many Loan Options

Study 4, in which subjects are provided with a group of eight loans to rank, provides a stronger test of normative behavior than study 3 in two distinct ways. First, in study 3, the option chosen can be normatively correct dependent on the individual's rate of time preference. By using eight different loans in study 4, it is possible to test to see if the subject's ranking is

consistent with a normative model using a specific discount rate or if it is instead a result of considering other attributes, such as total payment amount. Second, study 4 deals with a possible criticism of study 3 in which subjects are not explicitly shown the APR for each loan and were therefore making choices with incomplete information. If they had seen the actual APR, they might have chosen differently, by always selecting the option with the lowest rate. Study 4 tests this possibility by providing subjects with all relevant information displayed per loan, including APR, thus providing a tougher test of the heuristic documented in study 3. Such a setup also allows us to attempt to understand the tradeoffs subjects are making between the attributes by calculating the implied weighting of each attribute within their responses. Finally, Study 4 moves from use of a financially sophisticated population of students to a general population sample which has a broader variety of experiences in borrowing decisions.

Method. Participants in this study were 94 community members of a Midwest university, recruited through posters on campus. Participants were randomly assigned to one of three conditions. The study was completed as part of a packet of other unrelated studies; participants were paid $5 for completing the entire packet.

The study used a questionnaire with three versions; the set of eight loans was held constant across the versions, but their order of presentation was varied. Participants were told to imagine that they were shopping for a loan for a used car and had received a list of 8 possible loans. A definition of each aspect of the loan (amount, payments, APR, etc.) was also provided. Participants were then shown a table with the details for all eight loans, in random order, and asked to enter a rank next to each loan. A copy of the stimulus is provided in appendix C.

Results and Discussion. Similar to study 3, the normative answer to this problem depends on the participant's rate of time preference; respondents should evaluate the loans as if they are

using this rate to estimate a present value for each of them, and then rank them according to these present value estimates. To determine if participants are behaving normatively, the ranking for every possible positive discount rate, from 0% to 100% (see figure 3), is calculated, and then these rankings are compared with the participants' rankings to estimate what individual discount rate a participant might be implicitly using. It is also possible that participants are not identifying a ranking consistent with any positive discount rate; these individuals can be identified and labeled as "non-normative". The result of this categorization is that seven participants have a ranking consistent with a discount rate of 0%, 16 participants have a ranking consistent with a discount rate of 12%, and one participant has a ranking consistent with a discount rate of 100%. The remaining 70 participants are categorized as non-normative, since they display a ranking that is inconsistent with any present value calculation. These categories can also be mapped to the heuristic-based patterns described for study 3. The 0% discount rate is equivalent to ranking the loans based on total payment amount, the 12% rate is equivalent to a ranking based on APR, and the 100% rate is equivalent to a ranking based on smallest monthly payment. Unlike study 3, there is not a single strategy predominating; instead, respondents seem to integrate all of the information into their ranking process.

--- Insert figure 3 about here ---

A second approach to analyzing this ranking data is to use it to understand the actual attribute-level tradeoffs that a participant is making by defining a linear model with the participants' ranks as dependent variables and estimating the weights being applied to the loan attributes. Since the dependent variable is a rank between one and eight, an ordered logit model was used for this analysis. The independent variables in the model can be either the ranks for the attributes (for example, the ranking of smallest APR to largest APR) or the actual values

themselves. An advantage of using rank in the model is that it better represents the actual process used by the subjects if they are using a heuristic such as ranking based on total payment amount. If they are instead using a compensatory model that trades off between attributes, then the model with actual values has an advantage, since attributes which are close together (e.g., 3.9% APR vs. 4.5% APR) are treated as such. Note that the rank orderings for number of payments and for size of monthly payment are perfectly negatively correlated so their effects cannot be distinguished in the model. The results of the ordered logit using attribute ranks indicate that all three attributes - the total payment amount, APR, and monthly payment - are significant ($p \leq$ .001). When using actual attribute values as the independent variables, total payment amount and monthly payment amount are the only significant variables ($p < .001$ for both); APR and number of payments are not significant ($p = .98$ and $p = .38$, respectively). The implication of these results are that subjects are taking attributes other than interest rate into account in their ranking process; the fact that all of attributes are significant when using ranks as independent variables indicates that subjects may be using some kind of compensatory model, rather than a simple heuristic that focuses on only one attribute (even a heuristic as simple and normatively correct as ranking according to APR). However, if they are using a compensatory model, it is based only on the ranks of the attributes, rather than on the absolute values. These results provide further support that decision strategies other than a normative discounting model are in use.

The idea that heuristics like the total payment heuristic found in these studies are more than laboratory-based demand effects is supported by some empirical results. Empirical studies have found that even in real loan situations, consumers fail to understand which loans provide them the most value, even with benefit of calculators and spreadsheets. For example, in a survey of recent homebuyers, Lino (1992) found that although the majority of his highly educated

population made loan choices that were consistent with normative models, a substantial number of borrowers did not recognize which type of mortgage had the higher expected cost. Thus, even in real financial decisions, people are choosing loans not based on finding the best value but on some other set of attributes. The link between empirical loan data and the importance of total payment amount is the basis of the design for study 5.

Study 5: Choosing Between Points and Payments

The studies presented thus far suggest that for hypothetical choices between loans, individuals are paying attention to attributes other than interest rate; specifically, they are heavily influenced by the total payment amount of the loan. While some empirical field research has suggested that real homebuyers are not making optimal decisions (Lino 1992), Study 5 attempts to make more explicit the connection between decisions being made in the laboratory to observable actual decisions being made by real homebuyers by using an observable trend in mortgage data as the basis for a scenario-based study, to see whether the study results can explain the empirical data.

To do this, we can look at the use of points by mortgage brokers for reducing interest rates on long-term loans for purchasing homes. Points are defined as upfront payments of the loan which are paid at closing; each point costs one percent of the loan amount. Borrowers receive a reduction in the interest rate in exchange for paying discount points, with the typical rule of thumb being that the mortgage's interest rate is reduced by a quarter of a percentage point for every point paid. An analysis of the link between paying mortgage points and interest rates suggests that homebuyers tend to pay points more often when nominal interest rates are high; evidence for this trend is observable in the historical record of rates versus average points

(measured as initial fees and charges) shown in figure 4 (Federal Housing Finance Board 2006).

An analysis of this data shows a high correlation between federally tracked rates and points ($r =$

.88). Should we expect a "rational" homebuyer to pay more mortgage points when interest rates

are high? When nominal rates are high, the payments in a fixed rate mortgage become set at a

high level for the life of the mortgage. However, the borrower should also be discounting those

future payments at a higher rate since investments and other savings vehicles are also providing a

higher return. In such an environment, the borrower should be focused on investing any available

cash (at current high rates) rather than using cash to reduce future payments. Thus, the desire to

use points when nominal rates are high is puzzling if the homebuyer's goal is to use the loan to

smooth consumption; applying large amounts of available cash upfront to a mortgage is a poor

use of funds relative to other current opportunities. This connection between points and nominal

rates is a puzzle to many economists. It is also the most likely explanation for the well-

documented result that mortgage brokers get higher fees when nominal rates are high

(Woodward 2004).

<div align="center">--- Insert figure 4 about here ---</div>

Building upon the documented positive link between high interest rates and the likelihood of

a homebuyer to use points against a mortgage, study 5 presents participants with a series of

mortgage options that vary in points. It also manipulates the referent interest rate to examine

whether higher rates lead to a higher preference for points. As interest rates increase, points have

a larger effect on reducing the total payment amount of the mortgages being evaluated; in other

words, paying an upfront deposit in the form of higher points results in a larger absolute

reduction on the total payment amount when interest rates are high than the reduction from the

same upfront deposit when interest rates are low. Unfortunately, this focus on changes in the

total payment amount ignores both the present value of the payment stream and the borrower's other uses for the money spent on buying points (those other uses presumably have higher returns when interest rates are relatively high; similar neglect of opportunity costs has been documented in Spiller 2010 and Bartels, Urminsky, and Frederick 2010). If behavior in this study is consistent with the findings from studies 3 and 4, participants will gravitate toward the options with the lowest total payment amount, especially as interest rates increase. Such a finding would be consistent with the observed data in figure 4; this is the result we expect.

Method. Participants in this study were 88 adults in a large Southern city recruited on both a college campus and at a local shopping mall. Research assistants administering the experiment were explicitly instructed to target adults of working age rather than undergraduate college students. Participants were randomly assigned to one of three conditions. The study was completed as part of a packet of other unrelated studies; participants were paid $5 for completing the entire packet.

The study used a questionnaire with three versions which varied the annual interest rate used as a reference point for the loan choices; the reference point is given as either 6%, 9%, or 12% APR. Participants first read a scenario about the purchase of a new condo, including the final negotiated sales price and their ability to make a substantial downpayment. Historical information about interest rate ranges is provided, and they are then told that they have found a competitive 20-year mortgage at a specific interest rate, which translates into a specific monthly payment. They also receive information about the ability to pay points toward their mortgage as a way of reducing the mortgage's interest rate. Participants then see and evaluate a set of five different loans. The five loans differ in number of upfront points paid, which then influences the interest rate, monthly payment, and total payment amount; length of the mortgage and total loan

amount are held constant. Participants are asked to evaluate the attractiveness of each mortgage and how likely they would be to select it. A final question asks which of the five mortgages would be their first choice. A sample of the stimulus instructions is provided in appendix D.

Results and Discussion. Results of both per-question evaluations and percentage of participants choosing each of the five mortgages are given in table 4. Analysis of the results shows a consistent pattern: as interest rates increase, both the attractiveness and selection of higher point mortgages increase. In other words, at higher interest rates, homebuyers express an interest in mortgages with larger upfront payments (points) and lower implied interest rates. Consider the results for the percentage of participants selecting each mortgage in the three conditions. In the first condition, where the reference interest rate is 6%, the most preferred mortgage (rated 5.53 on attractiveness) and the one most selected (41% of participants) is the mortgage with no points. When the reference interest rate increases to 9%, the preferences shift to the mortgage with two points (rated 5.55 on attractiveness and chosen by 48% of participants); at the highest reference interest rate, 12%, preferences shift to the mortgage with the highest points: four points, or $8,000 down (rated 5.45 on attractiveness and chosen by 52% of participants). An ANOVA of the attractiveness variable using condition, mortgage option, and an indicator variable to capture the match between the reference rate and points option (e.g., the match between the highest 12% rate condition and the highest point mortgage option) shows no significant main effects of either rate condition or mortgage option on attractiveness, but a significant effect of the interaction ($F(1,433) = 5.01$, $p = .03$), suggesting that there is a relationship between the higher rates and the attractiveness of mortgages with higher points. Analyzing participants' preferred choice among the five options available, a binary logistic regression also shows no significant main effects of either reference rate condition or mortgage

choice option, but a highly significant interaction effect ($z = 6.64$, $p < .001$). In this study, choice among mortgage options offering points does appear to be influenced by current interest rates, with higher points mortgages being preferred when rates are higher.

--- Insert table 4 about here ---

This pattern of results is consistent with both the empirical data on points and interest rates and with the findings of studies 3 and 4 regarding use of a total payment heuristic when evaluating loan choices. As the number of upfront points increases for the mortgage options, the implied interest rate for each mortgage, the monthly payment, and the total payment amount all decrease. The decrease is most evident for the high interest rate mortgages. Consider, for example, the difference between the zero point and four point mortgages at interest rates of 6% and 12%. At 6%, the difference in total payment amount between those two mortgages is $13,756, while at 12 %, the difference in total payment amount is $21,041. Compared to the $4,000 upfront payment to cover the points, the savings in the 12% condition are more appealing to the potential homebuyer. In other words, when interest rates are high, paying upfront points results in a larger reduction in the total amount paid over the life of the loan. However, this perspective fails to take into account the homebuyer's other potential uses for the money, and focuses only on the total payment amount for the lifetime of the loan rather than on the appropriate discounted value of the funds.

GENERAL DISCUSSION

The studies reported in this paper attempt to show that, when choosing between loan options, decision makers focus on loan attributes other than NPV and APR. This approach differs from previous work in this area since it suggests that people are not implicitly discounting the payments as a normative present value model would suggest, but are instead using simpler

decision strategies. However, their heuristics are not as simple as just choosing based on lowest APR, which may be the simplest strategy of all. For example, study 3's results indicated that, although heuristics like choosing the shortest loan or the smallest monthly payment were in use, the heuristic most subjects seem to turn to is the total payment heuristic. Study 4 reinforced these results, showing that individuals take total payment amount into consideration even when information on APR is fully available, rather than basing their rankings on APR alone. The working adults in study 5 also relied on total payment amounts in their evaluations of the attractiveness of different loans, choosing to pay higher upfront points when the effect on the total payment amount was more substantial.

Why is it that the particular calculation of total payment amount can be more influential than present value or simply APR in certain situations, as in the studies presented here? The answer may be a combination of salience and reference points. First, the number of payments and the payment size are both highly salient pieces of information for any loan. With these numbers in hand, a natural next step is to multiply them to get the total payment amount, and then compare this result to the actual purchase price of the item, which serves as a readily available reference point. This calculation may happen even when the decision maker realizes that it's not normatively correct; note that this is what the financial advisor from Money Magazine did in the opening quote. She should certainly be aware of the concept of present value, yet she chooses to discourage 40-year loans based on this simple multiplication task. The difference between the total payment amount and the purchase price, which equals the interest to be paid, is equivalent in the consumer's mind to the cost of borrowing money. Simple psychophysics predicts that people will react differently when this interest cost is large relative to the original price (as it is in the case of a long loan, such as a mortgage) versus when this cost is

small relative to the original price (as it is for a payday loan). This focus on total payment (or, equivalently, amount of interest) may be stronger than the focus on interest rates because the concept of an interest rate is intangible for many consumers. As suggested in study 2, they may interpret interest costs as a penalty assessed by the lender rather than as a way of calculating the time value of money. Thus, even in cases where a consumer can directly compare loans based on APR, interest rates may have some influence, but the total payment amount will also still be taken into account (as the results of studies 2, 4, and 5 demonstrate).

It is also worth pointing out that most of the loans used in the studies presented here use fixed interest rate options rather than more complicated borrowing structures like adjustable rates, ballooning payments, graduated payments, or negative amortization loans. Study 1 provides evidence that consumers have a difficult time understanding the material in an adjustable rate mortgage disclosure, perhaps the simplest version of these new structures. Such options expanded steadily as the housing market increased in recent years, especially in the sub-prime lending market where consumers are especially vulnerable. If consumers are making choices in a non-normative fashion for relatively less complex fixed rate loans, then it is highly likely that the quality of their decisions deviates even further from normative recommendations when faced with these complex options. Indeed, these more complicated borrowing structures are often difficult to completely understand for even the most savvy financial managers (Lacko and Pappalardo 2007). Increasing examination of mortgage fees suggests that mortgage brokers often benefit by taking advantage of such borrower confusion and misunderstanding (Woodward 2004, Woodward and Hall 2010), suggesting that improved transparency in disclosures and mortgage terms can have real impact on consumer welfare. Additional research on how

consumers make sense of these financial decisions, and the behavioral influences on such decisions, is essential to finding ways to help consumers improve their decision making.

Given that borrowers are not spontaneously using either present value estimates or direct comparisons of interest rates when evaluating loans, what are the implications for disclosure and mortgage option design? Besides improved disclosure forms, introducing advisors or recommender systems that are not rewarded based on the final loan choice (as mortgage brokers currently are) would be an important improvement (Lynch and Woodward 2009). Another approach would be to have borrowers begin their mortgage choice by comparing a standard set of options that vary in only one attribute at a time, such as a set of 30-year fixed rate mortgages that differ only in APR. Once a choice from the first set is made, additional options can be brought into consideration so long as no more than one attribute is being varied (for example, a direct comparison of a 30-year fixed rate to a 30-year variable rate). This type of "plain vanilla" approach (Barr, Mullainathan, and Shafir 2008, Thaler 2009) allows consumers to evaluate each attribute in turn rather than asking them to simultaneously make tradeoffs across multiple attributes, which is likely to lead to reliance on a non-normative simplifying heuristic as documented in study 4. Given the extent of consumer confusion that comes from both a poor understanding of current disclosure forms and a focus on non-normative attributes such as total payment amount when choosing between options, and the impact of this confusion on both individual borrower welfare and the housing market as a whole, continued efforts to understand the psychology that underlies borrowing choices remains a crucial domain of consumer financial decision making research.

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		$5000 loan, APR given	$5000 loan, no APR given	$600 loan, APR given	$600 loan, no APR given
	Number of subjects	46	89	54	92
Q1	Which loan do you think is financially better for the consumer?	28%**	9%**	39%	39%
Q2	Which loan do you think is financially better for the bank?	61%	72%**	67%**	60%
Q3	Which loan do you think is more fair for the consumer?	28%**	11%**	43%	28%**
Q4	Which loan do you think is more fair for the bank?	35%	25%**	39%	30%**
Q5	Which loan do you think has a lower interest rate (APR)?		37%**		27%**
Q6	The difference between the principal and the total amount of payments represents the bank's profit on the loan	5.15	5.25	5.26	5.13
Q7	When comparing between two loans, the loan with the higher total payment amount will always have a higher APR	3.13	4.43	2.66	4.11
Q8	The bank will make a profit on these loans regardless of what happens to overall interest rates	4.76	4.80	5.08	4.45
Q9	If interest rates rise, the bank will increase the APR for new loans and be able to make higher profits per loan	4.83	4.66	4.91	4.91
Q10	The difference between each loan's APR and overall market interest rates represents the bank's profit on the loan	4.44	4.48	4.48	5.43

TABLE 1

Summary of study data and results per question for Study 2

Number of payments, payment amount, and total payment amount given to participants; APR given in two conditions (as noted). For questions 1 through 5, values represent percentage of respondents who indicated the lower interest rate loan for that question; answers marked ** are significantly different from 50% (random) at a 95% confidence level. For questions 6 through 10, values represent mean response on a 7-point Likert scale, with 7 indicating strong agreement and 1 representing strong disagreement.

Question	# months	Monthly payment	APR	Total payments	Actual choice
Version 1:					
1A	40	$180	63%	$7200	19%
1B	80	$55	12%	$4400	81% ***
2A	18	$250	56%	$4500	83% ***
2B	180	$36	12%	$6480	17%
3A	120	$45	13%	$5400	35%
3B	6	$600	66%	$3600	65% **
Version 2:					
1A	18	$250	56%	$4500	23%
1B	36	$100	12%	$3600	77% ***
2A	120	$45	13%	$5400	26%
2B	12	$330	55%	$3960	74% ***
3A	10	$370	48%	$3700	77% ***
3B	100	$60	19%	$6000	23%

TABLE 2

Summary of study data and results per question for Study 3

Number of months and monthly payment information given to participants; APR and total payment amount not given (but implied). On choice, *** significant at $p<.01$, ** significant at $p<.05$. For version 1, $n = 54$; for version 2, $n = 39$.

Version	Type Total	Type APR	Type Time	Type Misc
1	26 (48%)	6 (11%)	6 (11%)	16 (30%)
2	16 (41%)	9 (23%)	5 (13%)	9 (23%)
Combined	42 (45%)	15 (16%)	11 (12%)	25 (27%)

TABLE 3

Summary of study data by choice pattern type for Study 3

Type Misc includes five possible combinations of choices. No more that 17% of the participants

fall into any one of the five combinations. n = 93 subjects.

| Number of points	Attractiveness rating			Likely to choose			Choice percentage		
	6%	9%	12%	6%	9%	12%	6%	9%	12%
0 points	5.53	4.45	4.79	5.47	4.34	4.14	41%	14%	10%
1 point	4.87	4.07	4.68	4.67	4.34	4.43	7%	7%	3%
2 points	4.97	5.55	5.07	5.13	5.24	4.81	17%	48%	17%
3 points	5.43	4.89	4.75	5.33	4.66	4.43	10%	10%	17%
4 points	5.17	4.86	5.45	4.83	4.41	5.10	24%	21%	52%

TABLE 4

Results for Study 5

Three conditions of reference point interest rates (6%, 9%, 12%) are given in columns;

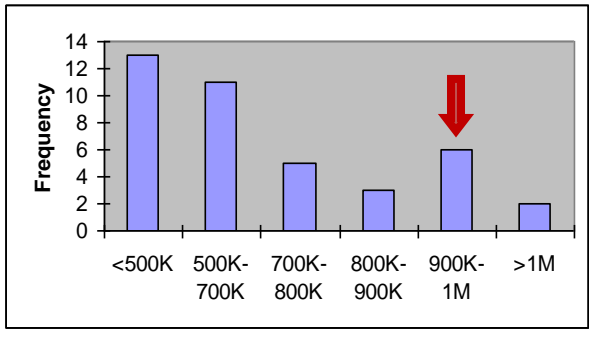evaluations and choice percentages within condition are given for each mortgage option.
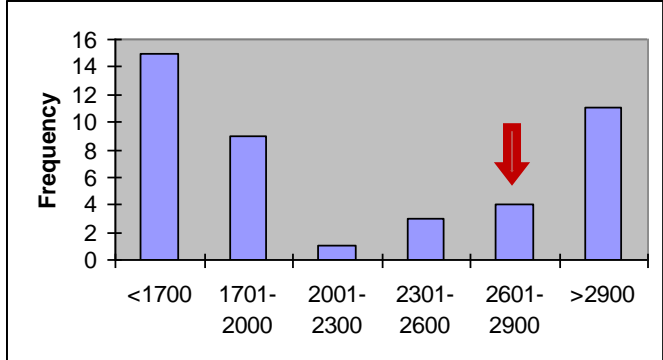
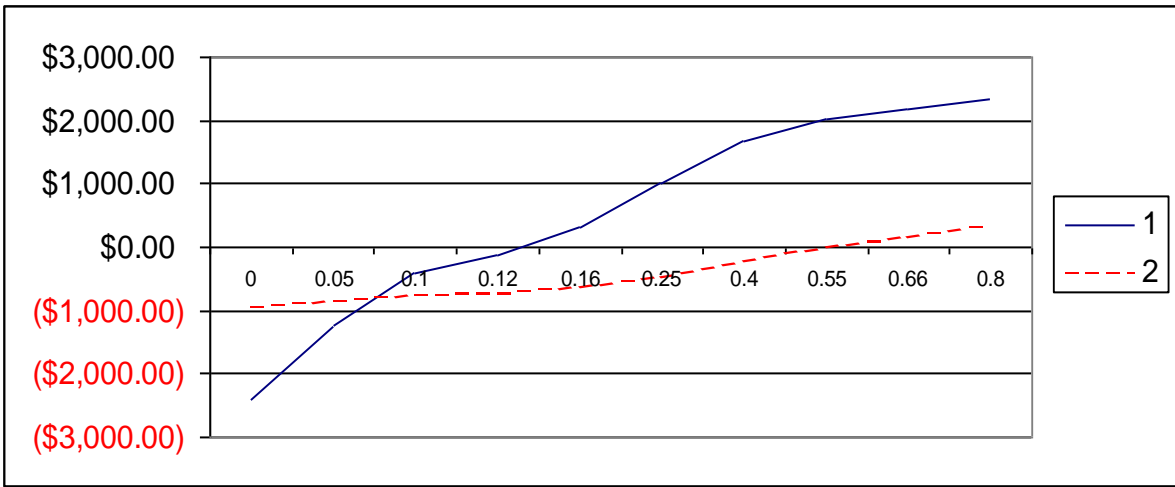**Question 1**
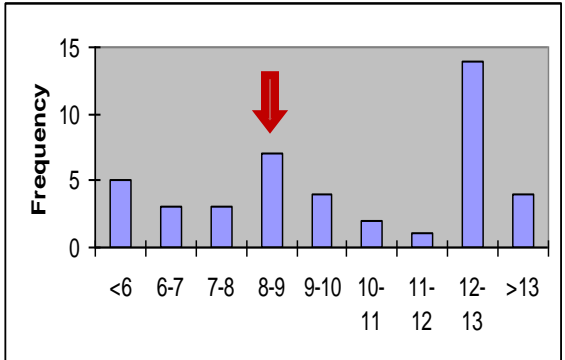
Question 2a
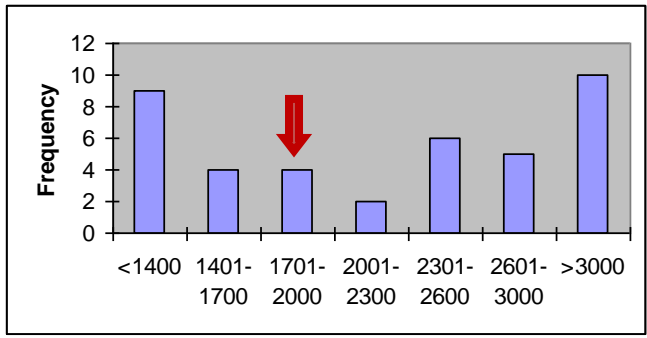
Question 2b

Question 3

FIGURE 1

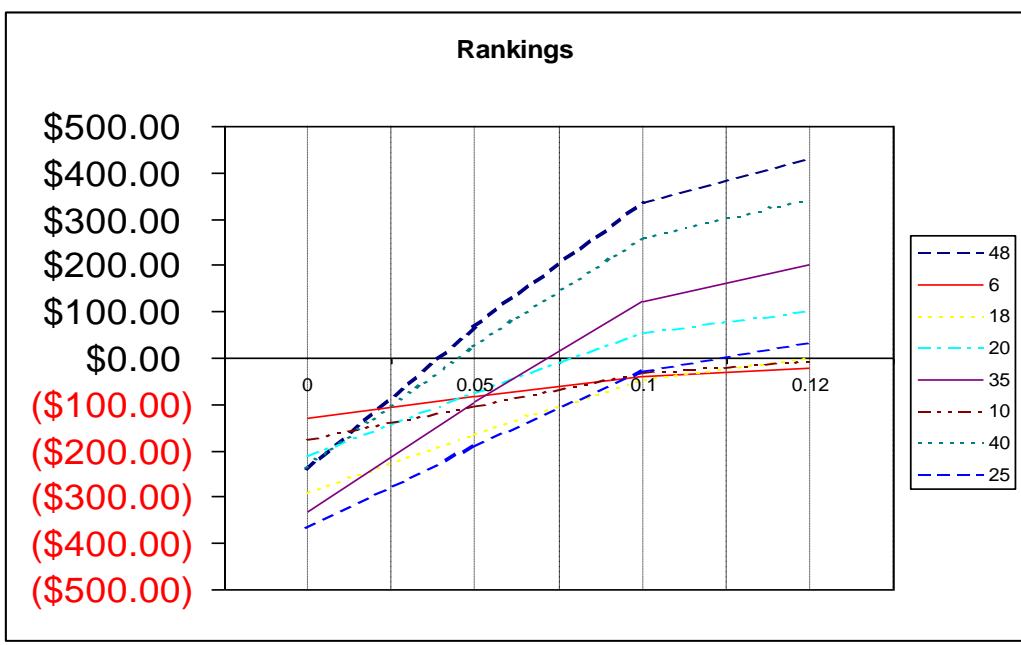**Responses per question in Study 1**

Histograms show frequency of responses to open-ended questions (n=43). Correct answer for each question is marked with an arrow.
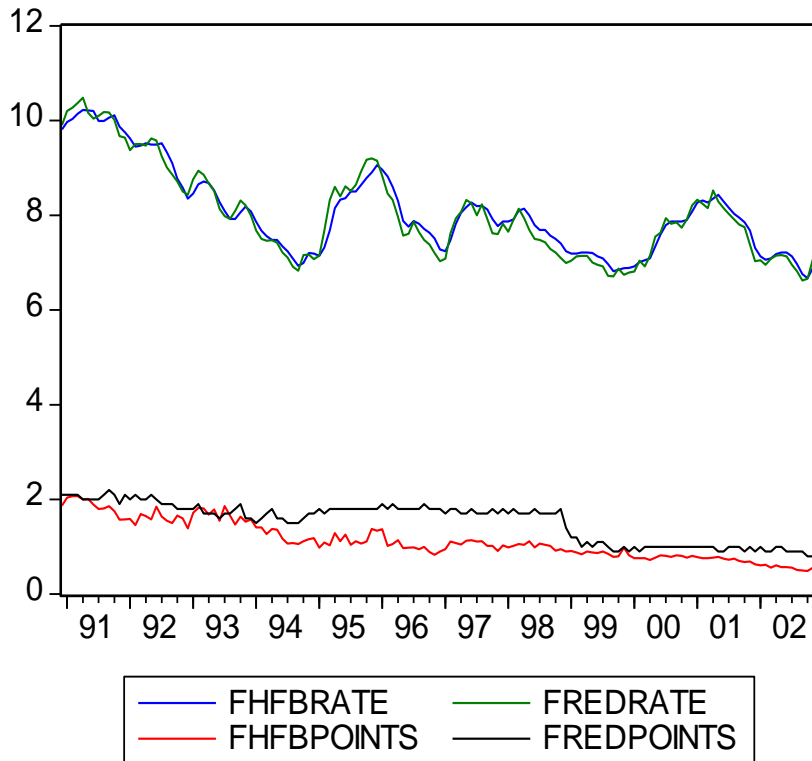
FIGURE 2

Present value estimates for Study 3

Difference between present value and loan amount ($3000), calculated for a variety of discount

rates; option 1 is 120 payments of $45, option 2 is 12 payments of $330.

FIGURE 3

Present value estimates for Study 4

Difference between present value and loan amount ($3000) for all eight loan options, calculated

for a variety of discount rates.

FIGURE 4

Relationship between points and interest rates, 1990-2003

High Federal interest rates are correlated with higher average points on mortgages taken out by homebuyers.

Appendix A: Stimulus for Study 1

On the following page you will see information excerpted from a mortgage disclosure form that is required by the Truth in Lending Act (TILA). The information on this form is provided to all individuals who take out a mortgage for the purposes of purchasing a house.

Please look carefully at the information provided on the form. Once you think you understand the form, please return to this page and answer the questions listed below. You can refer back to the disclosure page as many times as you need to in order to answer these questions.

Note: the calculations requested in these questions are difficult, even for experts. If you cannot figure out an exact answer, simply give your best estimate of the answer.

---

1. The attached disclosure form is for a variable rate (also called adjustable rate) mortgage. This means that the interest rate on the mortgage can change over time rather than staying fixed. The text of the disclosure gives an example of what can happen if the interest rate changes to its maximum amount. Using the information on the disclosure statement, and assuming that the interest rate rises to its maximum amount in the 4th year, what do you estimate the monthly payments would be for this particular mortgage after 4 years?

$ _____

2a. Assume that the interest rate on this mortgage adjusts upward after two years (24 months) by the maximum allowable amount. What would the interest rate be after this adjustment?

_____ %

2b. What is your best estimate of what the monthly payments would be once the interest rate adjusts to the level you estimated in question 2a?

$ _____

3. Given the monthly payments you calculated in questions 1 and 2b, what is your best estimate of the "total of payments" for this mortgage under the scenario that interest rates adjust upward by the maximum amount in each time period?
(Note that the total of payments when the interest rate remains fixed at 6.625% is $576,279.86.)

$ _____

TRUTH-IN-LENDING DISCLOSURE STATEMENT

Enter Company Name in Global Defaults
123 Any Street
This City, WA 99202

Loan Number: LH-1234

☒ Preliminary   ☐ Final

Borrower(s): JOHN H. SAMPLE
JANE W. SAMPLE

Property Address: 123 Any Street
Seattle, WA 98123

Type of Loan: CNVL Purchase, Fixed
Date Prepared: January 31, 2006

ANNUAL PERCENTAGE RATE	FINANCE CHARGE	Amount Financed	Total of Payments
The cost of your credit as a yearly rate.	The dollar amount the credit will cost you assuming the annual percentage rate does not change.	The amount of credit provided to you or on your behalf.	The amount you will have paid after you have made all payments as scheduled assuming the annual percentage rate does not change.
6.625%	$ 326,279.86	$ 250,000.00	$ 576,279.86

" e " means estimate.

PAYMENT SCHEDULE:

Amount of Payments

Number of Payments	P & I	Mortgage Insurance (range)	Payments are Due Beginning
1-360	$1,600.78		May 1, 2008

VARIABLE RATE MORTGAGE PROGRAM DISCLOSURE
Fixed first 24 months, 12 month ARM thereafter, LIBOR Index

1. **ARM DISCLOSURES**:
   This disclosure describes the features of the Adjustable Rate Mortgage (ARM) program you are considering. Information on other ARM programs are available upon request.

2. **INTEREST RATE**:
The interest rate for the type of loan you are considering will be based on:
   X Fixed Rate for the first twenty-four months, then adjustable annually based on the weekly average yield of the United States Treasury Securities (adjusted to a constant maturity of one year) index plus our margin.

3. **CHANGES IN THE INTEREST RATE**:

A.   FREQUENCY OF INTEREST RATE CHANGE: The interest rate on this type of loan may change Annually after the first 24 months.

B.   RATE CHANGES FOR EACH ADJUSTMENT: The interest rate on this type of loan cannot increase more than 2.00% or decrease more than 2.00 percentage points at each adjustment.

C.   RATE CHANGES OVER THE TERM OF THE LOAN: The interest rate on this type of loan cannot increase more than   6.00% or decrease more than 2.00 percentage points over the initial interest rate over the term of the loan.

D.   The interest rate on this loan cannot exceed ____12.625____ percent.

E.   The interest rate on this loan cannot fall below ____4.625__ _percent.

4. **CHANGES IN THE PAYMENT**:

A.   FREQUENCY OF CHANGE: The payment on this type of loan may change annually after the first twenty-four months, based on changes in the interest rate.

5. **EXAMPLE OF THE EFFECT OF AN INTEREST RATE CHANGE:**
   Your periodic payment can increase or decrease substantially based on annual changes in the interest rate. For example, on a $10,000 loan amortized over _____30 years_____ and an initial interest rate of 6.625% ** (in effect April 10, 2008), the maximum amount that the interest rate can rise under this program is 6.00   percentage points, to 12.625 %.

   Based on a $10,000 loan at the above initial rate, the periodic payment can rise from a first year payment of $ 64.03 to a maximum of $ 107.70 in the 4th   year.

   To see what your payments would be, divide your mortgage amount by $10,000; then multiply the periodic payment by that amount. (For example, the periodic payment for a mortgage amount of $60,000 would be: $60,000 divided by $10,000 = 6): 6 X 64.03 = $…384.18   per period.

Appendix B: Sample Stimulus for Study 3

This questionnaire is designed to understand how people choose between payment plans, even when details of the loan (such as interest rates) are not apparent. Thank you for your participation.

You have been shopping for new dining room furniture for a few months. You've finally found a set that meets your needs perfectly. It's large enough for big gatherings, is of excellent quality, and will last you many years to come. You're also satisfied that you're getting it for an excellent price: $3000 for the entire set. You've decided to finance the full $3000, and start checking into different loan options.

The first place you check for financing is the furniture store itself. The salesperson tells you that they have two payment plans available. If you were to finance it through the furniture store, which of the following payment plans would you choose? *[Circle one]*

1. 40 monthly payments at $180 per month
2. 80 monthly payments at $55 per month

The next place you check with is the furniture manufacturer, since they also offer financing on their products. The manufacturer also has two payment plans available. If you were to finance it through the manufacturer, which of the following payment plans would you choose? *[Circle one]*

1. 18 monthly payments at $250 per month
2. 180 monthly payments at $36 per month

Finally, you check with your local bank. They can also loan you the amount, and they also have only two payment plans available. If you were to finance it through the bank, which of the following payment plans would you choose? *[Circle one]*

1. 120 monthly payments at $45 per month
2. 6 monthly payments at $600 per month

Appendix C: Stimulus for Study 4

Imagine that you just bought a used car for $3000. You decide to shop for a loan for the car by using one of the new Internet websites that can give you a list of loans available from banks all over the country. You enter the value of $3000 for the loan amount, and it gives you a list of 8 possible loans. For each loan, it provides the following information:

Loan amount: the $3000 that you requested

Number of payments: the number of months that you'll be paying off the loan, starting next month

APR: the annual interest rate being charged by the bank for that loan

Monthly payment: the size of the payment you'll have to make each month

Total payments: the total amount that you'll be paying for the loan over the length of the loan (calculated by taking the number of payments times the monthly payment size)

Please rank the loans according to which ones you'd be most willing to take. Rank your favorite (most preferred) loan as 1, and your least favorite loan as 8.

Loan Amount	Number of Payments	APR	Monthly Payment	Total Payments	Your Rank
$3000	48	3.9%	$67.60	$3244.94	
$3000	6	14.5%	$521.36	$3128.14	
$3000	18	12.0%	$182.95	$3293.03	
$3000	20	7.9%	$160.58	$3211.68	
$3000	35	7.1%	$95.15	$3330.17	
$3000	10	12.5%	$317.45	$3174.55	
$3000	40	4.5%	$80.91	$3236.23	
$3000	25	10.9%	$134.68	$3367.05	

Appendix D: Stimulus Instructions for Study 5

Suppose that it is several years from now and you are in the process of buying a condo as a second property. The negotiation with the builder went well and you've settled on a price of $220,000.

You are giving the builder $20,000 as a down-payment, so you'll have to secure a mortgage for the remaining $200,000. Your mortgage broker explains that mortgage rates have historically ranged from **5% to 15%** APR. You decide that you want a 20-year, fixed rate mortgage. Luckily, your broker has found you a **20-year loan** with a fixed APR of **6%**, a very competitive rate at that time. Since your loan is for **$200,000**, this rate results in monthly payments of **$1,432.86**.

Your broker also explains that you can choose to pay **points** toward your mortgage. When you pay points, you pay interest in a lump sum upfront to get a lower rate on your fixed rate mortgage. Each point costs 1% of the mortgage amount. The more points you pay, the lower your mortgage rate.

On the following pages are the various options available for this mortgage, with or without paying points. To the lender, all of these loans are financially equivalent. To you, however, some may be more attractive than others. You should assume that you have enough money in cash savings (about $9,000) to pay some points, although paying more points leaves you less cash on hand for other uses, so you are wary of paying too much right now. *Think carefully about how much the upfront points payment matters to you – you can lower your interest rate and save future money by paying more now, but you have to decide for yourself how much of your current savings you are willing to give up to do so.* For each option listed, please indicate how attractive your find that particular loan and how likely you are to choose it. Assume that you can afford the monthly payment for each loan listed. You will be asked at the end which loan you prefer.

Note that all of the loans are for $200,000, which is what you will receive from the lender to use toward your new condo.

For your reference, below are the terms used to describe each loan:

- Number of payments: since all the loans you are considering are 20-year loans with monthly payments, there will be a total of 240 payments for every option
- Interest rate: the interest rate collected by the bank on the money being borrowed. Provided as an annual interest rate. The effective rate will vary based on the amount of points you choose to pay.
- Size of payments: the amount of money due on each monthly payment during the length of the loan
- Total loan payments: calculated by multiplying the number of payments by the monthly payment amounts. This is how much you will be paying over the next 20 years. It does <u>not</u> include the amount paid in points.

- <u>Points</u>: the number of points and their dollar value. Each point is 1% of the loan value. This payment is due at the very beginning of the loan and is used to reduce your annual interest rate. It is in addition to the monthly payments.