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Estimation of Student Loan Duration

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Abstract

Previous studies (Ranyard and Craig, 1993; and Lewis and van Venrooij, 1995) investigated the accuracy with which individuals could estimate loan duration (instalment credit), given various amounts of information about a loan. Results of these studies suggest that the accuracy of predicting loan duration may indeed be affected by both the type *and* the amount of information provided. This thesis investigates whether the results and conclusions of these previous studies can be extended to estimation of student loan duration. This has been done by distributing four different questionnaire versions to students regarding a fictitious student loan. The results of the current experiment support some of the previous authors' conclusions. As well, some additional hypotheses were tested in the current experiment that were not investigated by the previous authors. In particular, this thesis looked at the impact of a one-year delay in the commencement of payments.

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I. INTRODUCTION

It is becoming increasingly important for young people to continue their educational goals past high school, as earnings differentials reflect a definite advantage for college and university educated individuals. For example, according to Statistics Canada's 1991 Census, Canadian male high school graduates earned an annual salary of $17,600 in the first year after graduating, whereas Canadian male college and university graduates earned an annual salary of $21,300 and $23,300, respectively, in the first year after graduating. This discrepancy continues and can become even more apparent as individuals get older. For example, whereas high school educated males between the ages of 35 and 44 earned an annual salary of $37,400 in 1990, the salary figure increases to $40,900 and $57,600, respectively, for males in the same age category who are college and university educated.[1]

Clearly, college and university educated individuals can expect to earn substantially more over their lifetimes than high school educated individuals, assuming similar earnings differentials remain in the future. Most young people are aware of the financial advantages that can be expected from obtaining a post-secondary education. However, the initial cost of obtaining a post-secondary education (i.e., tuition fees, books, room and board) is often minimized, especially considering the accessibility of student loans. In other words, due to the availability of student loans, the costs

[1] These figures are derived from a special tabulation of Statistics Canada's 1991 Census, prepared exclusively for Brown Economic Assessments Inc.

incurred may not be carefully assessed until after a diploma or degree is obtained. By this time, students have often incurred at least four years of debt to finance their education. A sizable debt upon graduation may be unmanageable for individuals who are trying to start their "adult lives" after leaving school. This indeed appears to be a problem, as Lloyd Axworthy, Minister of Human Resources Development Canada pointed out in a News Release, dated August 1, 1995: "Students told me that one of their greatest concerns is unmanageable debt loads upon graduation."

That individuals may not realize the consequences of accumulating student loan debt is supported by a student loan default ratio of over 20 percent in Canada between 1984 and 1992.[2] So why are individuals unable to pay back loans they intentionally obtained to improve their future? One reason could be that individuals do not contemplate the ramifications until after the debt has been accumulated. Another reason could be that although individuals do consider the ramifications, they may be inaccurate or incorrect in estimating how much interest will accrue, or how long it will take to pay off their loans.

To find out whether students indeed make errors in their estimating procedures, an experiment was conducted to form the basis of this thesis. The focus of this thesis follows previous studies undertaken in the United Kingdom by Ranyard and Craig (1993) and Lewis and van Venrooij (1995). Ranyard and Craig (1993) conducted two studies that investigated the accuracy with which individuals could estimate loan

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[2] This ratio means that over 20% of individuals defaulted on their loan payments within the first three years after they started paying off their loan. From statistics provided by the Canada Student Loan Program, Learning and Literacy Directorate at Human Resources Development Canada.

duration as applied to flexible personal credit. Lewis and van Venrooij (1995) followed up on Ranyard and Craig's work by conducting a similar study except that it pertained to fixed, not flexible loans. Results of all of the studies revealed a similar pattern: individuals tended to underestimate loan duration, especially when only limited information about the repayment process was provided (i.e., underestimation was found to be more pronounced when additional information about monthly or total interest charges to be paid out over the life of a loan was *not* provided).

The current thesis expands on each of these studies by conducting an experiment designed to ascertain whether similar results will be obtained from a small sample of University of Calgary students. However, the current experiment has some distinct differences (see section II.c of this thesis). The approach of the experiment was as follows:

Participants were presented with one of four versions of a questionnaire that contained information regarding a fictitious student loan in the amount of $1,300.[3] All participants were informed that the monthly payment amount (MPA) was either $72 or $156 per month, the monthly interest rate charged was 1.9 percent, and the compounded annual interest rate was 25.34 percent.

[3] In reality, students are likely faced with much larger student loan debts than $1,300. However, for the purpose of ease of calculation, the amount has been kept to a minimum.

Half of the distributed questionnaires contained additional information regarding which portion of each monthly payment consisted of interest (on average). Specifically, $13.36 of each $72 MPA, and $12.88 of each $156 MPA consisted of interest, based on the principal amount ($1,300), MPA ($72 or $156), and interest rate (1.9% per month). Furthermore, half of each of these two sets of questionnaires indicated that the first repayment on the loan would not have to be made until one year later, without any penalty (in the form of additional interest or service charges).

Students were then asked to calculate how many months it would take to pay off each of the two loan payment streams (MPA = $72 or $156).

The correct answer to the two questions is 23 months for the smaller MPA ($72) and 10 months for the other MPA ($156). The correct method of calculating the answers to the two questions is outlined in detail in Appendix C of this thesis. (This information was provided to each participant upon completion of the questionnaire as part of a debriefing procedure required by the University of Calgary Ethics Committee.)

As noted earlier, this thesis sets out to investigate whether the current experiment will reveal similar results to the previous studies (Ranyard and Craig, 1993; Lewis and van Venrooij, 1995). Section II of this thesis outlines the previous studies in greater detail and provides background literature, which forms the basis for some hypotheses regarding the outcome of this particular experiment. In section III, the

importance of conducting this experiment is discussed, emphasizing some current issues surrounding the Canada Student Loan Program. A detailed description of the questionnaire, participants, procedure, and results is delineated in section IV of this thesis, followed by a discussion (section V) and brief conclusion (section VI) regarding the experiment and its results.

II. ESTIMATING LOAN DURATION: Previous Studies and Background Literature

This section provides some background information that is relevant to the focus of this thesis. First, some previous experiments (on which this thesis is based) will be reviewed. Results of these experiments suggest that individuals tend to underestimate loan duration, particularly when they have been provided with limited information. The second part of this section introduces possible factors underlying the erroneous estimation of loan duration observed in these experiments. This is carried out by first discussing the other authors' interpretations of their own results and the theories they use to explain consistently observed underestimation of loan duration. These theories, and others, will then be delineated in further detail in order to hypothesize about the outcome of the results of the experiment for this thesis. Finally, a brief summary of the similarities and differences between the previous studies and the

current experiment will be provided, as a preface to the following section, which discusses in further detail the issues surrounding student loans.

(A) Previous Experiments on the Estimation of Loan Duration

Previous studies (Ranyard and Craig, 1993; and Lewis and van Venrooij, 1995) investigated whether varying the information that is initially provided to individuals affects the accuracy with which they are able to estimate how long it takes to pay off a loan. Results of each of these studies suggest that the accuracy of predicting loan duration may indeed be affected by both the type *and* the amount of information provided.

Ranyard and Craig (1993) were the first to investigate this issue in greater detail by undertaking two separate studies. Both studies consisted of experiments that required participants to answer a survey questionnaire. The questionnaires were administered either in small groups or individually.

In the questionnaire for their first study, participants were given basic information about a number of flexible, fictitious store credit card loans: amount borrowed ($119.99 or $599.99), percentage monthly interest rate charged on outstanding amount (2.4 percent per month), and monthly repayment amount ($5 or $11 for the smaller amount borrowed, and $25 or $42 for the larger amount borrowed). Half of the participants was given the APR (annual compounded percentage rate charged on the amount borrowed), in this case 32.9 percent (equivalent

to [{$(1.024)^{12}$ - 1} x 100]), whereas the other half was not. Furthermore, half of each of these two groups of participants was given information about the MIC (average monthly interest charges) for each combination of amount borrowed and monthly repayment amount, and the other half of each of these groups of participants was not given any information about the MIC. In all cases, there was sufficient information so that it would have been possible to calculate the duration of the loan precisely.

All participants were then asked to estimate how many months it would take to pay off each of the above mentioned combinations of the fictitious loans. It was found that, on average, participants underestimated the length of time required to pay off the loan. Results further indicated that estimation improved slightly when MIC information was given, whereas estimation was slightly worse when APR information was given. Results also indicated that "...the degree of underestimation increased with actual length of loan" (Ranyard and Craig, 1993, p. 324).

In the second study undertaken by Ranyard and Craig (1993), participants were given the same basic information as in the first study about a number of flexible fictitious store credit card loans: amount borrowed, percentage monthly interest rate, and monthly repayment amount. The main difference from the first study is that in the second study, half of the participants were given information about the TIC (total interest charges to be paid out over the entire loan), whereas the other half of the participants were not. Also, unlike the first study, all participants were given the APR.

It was found, in the second study, that TIC information improved accuracy of estimation substantially. Furthermore, results from the second study indicated that as

the length of the loan increased, so did the degree of underestimation, especially when participants were not given any information about the TIC. These results are similar to the results obtained by Ranyard and Craig in their first study.

Subsequent to these studies, Lewis and van Venrooij (1995) conducted a similar study as a follow-up of Ranyard and Craig's work. This later study, which varied slightly from Ranyard and Craig's studies in its approach in that it focused on fixed loans instead of flexible instalment credit for ease of calculation for the participant, revealed similar results. Specifically, it was found that "...length of loan was persistently underestimated" (p. 167). Also similar to Ranyard and Craig's findings from their second study, accuracy of estimation of loan duration improved when participants were provided with information regarding the TIC.

This thesis attempts to determine whether the results and conclusions put forth by Ranyard and Craig (1993) and Lewis and van Venrooij (1995) about instalment credit can be extended to student loan estimation. This will be done by distributing questionnaires to students regarding a fictitious student loan (as opposed to instalment credit). The results of the current experiment will then be compared to the results obtained in the previous studies. Part B of this section outlines background literature aimed to reveal some possible factors underlying the estimation of loan duration.

(B) Background Literature: Possible Factors Underlying the Estimation of Loan Duration

In an attempt to interpret the results of their studies, and to shed some light on the apparent differences in participants' methods of calculation and subsequent answers, Ranyard and Craig (1993) suggested that most individuals may not wish to, or know how to, go through the tedious task of calculating the month to month changes in the status of a loan or line of credit. As a result, the authors suggest that "... most people will settle for some approximation to the correct answer, and apply various estimation heuristics" (p. 319). Specifically, Ranyard and Craig (1993) noted the following regarding the theory of psychological accounts, a theory developed initially by Kahneman and Tversky (1984) and Thaler (1985):

> We have suggested that people often frame credit offers in terms of both *total accounts* and *recurrent, budget period accounts* (Ranyard 1992). If this is so, then the TIC might be an important component of the *total account* frame of reference. Similarly, the MIC might be important for *recurrent, budget period accounts.* If people do think about credit in terms of these accounts, then they may readily use MIC and TIC information in estimating loan duration. APR, on the other hand, may be confusing since it is not easily accommodated into people's account representation. (p. 321)

Ranyard and Craig (1993) also recognized views of the process of discounting (see Loewenstein, 1988) as a potential contributor to their results. According to Loewenstein (1988), "... [d]iscounting permits an individual to make value comparisons

between immediate and delayed consumption" (p. 201).[4] However, Ranyard and Craig (1993) note that this theory had not yet been applied to flexible instalment credit in a formal setting. Consequently, for the purpose of explaining their results, they preferred to rely on the theory of psychological accounts.

The remainder of this section will further outline these and other economic and psychological theories in an attempt to shed some light on the results of the previous studies and to hypothesize about the outcome of the current experiment. It will begin with an introduction to some basic theories of "rationality", commonly referred to and often preferred by most "conventional" economists. This brief discussion will be followed by a description of some alternate theories, which may be more useful in explaining individual decision making processes in some economic settings, specifically those involving uncertainty. Certain aspects of these theories will be employed to make a number hypotheses about the expected results of the experiment of this thesis.

1) Rationality

Economic theory is often based on the assumption that individuals are "rational". In a world of certainty, rationality typically implies that people maximize their utility by essentially consistently choosing in line with a "well-behaved" preference ordering which has certain anticipated properties. In other words, if it is assumed that individuals maximize their utility, then this implies that their choices

[4] It will be proposed, further into this section, that individuals make systematic errors in discounting in certain economic situations which may lead to the results observed by Ranyard and Craig (1993).

between different consumption bundles within a consumption set adhere to these properties. This is how a standard utility function is formed. We shall not describe these principles in further detail, but note that the main purpose of assuming that they are adhered to is that they "force" individual choices to be consistent within a consumption set. Therefore, any observed inconsistent choices that individuals make (i.e., their preference ordering changes and/or a single ordering has properties other than those assumed and/or their choices are not rational) can not be explained by this fundamental theory.

In a world of less than perfect certainty, rationality usually implies that expectations are formed rationally and that choices maximize expected utility. In their introductory textbook, *Economics*, Lipsey, Purvis, and Steiner (1991) define rational expectations as "the theory that people understand how the economy works and learn quickly from their mistakes so even though random errors may be made, systematic and persistent errors are not made" (p. G-14).

Similarly, expected utility theory (also referred to as subjective expected utility theory) delineates how individuals make rational choices when they are faced with decisions under risk. According to this theory, there are once again a number of principles (eg., cancellation, transitivity, dominance, and invariance) that can be used to describe the characteristics of the choices individuals make (see Kahneman and Tversky, 1986, pp. S252-54). Simon (1986) characterizes this theory as follows:

> The basic idea of this theory is to load all values into a single function, the utility function, in this way finessing the question of how different values are to be compared. The comparison has in effect already been made when it is assumed that a utility has been assigned to each particular state of affairs. (p. 99)

Subjective expected utility theory also suggests that probability values can be assigned to risky and uncertain situations. These values can then be combined with a single utility function to calculate the expected utility associated with each possible action in a situation. The utility function itself is very similar to the utility function in a world of certainty.

The obvious attraction to theories that are based on the assumption of "rationality" is that they provide a relatively clean set of predictions about human behaviour. However, if it is found in some economic settings that the basic assumption of "rationality" does not always hold true, then these theories are no longer as useful for the purpose of explaining and predicting human behaviour. According to Varian (1992, p. 95), "[a] utility function is often a very convenient way to describe preferences, but it should not be given any psychological interpretation. The only relevant feature of a utility function is its ordinal character". Clearly, this is a somewhat limited theory so that it may be useful in some circumstances, particularly when utility theory does not appear to describe behaviour accurately, to provide psychological depth to the theory.

Consequently, it may be desirable to look at alternate theories, which tend to be less well grounded in economic theory, in order to predict human behaviour more

accurately. The next section introduces several examples of alternate theories, sometimes referred to as "quasi-rational" approaches (Thaler, 1991).

2) Quasi-Rationality

Despite the existence of the above noted clearly defined theories of economic "rationality", there is a growing body of literature that casts doubt on this basic concept in some economic settings. For example, Thaler (1991) stated the following:

> In some well-defined situations, people make decisions that are systematically and substantively different from those predicted by the standard economic model. Quasi rational behaviour can be observed under careful laboratory controls and in natural economic settings such as the stock market. Market economies and their institutions are different from the way they would be if everyone were completely rational. (p. xxi)

Similarly, Simon (1986) noted that

> ...by examining the results of laboratory experiments in which human subjects have been asked to make decisions involving risk and uncertainty in game-like situations orders of magnitude simpler than the game of real life, [it is evident that] human beings have neither the facts nor the consistent structure of values nor the reasoning power at their disposal that would be required, even in these relatively simple situations, to apply [subjective expected utility] principles. (pp. 102-3)

Simon (1986) suggests that a more accurate description of the real world might be that human decision making processes are governed by the principles of the theory of "bounded rationality", which he views as a behavioural model.

> Within the behavioural model of bounded rationality, one doesn't have to make choices that are infinitely deep in time, that encompass the whole range of human values, and in which each problem is interconnected with all the other problems in the world. In actual fact, the environment in which we live, in which all creatures live, is an environment that is nearly factorable into separate problems. (p. 104)

As a result, Simon (1986) states that individual decision making may not necessarily be optimal or consistent. In fact, the theory of bounded rationality "...postulates that human rationality is very limited, very much bounded by the situation and by human computational power" (p. 113).

Similar to Simon's theory of bounded rationality, there exists a substantial amount of additional literature designed to predict human behaviour when the theory of "rationality" fails, particularly when decision making under risk is involved. For example, Kahneman and Tversky (1979, p. 263) observed

> ...several classes of choice problems in which preferences systematically violate the axioms of expected utility theory. In the light of these observations we argue that utility theory, as it is commonly interpreted and applied, is not an adequate descriptive model and we propose an alternative account of choice under risk.

In a later paper, Kahneman and Tversky (1986) once again argue that actual observation of individual behaviour suggests that decision making often violates behavioural predictions made by theories that are based on the common assumption of "rationality". For example, the authors state that an *essential* axiom of expected utility theory is that individual decision making should adhere to the principle of invariance, which implies that, all else equal, "...alternative descriptions of the same problem

should lead to the same choice" (Kahneman and Tversky, 1986, p. S253). However, through numerous studies and experiments, the authors showed that this essential axiom is often violated by individuals. Below, we summarize an example of one of Kahneman and Tversky (1986) experiments, in which participants were given a fictitious medical problem and asked to choose a program of treatment. The results of the experiment are presented in parentheses, where the percentage of participants selecting that program are shown.

Suppose the U.S. is preparing for the outbreak of an unusual disease, which is expected to kill 600 people. Two alternative programs to combat the disease have been proposed with the following outcome:

[72%] If program A is adopted, 200 people will be saved.

[28%] If program B is adopted, there is a one in three probability that 600 people will be saved, and a two in three probability that no people will be saved.

A second group of participants is given the same problem with the following outcomes:

[22%] If program C is adopted, 400 people will die.

[78%] If program D is adopted there is a one in three probability that nobody will die, and a two in three probability that 600 people will die.

Clearly, programs A and C have the exact same outcome, as do programs B and D. It should be noted that individuals had been assigned to the two groups randomly, so there would be no reason to assume that the groups should differ in average make-up. Therefore, the results of this particular experiment indicate that the way in which information is presented can influence the choices individuals make.

In a later study, Loke (1989) conducted a similar experiment in which he also found that "[j]udgments and decisions can be influenced by the way information is presented or framed" (p. 329). As such, this concept is commonly referred to as 'framing'. Furthermore, in an attempt to build on the work carried out by Kahneman and Tversky, which is largely focused on frames externally imposed by the examiner, Elliott and Archibald (1989) conducted a study from which they concluded that decision makers sometimes impose their *own* frame on choice problems, presumably to simplify the problem.

A focal point of most framing literature has typically been on the classification of choices in terms of losses and gains (like the previous example), since a main finding of the framing research has been that "...choices framed in terms of losses have a greater influence than those framed in terms of gains" (Loke, 1989, p. 329). This specific finding -- of the effect that the framing of information has on subsequent decision making -- was incorporated by Kahneman and Tversky (1979) in what they referred to as prospect theory.

Prospect theory attempts to provide a more accurate explanation of individual decision making under risk. "The theory is developed for simple prospects with monetary outcomes and stated probabilities, but it can be extended to more involved choices" (Kahneman and Tversky, 1979, p. 274). The main focus of prospect theory is to divide decision making into two phases, editing and evaluating. In the editing phase, individuals go through a preliminary analysis in which prospects, or choices, are organized and/or simplified. In the second phase, these simplified choices are then evaluated and decisions are made accordingly (Kahneman and Tversky, 1979). As might be expected with a behavioural model of decision making, prospect theory is subject to revisions in light of new information about actual choice behaviour (Kahneman and Tversky, 1982).

Although the focus of this thesis is not directly on choice problems or decision making under risk, these phases, "editing" and "evaluating", can be relevant to decision making when an individual is provided with limited information in order to solve a problem, as is the case for participants involved in the experiment of this thesis. The reason for this is that when individuals are provided with limited information, they may in fact view the process as a 'guessing game', similar to that of decision making under risk, in which there are a number of unknown factors. The main difference, however, is that in the case of the current experiment, the "unknown" factors are not truly unknown, because the fictitious loan problems can potentially be systematically solved for each of the four versions of the questionnaire administered to the participants. Nevertheless, there may be some factors that *appear* to be unknown to the

participant, because a method for solving the problem is not readily available or obvious. In other words, they remain unknown because the individual fails to search them out and utilize them correctly.

In order to hypothesize about the specific errors individuals may make in the experiment undertaken for this thesis, attention will be focused on some specific theories that could shed light on the possibly erroneous process of decision making with limited information. In order to do this, however, it will be useful to discuss the concept of estimation heuristics, which is a broad term that encompasses all types of "rational mistakes" individuals may make when they are engaged in estimation tasks and making decisions. (A "rational mistake" refers to some procedure used in making decisions that appears reasonable to the decision maker, but leads to a decision that is not rational according to the conventional utility maximization model. It can be seen as an example of "quasi-rationality".)

Roughly speaking, the concept of an estimation heuristic is based on the notion that in the "editing" phase of decision making, people resort to their own methods of mental accounting, often erroneous, in order to simplify a problem. (This phenomenon could be considered an extension of Elliott and Archibald's findings mentioned earlier that, in certain situations, individuals tend to impose their own frame on problems.) Once the problem has been simplified in the "editing" phase, regardless of whether this has been executed correctly, the "evaluation" phase becomes easier, and a decision can be made.

According to Kahneman and Tversky (1982), the main concept behind the theory of estimation heuristics flows from the observation that

> ...people rely on a limited number of heuristic principles which reduce the complex tasks of assessing probabilities and predicting values to simpler judgmental operations. In general, these heuristics are quite useful, but sometimes they lead to severe and systematic errors. (p. 3)

As the above passage suggests, people do not necessarily resort to correct heuristic 'short-cuts' when they are faced with solving a problem seemingly too complex to handle without such heuristics. As a result, systematic errors are made. According to Ranyard and Craig (1993), individuals rely on psychological accounts to simplify problem solving. As mentioned previously, the authors suggested that individuals separate credit offers into total accounts and recurrent, budget period accounts. This separation of information is not relevant to the current experiment, however, since each of the four questionnaire versions is set up strictly as a recurrent, budget period account (i.e., none of the questionnaires provide information regarding total charges to be paid out over the entire loan, which could lead to a total accounts analysis). Therefore, only the recurrent, budget period accounts analysis is relevant to the current experiment and hence it will be discussed in further detail below.

The concept of a recurrent, budget period account is best described by Ranyard and Craig (1995) in a recent study in which the authors conducted a number of experiments to determine the mental accounting process individuals undergo when

they are dealing with installment credit. In their study, Ranyard and Craig (1995) proposed that individuals use the concept of a budget period, which is

> ...a heuristic which reduces the temporal complexity of financial transactions, as follows. The time over which a core account runs is perceived as a sequence of discreet units, or budget periods... Successive budget periods are perceived as being similar to each other, incorporating similar, recurrent transactions... The relevant core account, therefore, will be a recurrent, budget period account. (p. 4)

The experiment for this thesis is set up very much like a recurrent, budget period account in that participants are given information about specific fixed monthly payment amounts. As such, we can expect the results of the current experiment to be in line with such an analysis.

Results of Ranyard and Craig's (1995) experiments on budget periods suggested that time has an effect on the way in which individuals view budget periods. Specifically, the authors' study revealed that when individuals evaluate credit based on a budget period, they tend to give less weight to future budget periods, relative to more recent ones, and that "... a weakness of a recurrent account might be to focus too much on current transactions, resulting in a bias towards longer loans with lower monthly repayments" (Ranyard and Craig, 1995, p. 18).

As will be shown in the next section, however, any form of discounting implies that less weight be applied to future budget periods. (For example, see Figure 1 of this thesis.) The key issue, therefore, should be whether individuals tend to give less weight

to future budget periods, relative to what is appropriate, or correct. This issue is addressed in the next section.

The remainder of this section presents three specific examples of estimation heuristics that are relevant to the experiment and results of this thesis. These heuristics include "adjustment and anchoring", "discounting", and "psychological accounts".

i) Adjustment and Anchoring

Although there are a number of heuristic principles that people may follow to predict values, one that is of particular interest for the purpose of this thesis is referred to by Tversky and Kahneman (1982) as 'adjustment and anchoring'. According to the authors, this theory intimates that

> ...in many situations, people make estimates by starting from an initial value that is adjusted to yield the final answer. The initial value, or starting point, may be suggested by the formulation of the problem, or it may be the result of a partial computation (Kahneman and Tversky, 1982, p. 14).

Since it is anticipated that many of the participants of this study will not attempt to go through the somewhat tedious computations necessary to derive the correct answer to the loan duration problem, it is likely that they will commence by quickly focusing on an initial value that will subsequently be adjusted to obtain a final answer. In the case of the current experiment's questionnaires that do *not* include information regarding monthly interest charges (Questionnaire versions 1 and 2, see Appendix A), a likely starting point would be to divide the amount of the total loan

($1,300) by the monthly payment amount ($72.00 or $156.00). This yields an approximate initial value of 18 or 8 months, respectively, depending on whether the monthly payment amount is $72.00 or $156.00. However, it is clear that this preliminary calculation makes no allowance for interest on the loan.

Once an initial value has been established, Tversky and Kahneman (1982) state that subsequent adjustments or estimates tend to be biased toward this value. They call this concept 'anchoring'. "Because adjustments are typically insufficient, this procedure should lead to underestimation" (Kahneman and Tversky, 1982, p. 15). For the purpose of the current experiment, therefore, it may be the case that the adjustments that participants make to an initial value of 18 or 8 months will be insufficient, and therefore loan duration will be underestimated as the adjustment and anchoring theory predicts.

The underestimation of loan duration is expected to be relatively less severe for the responses of the participants who received the questionnaire versions that include monthly interest charges (Questionnaire versions 3 and 4, see Appendix A). This is because it is a relatively simpler[5] task for the participant to subtract the monthly interest charges from the monthly payment amount, and then divide the total amount of the loan by this difference, thereby obtaining the correct answer through a much simpler "anchor and adjustment" process. This analysis is the basis for the first hypothesis of this thesis, based on a possible anchor and adjustment process.

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[5] See Appendix C for a more detailed explanation of the correct method of derivation of the answers to each of the four questionnaire versions.

Hypothesis 1: The numerical responses to the loan duration estimation question given by participants who do not receive MIC information will be lower, on average, than the numerical responses of participants who do receive MIC information.

It should be noted that the observed underestimation may be less apparent for the shorter term loan, which generates an initial value of 8 months, because less adjustment would need to be made (in absolute terms) in order to derive the correct answer of 10 months. (The longer term loan, which generates an initial value of 18 months would need to be adjusted by 5 months in order to drive the correct answer of 23 months.)

ii) Discounting

Ranyard and Craig (1993) suggest that biases in estimation of loan duration may be a reflection of the time discounting process, but they do not speculate on exactly why this might be the case. Since loan payments extend over time, it is certainly possible that estimates are affected by how people discount the future. In this section, the concept of discounting will be discussed, in order to hypothesize how it may contribute to the explanation of potentially erroneous loan estimation. It is important to note that the content of this section is very speculative, since it is difficult to extend the concept of discounting to the estimation of loan duration without making some important assumptions.

At a superficial level, it might be suggested that the key factor could be tendency to myopia on the part of many people: that is, the same theory that leads people to over-discount future values "seemingly" also leads them to underestimate the time required to pay off loans. However, it is important to ground expectations more firmly in an explicit model of the discounting process.

In his book entitled *The Winner's Curse: Paradoxes and Anomalies of Economic Life,* Thaler (1992) discusses the concept of intertemporal choice, which involves decision making over time. He states that

> ...for decisions involving choices between time streams of money (receipts and payments), economic theory makes a precise and testable prediction, namely that (at the margin) people should discount money streams at the (after-tax) market rate of interest (r). [Furthermore,] ...consumers should be consistent in their intertemporal choices. The discount rate should be constant across situations and over time. (p. 93)

Similarly, Ainslie (1991) stated that "[a]ccording to conventional utility theory, the value of 'delayed goods' is discounted in an exponential curve" (p. 334). This implies a discount curve as illustrated in Figure 1, where the horizontal axis shows the length of time in the future over which some good will be discounted, and the vertical axis shows the current (present) value of the discounted good.

Figure 1: Exponential Discount Curve

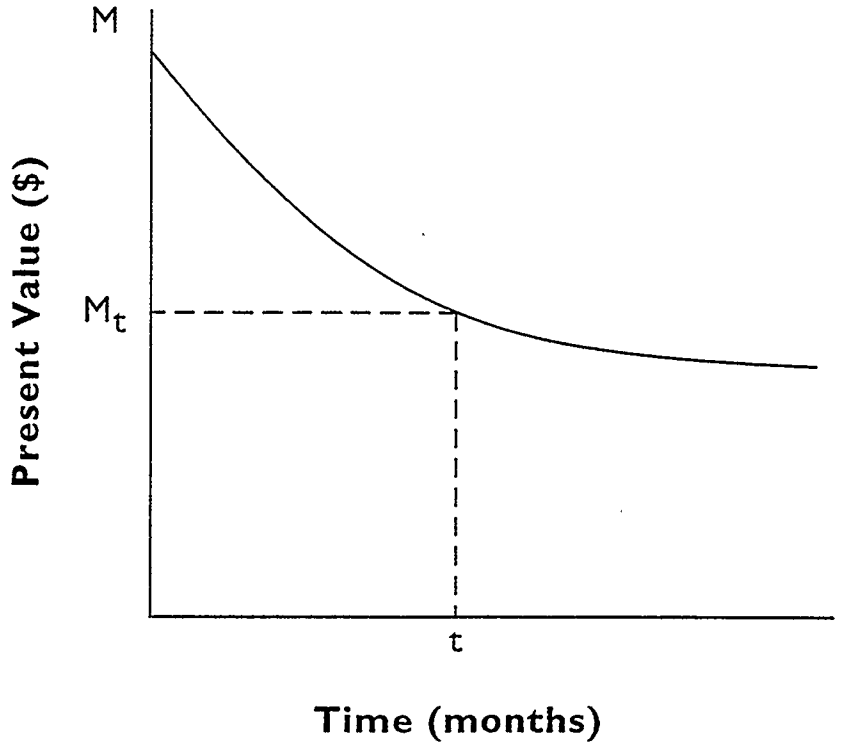
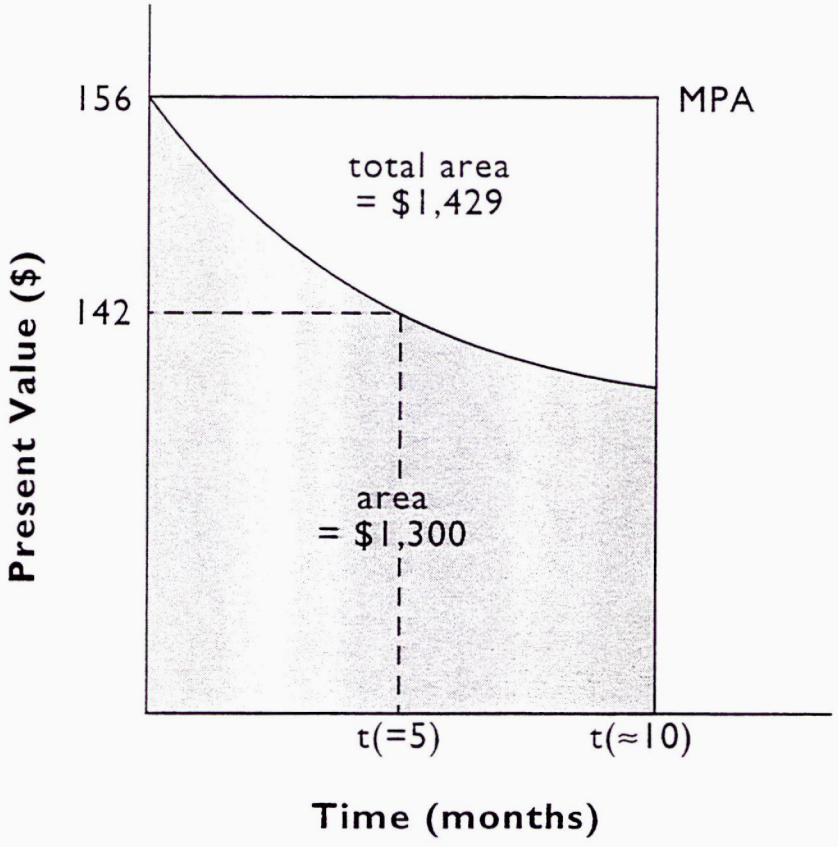


Figure 1 should be interpreted as follows: Suppose the value of consuming a good is $M at the time it is consumed. This would be the value ascribed to consumption if it were consumed today (at time '0'). Then exponential discounting implies that the present value of consuming this good at some time in the future, for example at time 't', is M_t$, where '$M_t$' is equivalent to 'M' discounted at the same discount rate *each* period from time '0' to time 't'. That is, $M_t = M/(1+r)^t$.

In order to relate the concept of an exponentially declining discount curve to the current experiment, and to the process of estimating the duration of a loan, Figures 2a and 2b have been constructed to show the time stream of a loan. It should be mentioned that this transition is not an obvious one, and as a result is somewhat fragmented, since we are dealing with two different concepts, discounting the value of a delayed good versus estimating the duration of a loan.

Figures 2a and 2b illustrate how the exponentially declining discounting process applies to a $1,300 loan with monthly payment amounts of $156.00 or $72.00, at a monthly interest rate of 1.9 percent. The curve shows the present value of the payment amount, up to the time of final payment.

Figure 2a: Time Stream of Loan (MPA = $156) with Exponential Discounting



In Figure 2a, it can be seen that the actual Monthly Payment Amount (MPA) is $156. However, the present value of the 5th MPA, for example, is equivalent to $142.[6] In other words, if an individual put $142 in the bank today, earning interest at 1.9 percent per month, compounded monthly, then in 5 months that individual would have the $156 that would be required to make the 5th MPA.

Clearly, the difference between $156 and $142, or $14 is interest accrued over the 5 month period. Furthermore, the sum of the present values of each payment to be made on the loan (until the loan is entirely paid off) is equivalent to the area under the exponentially declining discount curve ($1,300), or the initial amount of the loan. Therefore, although the individual would be making total payments in the amount of $1,429 in un-discounted dollars,[7] the sum of the present values of each of the payments (discounted at 1.9 percent per month) is exactly equal to the initial amount of the loan, or $1,300.

Figure 2b, below, is similar to Figure 2a, except that it pertains to the time stream of a $1,300 loan with MPA's of $72 per month.

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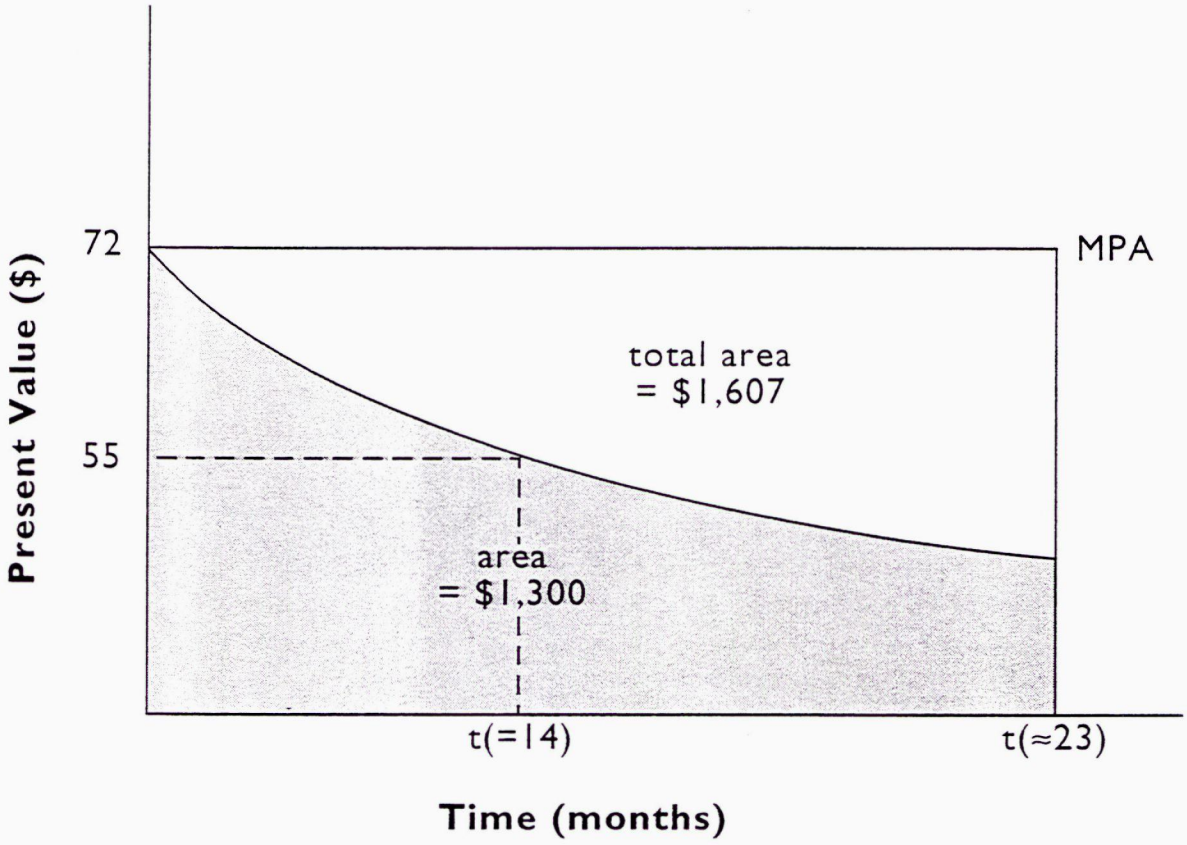
[6] Equivalent to $\{\$156/(1.019)^5\}$.

[7] This figure is less than the sum of 10 payments of $156, because the last monthly payment will be less than $156. (See Appendix C for further details regarding the re-payment schedule.)

Figure 2b: Time Stream of Loan (MPA = $72) with Exponential Discounting



In Figure 2b, it can be seen that although the MPA is $72, the present value of the 14th MPA, for example, is equivalent to $55,[8] and the difference between these two amounts ($17) constitutes interest. Once again, the sum of the present values of each payment to be made on the loan (until the loan is entirely paid off) is equivalent to the area under the exponentially declining discount curve ($1,300), or the initial amount of the loan. Therefore, although the individual would be making total payments in the amount of $1,607 in un-discounted dollars,[9] the sum of the present values of each of the payments (discounted at 1.9 percent per month) is exactly equal to the initial amount of the loan, or $1,300.[10]

Since it is assumed that exponential discounting is part of "rational" judgment and assessment, it follows that exponential discounting would, of itself, contribute nothing to the miss-estimation of loan duration, so long as the discounting is executed correctly (i.e., exponentially).

Although rational choice might be based on the use of a constant exponential discount rate, a number of studies have found that actual observations of individual discount rates do not always support this simple theory of inter-temporal choice. For example, Ainslie (1991) found that

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[8] Equivalent to $\{\$72/(1.019)^{14}\}$.

[9] This figure is less than the sum of 23 payments of $72, because the last monthly payment will be less than $72. (See Appendix C for further details regarding the re-payment schedule.)

[10] Obviously, the total amount of all the payments to be made on the loan with the smaller MPA's ($1,607) is larger than the total amount of all the payments to be made on the loan with the larger MPA's ($1,429), because of the total interest that has accrued over a longer period of time.

> ... [v]arious experimental designs have given the curve a number of specific forms, but all are hyperbolic – more bowed than an exponential curve, so that preference for goods of different delays will indeed change as a function of time. (p. 334)

The hyperbolic curve implies a relatively higher discount rate close to the present and a lower discount rate further away in time. That is, $M_t = M/(1+h(t)r)^t$, where $h > 0$, and h is a decreasing function of time (i.e., $h' < 0$). Clearly, if $h = 1$ (and not a function of time), so that $M_t = M/(1+r)^t$ then this would be special case of hyperbolic discounting, namely exponential discounting, as was explained previously.

Similar to Ainslie's findings, Thaler (1991) also found that observed individual discount rates do not necessarily translate into an exponentially declining curve. He also found that "... implicit discount rates drop sharply as the ... length of time increases" (Thaler, 1991, p. 129), again implying a more bowed discount curve than that suggested by conventional utility theory. Finally, in a later study, Thaler (1992) once again found that "...discount rates declined sharply with the length of time to be waited" (Thaler, 1992, p. 96). Results from each of these studies suggest that time delay has a generally predictable effect on implicit discount rates.

Figure 3, below, illustrates a hyperbolically declining discount curve as compared to an exponentially declining one. It can be seen that at some future time the two curves will intersect. Ainslie (1991) argues that such intersections can lead to inconsistent inter-temporal choices or perhaps periods of regret about choices (p. 334).

Figure 3: Hyperbolic versus Exponential Discount Curves

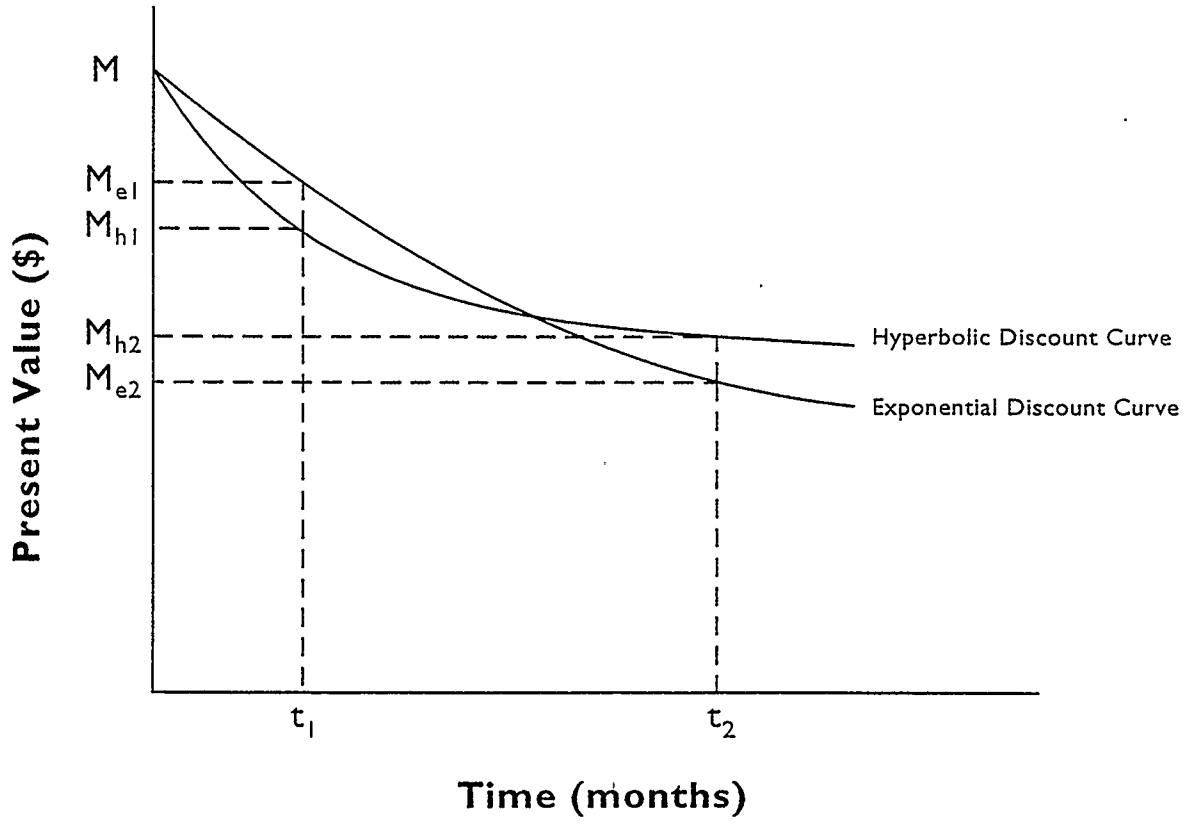
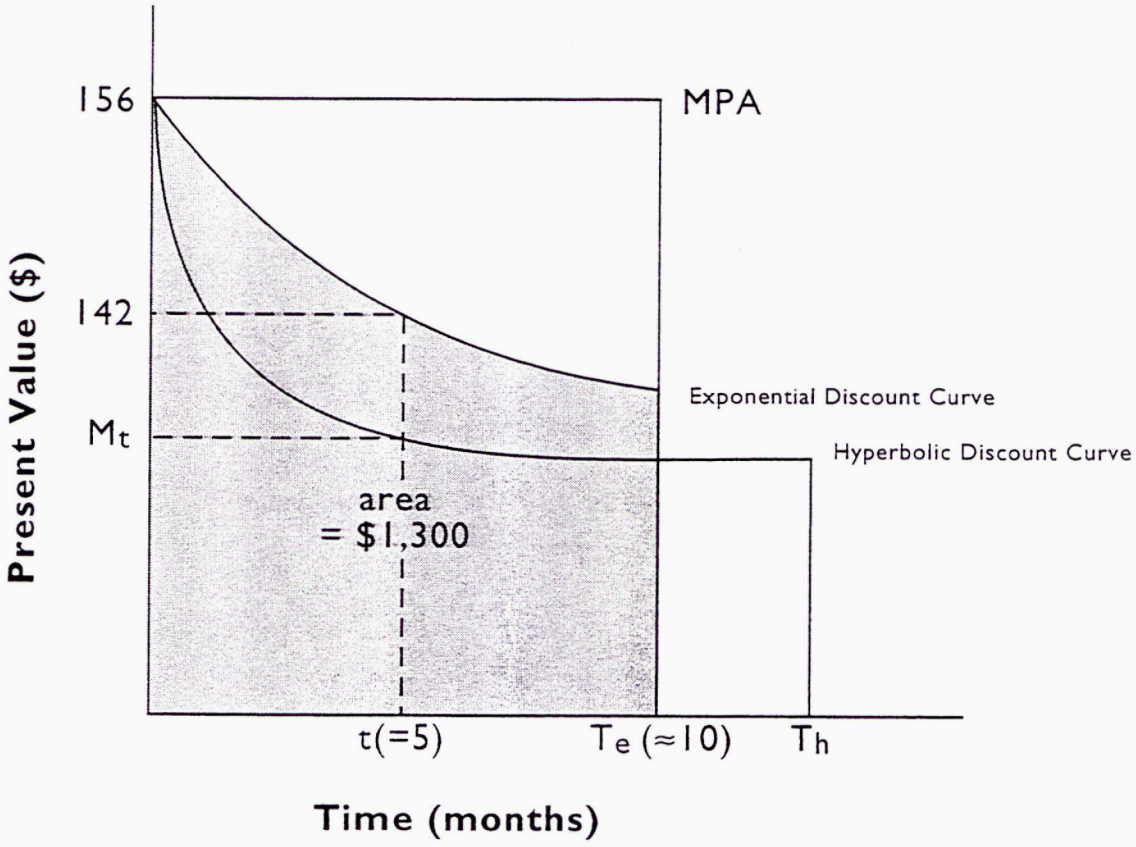


Figure 3 should be interpreted as follows: Suppose the value of consuming a good today (time '0') is $M, and that the user derives the same value ($M) on consumption at any future date. Then the present value of consuming this good at time 't_1', is either $\$M_{e1}$ or $\$M_{h1}$, depending on which type of discounting is observed. Similarly, the present value of consuming this good at time 't_2', is either $\$M_{e2}$ or $\$M_{h2}$. Notice that $\$M_{e1}$ is greater than $\$M_{h1}$, but $\$M_{e2}$ is less than $\$M_{h2}$. This change in ranking is a result of the two curves crossing, and leads to Ainslie's previously mentioned argument about inter-temporal choices.

In order to relate the concept of a more bowed, hyperbolically declining discount curve to the process of estimating the duration of a loan, Figures 4a and 4b have been constructed to show two different examples of the time stream of loan payments. These examples, which are simply an extension of Figures 2a and 2b, focus on the discounting process alone, without reference to the concept of mental accounts or heuristics in decision making. Therefore, this discussion assumes that individuals rely upon present value calculations to determine when the loan will be repaid.

Figures 4a and 4b illustrate how the hyperbolically declining discounting process might apply to a $1,300 loan with monthly payment amounts of $156 and $72, respectively, with declining discount (interest) rates, as compared to the exponentially declining discount process. It is important to note that these are two specific examples of different hyperbolically declining discounting procedures, arbitrarily chosen, and that the *rate* at which the discount rate declines has important implications about where the two curves (hyperbolic versus exponential) might cross.

Figure 4a: Time Stream of Loan (MPA = $156) with Hyperbolic versus Exponential Discounting

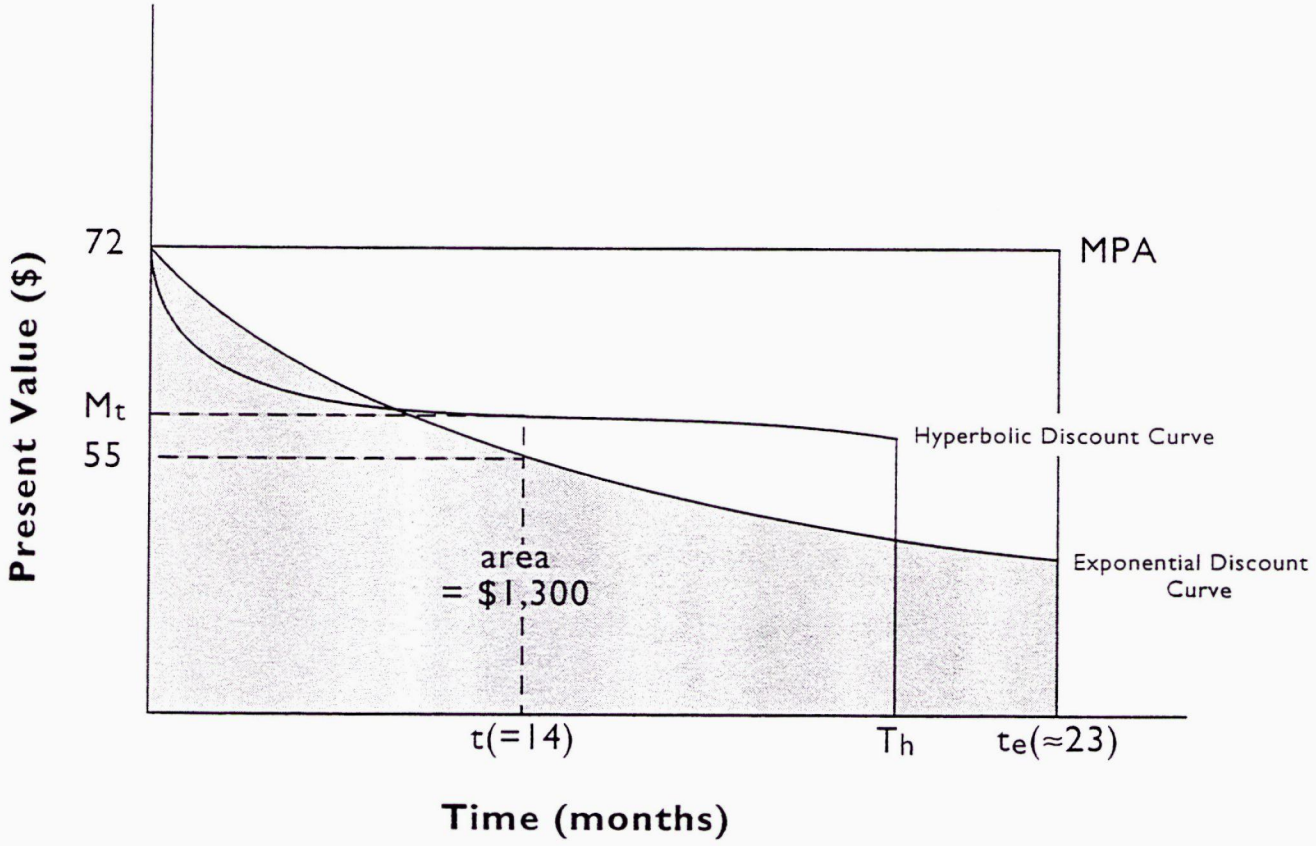


In Figure 4a, as in Figure 2a, it can be seen that if an exponential discounting procedure is used, the estimate of the length of loan is determined at the point where the sum of the present values of payments reaches $1,300, that is, at time 'T_e', or approximately 10 months. Figure 4a shows, however, that a hyperbolic discounting procedure may lead to an over-estimate of the duration of this particular loan, because at time 'T_e', the sum of the present values of payments is less than $1,300. This is because the present values calculated using hyperbolically declining discount rates are less than the present values using an exponential rate at every point in time.

The lower curve implies that an individual displaying this type of discounting procedure would likely ascertain that a lower amount (than under exponential discounting) is being paid towards the loan (in present value terms) each period. As a result, more time periods would be required before the entire loan is paid off, and the individual would likely over-estimate the duration of the loan. This scenario will be more probable the *shorter* the duration of the loan, because the initially higher discount rates suggested by the hyperbolically declining discount curve dominate in the shorter time period.

It is also possible to construct a comparison of a hyperbolically declining discount curve and an exponentially declining discount curve, such that the two curves intersect before time 'T_e', as is show in Figure 4b, below:

Figure 4b: Time Stream of Loan (MPA = $72)
with Hyperbolic versus Exponential Discounting



It can be seen from Figure 4b that if an exponential discounting procedure is used, the estimate of the length of loan is determined at the point where the sum of the present values of each payment reaches $1,300, at time '$T_e$', or approximately 23 months. Figure 4b shows, however, that a hyperbolic discounting procedure *may* lead to an under-estimate of the duration of this particular loan, because at time 'T_e', the sum of the present values of each payment would be greater than $1,300. This is because beyond the point where the two curves cross (arbitrarily chosen in Figure 4b), the present values calculated using hyperbolically declining discount rates are greater than the present values calculated using exponentially declining discount rates.

There is, however, another assumption that must be made before it can be ascertained that an individual displaying a hyperbolic discounting process will under-estimate the duration of the loan. Specifically, it must be assumed that the sum of the differences between the present values *before* the cross-over point is *less* than the sum of the differences between the present values *after* the cross-over point, up to time 'T_e'. This is because if the sum of the differences between the present values before the cross-over point is *greater* than the sum of the differences between the present values after the cross-over point, up to time 'T_e', then the initially higher discount rate suggested by the hyperbolically declining discount curve would still dominate, and the result would still be an over-estimation of loan duration.

Therefore, under-estimation of loan duration will be more probable the *longer* the duration of the loan, because this increases the likelihood that the initially higher discount rates suggested by the hyperbolically declining discount curve in the shorter

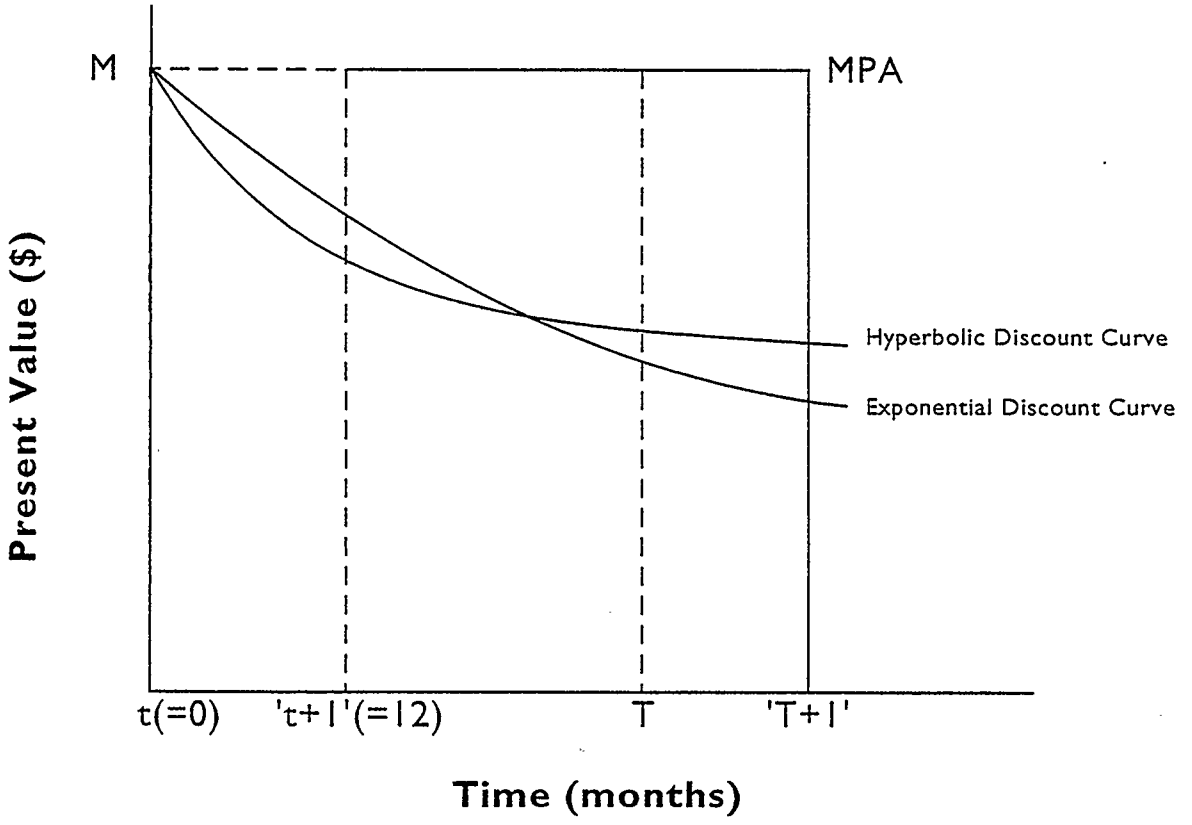
time period will be overshadowed by the effect of the subsequent lower discount rates in the future. In other words, more time will have passed during which the discount rate is declining.

As has been noted, the determination of which of the cases will be appropriate depends on a number of factors, including size of the loan, monthly payment amounts, the discount rate, the rate of decline of the discount rate, and possibly the presence of any time delay before the first payment. The current experiment only tests variations in the monthly payment amount ($156.00 or $72.00) and the time delay before first payment (no delay or one year delay). Therefore, hypotheses will be made for each of these variations only, and will be based on the presumptions that people utilize a hyperbolic decline rate, and that there is a general tendency to underestimate loan duration, as Ranyard and Craig (1993) and Lewis and van Venrooij (1995) found.

> *Hypothesis 2: The numerical answer for the shorter loan duration question (for which the correct answer is 10 months) will be less of an underestimate (or will be an overestimate), whereas the numerical answer for the longer loan duration question (for which the correct answer is 23 months) will be an underestimate of the correct answer.*

In order to hypothesize about the effect that time delay has on estimation of loan duration, an assumption needs to be made about how time delay fits into a discounted time stream. This is best illustrated in Figure 5, below:

Figure 5: Hyperbolic versus Exponential Discount Curves with Time Delay



Suppose an individual is faced with a time delay (to time 't+1') in the commencement of loan repayment stream. If the individual begins the hyperbolically declining discounting process at time 't' (as shown in Figure 5), then the crossing of the two lines will occur sooner in the life of the loan. This implies that loan duration will be more likely to be underestimated. However, if the individual simply puts him/herself one year later (not shown), and then begins the discounting process at time 't+1', then time delay itself should have no effect on the loan duration estimation, apart from the time delay itself.

It should be noted that the effect of time delay is *in addition to* the effect of the hyperbolically declining discounting process. Furthermore, it should be noted that time delay would not be expected to affect loan duration estimation if individuals discounted correctly (exponentially).

For the purpose of the current experiment, and assuming that discounting begins with the current period and not at time 't+1', it is expected that time delay will indeed have an effect on the estimation of loan duration. This forms the basis of the third hypothesis.

> *Hypothesis 3: The numerical answers of the participants who have a questionnaire that involves a time delay will be an underestimate, on average, relative to the numerical answer of the participants who have a questionnaire that does not involve a time delay.*

It should be mentioned that Ainslie and Thaler's results, on which these hypotheses are based, were primarily concerned with time preferences for "goods", or

gains, not losses. Some studies have found that when losses are involved, results tend to be somewhat different than for gains. For instance, in their introductory paper on prospect theory, Kahneman and Tversky (1979) stated that

> A salient characteristic of attitudes to changes in welfare is that losses loom larger than gains. The aggravation that one perceives in losing a sum of money appears to be greater than the pleasure associated with gaining the same amount. (p. 279)

With specific reference to discounting, Thaler (1991) also found that time did not have the same effect on implicit discount rates for losses as for gains. Specifically, he found implicit discount rates for losses to be lower relative to implicit discount rates for gains, and that time did not have any significant effect on implicit discount rates for losses.

A cautious reminder is given about the fact that the above discussion on the transition from discounting the value of a delayed good to estimating loan duration is not an obvious one, and as a result is somewhat fragmented. Unfortunately, it is not entirely clear what the aspect of actual discounting implies about the precise process of estimating loan duration. Furthermore, this discussion of discounting has emphasized the present value estimation of loan payments under different discounting procedures (exponential versus hyperbolic) ignoring the other behavioural economic concepts discussed in this chapter. The suggestion had been made that an anchor and adjustment heuristic is likely to be used, in which the estimator *adjust* the initial anchor (e.g., loan amount divided by monthly payment amount) to make allowance for the interest

accruing on the loan. If this is indeed the case, then a behavioural view would suggest that any discounting effects would overlap with framing effects and the utilization of decision making heuristics. The exact nature of the overlap is speculative, however, since it would be difficult to model an interaction between two distinct theories.

It could be argued that an individual may apply some type of discounting process to the adjustment phase of the anchor and adjustment process. If the problem is seen as adding time on to the initial loan duration estimate, one might suppose that the problem is viewed through a discounting filter. While the problem is not identical to the ones graphed in Figures 4a and 4b, the future relationship between the exponentially and hyperbolically discounted values would itself be identical. If the hyperbolically discounted values are larger than the exponentially discounted values at the critical future date (i.e., Figure 4b), then the discounting factor would tend to reinforce any anchoring effect, leading to an even greater underestimation of loan duration. On the other hand, if the hyperbolically discounted values are smaller than the exponentially discounted values at the critical future date (i.e., Figure 4a), it would tend to lead the individual to feel that more time is required to build up the requisite interest amount. This would tend to offset the anchoring bias. While these results are speculative – since we can only observe participants' responses, not what went on in their specific calculation processes – they are consistent with hypothesis 3, above.

If results of all of the above findings are considered, it becomes apparent that predicting participants' responses to the four different questionnaire versions becomes rather speculative. Therefore, hypotheses 1, 2, and 3 should be considered somewhat

conjectural. Clearly, there exists a complex relationship between adjustment and anchoring and discounting. Indeed, Ranyard and Craig (1995) caution that much of this relationship will remain speculative until further research is done in this area, which is one of the purposes of this thesis. However, the current experiment takes a slightly different approach than the previous studies. Part C of this section delineates some of the similarities and differences between the previous studies and the current experiment.

(C) Similarities and Differences Between the Current Experiment and Previous Studies

Like Ranyard and Craig (1993) and Lewis and van Venrooij (1995), the current experiment undertakes the task of conducting primary research by gathering responses to a number of different versions of a questionnaire, each containing varying amounts of information regarding a fictitious loan. There are, however, a few important differences that set this thesis apart from the previous studies.

The first obvious difference between the previous studies and this thesis is that the current experiment is conducted in Canada, while each of the previous studies was conducted in the United Kingdom. Although a significant difference in average response is not anticipated as a result of this distinction, similar results would serve to strengthen the previous authors' conclusions by supporting a more universal inference.

The second difference from the previous studies is also expected to have no significant effect on the outcome of the current experiment, relative to the previous studies. Whereas the previous studies focused on instalment credit and general debt and borrowing, the current study focused specifically on student loans. The purpose and importance of this choice are discussed in greater detail in the next section, but will briefly be identified: The Canada Student Loans Program is currently undergoing some major changes. These changes were mainly instigated as a result of a growing student loan debt, as well as very high default rates among students who have completed their studies and consolidated their student loans that they accrued over the duration of their studies. This growing problem has made the student loan issue somewhat topical in Canada.

With respect to the significance of the difference between previous studies and this thesis, however, the questionnaires of the current experiment are essentially set-up in the same way as the previous studies' questionnaires, regardless of the specific type of loan (instalment credit or student loan). Therefore, this difference should not impede the likelihood of obtaining similar results to the previous studies.

The next few differences concern the specific questions posed to the students on the questionnaires. First, none of the current questionnaire versions were set up to elicit a total accounts analysis. Instead, as was mentioned earlier in this section, each of the four versions was devised to evoke a current, budget period account analysis. The purpose for doing this was to focus specifically on how individuals deal with the complicated task of mentally processing the concept of time. A total accounts analysis

essentially eliminates this mental process, by lumping both components of the total payments to be made (principal and interest) into one amount, which can then be divided by the monthly payment amounts.

Second, the current experiment has an additional topic not incorporated in either of the previous studies. That is, half of the questionnaires for this experiment contain information regarding a one year, interest free, time delay before the first payment is to be made. This is meant to isolate the discounting process, because the same essential calculations need to be made to derive the correct answer, regardless of the delay. Therefore, any incorrect responses, relative to the responses to the questionnaires without a time delay, would specifically imply a flaw in the discounting process on the part of the individuals who were given the questionnaire versions that incorporated a time delay. As was noted previously, this type of analysis extension is somewhat speculative, and as such was not attempted by Ranyard and Craig (1993).

The final difference between the current experiment and the studies conducted by Ranyard and Craig (1993) and Lewis and van Venrooij (1995) concerns the participants in the study. Specifically, since the current experiment was conducted in a classroom setting with students from a variety of different classes (Anthropology, Sociology, and Economics), it made it possible to make a distinction between the responses of Economics students and non-Economics students (as defined by the class they were attending at the time of the survey). The purpose of this is to determine whether Economics students have a better understanding of the process of calculating interest and estimating loan duration. Since both of the Economics classes surveyed

were at least second year classes, it is assumed that these students are more likely to have encountered discounting and the other processes required to accurately estimate the duration of a loan.

Despite these noted differences, this thesis is largely based on the studies of the previously mentioned authors, especially in terms of the basic framework. Any differences that were incorporated serve as minor variances to the original format.

III. ESTIMATING LOAN DURATION: Importance of the General Issue

In contrast to the studies conducted by Ranyard and Craig (1993) and Lewis and van Venrooij (1995), which focused on flexible and fixed loan duration and instalment credit, the current experiment concentrates on how accurately individuals (specifically students at University of Calgary) are able to estimate *student* loan duration given various amounts of information. Even though the subject-matter of this thesis is slightly different from that of the previous studies, the underlying tentative assumption has not changed. That is, the more informed students are when deciding to apply for a student loan, the more accurately they may be able to assess the ramification of such a decision.

This section will first review the importance of studying the issue of consumer credit in general, as pointed out by the above noted authors. This will be followed by a

discussion about the specific current student loan problems in Canada and the relevance of investigating this subject.

(A) Consumer Credit

According to Ranyard and Craig (1993, p. 321), the purpose of conducting their studies, the importance of the results they obtained, and the need for further research on this issue were outlined as follows:

> Our practical reasons for examining the value of supplementary interest information are to do with developing consumer protection policies in a way that helps borrowers to make informed credit choices and keep control of their use of credit.

In this regard, the authors expressed the following concerns with respect to the current consumer protection legislation in Britain (where their study was conducted):

> The Consumer Credit Act (1974) is quite specific about information that must be provided to the borrower. In particular: (1) whenever information about interest rates is given, the APR (annual percentage rate charged) must be the most prominent; and (2) full details of interest charges and other costs must be provided in writing. In the case of fixed instalment credit, typical examples of loans with details of repayments, total interest charged and duration of loan must be provided. This latter information, however, is not required for flexible credit, which leaves borrowers under-informed in two important respects: for any specific pattern of repayments, they do not know in advance either the total interest charged on a loan, or its time-span. (p. 318)

It is evident from the results of Ranyard and Craig's studies (summarized in the first part of section II of this thesis) that accuracy of predicting loan duration may improve if more detailed information is provided to individuals regarding average monthly interest charges (MIC) and/or total interest charges (TIC). The authors stated that the results of their studies would appear to suggest that individuals may be able to make more informed credit decisions if legislation is revised so that more detailed information must be provided when individuals are in the process of obtaining credit or flexible loans. In particular, individuals should be informed about interest charges (either monthly or total) in addition to interest rates, and they should be provided with an example of a typical loan repayment schedule (comparable to the table in Appendix C of this thesis).

Similarly, Lewis and van Venrooij (1995, p. 168) stated the following regarding the importance of their study and its results:

> ...like Ranyard and Craig (1993) before us (when discussing 'flexible' loans) we would argue that the most obvious policy implication is to encourage lenders to display most prominently, not the APR, but the total amount of interest charged even for 'fixed' loans.

Clearly, results of the few studies that have been conducted on the issue of loan duration estimation support the proposition that legislation be reviewed and revised so that individuals are given more useful information in order to be able to assess the precise ramifications of obtaining a loan or instalment credit before any decisions have been made. This proposition can obviously be extended to many types of credit

decisions, some of which will be discussed later in this section. However, for the purpose of this thesis, the primary concern is whether varying the amount of information provided regarding a typical student loan can indeed improve accuracy of loan duration estimation. The next part of this section provides a more detailed discussion on the issues surrounding student loans in Canada. This discussion should clarify the importance of examining student loans, in particular.

(B) Student Loans

This thesis focuses on student loans as opposed to instalment credit for a number of reasons. First, the student loan issue has become a growing national problem in terms of both total debt and number of students who have default on their loan repayment. Second, since the participants in this study were university students, they were more likely to have had previous experience with student loans than any other types of loans.

According to Finnie and Garneau (1996), 47 percent of male and 44 percent of females pursuing bachelor's degree at Canadian universities borrowed money to finance their education in 1990. Furthermore, of those who borrowed, the mean amount owed at the time of graduation was $8,660 for males and $8,710 for females. Since 1982, this amount had increased by 60 percent for males and 70 percent for females.

With respect to default, from the year of inception of the Canada Student Loans Program in 1964, the total amount outstanding in loan defaults grew to $50 million by 1975. By 1985, this amount increased to $371 million, and subsequently expanded to $1 billion by 1995.[11]

According to statistics provided by the Canada Student Loans Program, Learning and Literacy Directorate at Human Resources Development Canada, a total of $3,092,794,000 in student loans was consolidated in Canada between 1984 and 1992 at the university and community/vocational colleges levels combined. In other words, this figure represents the total amount outstanding in student loans that has become subject to repayment by students because these students have completed their studies. Of this amount, approximately $625,689,000 was defaulted on by students within the first three years of consolidation alone. This implies an overall default ratio of over 20 percent. When this ratio is broken down by post-secondary education levels, we find that from 1984 to 1992, the average default ratio within the first three years after the year of consolidation of a student loan was 19.8 percent at the university level, and 23.8 percent at the community/vocational college level.[12]

Furthermore, Rowley (1993) noted that, in Canada, "...two-thirds of defaults occur as soon as one year after the participants leave the educational institution" (p. 268). The author indicated that excessively high default rates, combined with

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[11] Calculated from the Canada Student Loan Program Annual Report for the Loan Year 1987-1988, p. 19, prepared by the Student Assistance Directorate at the Department of Secretary of State, and as per the Human Resources Development Canada News Release, dated August 1, 1995, p. 5.

[12] Calculated from statistics provided by the Canada Student Loans Program, Learning and Literacy Directorate at Human Resources Development Canada.

decreasing opportunities for alternative financial support (familial or part-time employment) due to uncertainty of labour and financial markets, as well as increasing tuition fees, all helped to highlight the importance of improving student financial assistance programs.

Assessments of default on student loans has typically focused on the ability (or inability) of students to repay the loans. For example, an American study, which analyzed the characteristics of post-secondary guaranteed student loan (GSL) defaulters in great detail, revealed the following:

> ...borrowers from low-income households and minority groups, high school drop-outs, borrowers who do not complete their postsecondary programs, and borrowers who attend proprietary schools and two-year colleges are more likely to default on their loan payments... The ability to pay has consistently emerged in previous research as an important factor influencing default. Three factors associated with ability to pay – earnings, the monthly GSL payment, and family size – were found to be important determinants of default. (Dynarski, 1994, p. 66)

Some specific and alarming default rates reported by Dynarski (1994), and based on American data, were as follows: individuals who had **more than 2 dependents** at the time of first payment displayed a default rate of **31.5 percent**; those who reported **proprietary school** as the type of post-secondary institution most recently attended had a **31.5 percent** default rate; **those who did not complete their post-secondary education** defaulted on **32.6 percent** of their loans; individuals who reported **earnings of less than $10,000 annually** during the 2-year period beginning at the time of first payment displayed a default rate of **36.5 percent**; those who only completed a **GED**

(graduate equivalency diploma) before attending a post-secondary institution had a **44.2 percent** rate of default; **48.0 percent** of **blacks** defaulted on their loans; and finally, **individuals who did not complete high school before attending a post-secondary institution** defaulted **56.2 percent** of the time.

In Canada, prior to August of 1995, if a student defaulted on a student loan (i.e., failed to make a loan payment for two consecutive months), the bank at which the student loan was consolidated would be able to collect the defaulted amount from the government, thereby making the general tax payer fully accountable for the eventual loan repayment. However, as of August 1, 1995, some major changes were made to the Canada Student Loans Program, in response to "...serious problems with accessibility, flexibility, and accountability" (Human Resources Development Canada News Release, dated August 1, 1995, p. 1). One of these changes included a contract (signed by the government and nine financial institutions) that shifted the burden of collecting defaulted loans from the government to these nine financial institution, in exchange for a risk premium of five percent of the face value of each student loan (Human Resources Development Canada Backgrounder, dated August 1, 1995, p. 4). According to a News Release prepared by Human Resources Development Canada,

> ...$1 billion is outstanding in loan defaults since the program's inception. The tax payer has traditionally covered this shortfall. Through lending agreements with nine financial institutions, risk on defaulted loans will henceforth be carried by them. (p. 5)

It should be noted that while an inability to repay student loans can be seen as the immediate cause of default, a complete picture of the problem must be somewhat broader. In particular, default problems could arise, in part, because individuals have an incomplete understanding of the payment implications of the loans. In other words, individuals who may not have contemplated the actual ramifications of obtaining a student loan, and therefore thought that they could repay it, may be unable to repay due to their own lack of understanding of the eventual consequences.

As a result, the new Canada Student Loans Program now requires that financial institutions become more accountable to the borrower with respect to providing more detailed information regarding the specifics of obtaining and repaying a student loan. For example, participating financial institutions will be required to (i) give written notice and annual statements to borrowers who are in the process of repaying their loans; (ii) offer financial counseling; (iii) provide services in English and French; and (iv) have a toll-free telephone inquiry line (Human Resources Development Canada Backgrounder, dated August 1, 1995, p. 4).

Furthermore, as part of its goal to provide better service, the government has taken the first step by assembling a detailed informational package regarding the new program, which is available to anyone interested in obtaining a student loan. (Incidentally, this informational package includes a sample repayment schedule for a few fictitious student loans.) However, it is now the primary responsibility of, and clearly in the best interest of, the financial institutions to keep the borrower as

informed as possible in order to ensure prompt repayment of student loans, and to decrease the alarmingly high default ratios observed over the last decade.

One of the nine financial institutions that is currently under contract with the federal government for the purpose of providing student loans is the Canadian Imperial Bank of Canada (CIBC). As an example of the type of service that is currently provided by financial institutions, CIBC now provides a computer package entitled "CIBC Bankware II" to all interested students. This package, in addition to offering many other informative features concerning budgetting, enables an individual to calculate the time stream of a loan by varying factors such as initial amount borrowed, interest rate, and loan duration. This easy-to-use personal financial tool can instantly determine the financial consequences of any student loan.

Services like those provided by CIBC and other financial institutions will enable individuals to make decisions that are more informed than they were before these changes were in effect. It is not evident, however, whether those individuals who were identified by Rowley (1993) as most likely to default on their student loan, the financially disadvantaged, will have easy access to a computer in order to run the CIBC Bankware II program, or other programs like it.

The studies conducted by Ranyard and Craig (1993) and Lewis and van Venrooij (1995) appear to suggest that if students are indeed provided with detailed information about MIC and/or TIC, and they use it before they obtain a student loan, then they may be able and willing to determine the full extent of obtaining a student loan, at least in terms of the length of time it will take to eventually pay it off. Services

like CIBC Bankware II go one step further in that they explicitly enable an individual to determine loan duration without having to do any calculations. However, as long as these are services an not legal necessities, it is not clear whether all students will utilize such services, or even be able to use them.

Finally, debate over student loans saw a number of other proposals including income-based repayment schedules (see Rowley, 1993) and provisions for delay in payment. While such flexibility in repayment may be available to students, it does increase the complexity of the problem, since each repayment option will imply a different student loan duration. As noted, it is not clear that all individuals will have the opportunity to utilize computers to calculate exact repayment schedules and loan duration.

IV. EXPERIMENT

The experiment conducted for this thesis involved the distribution of four different versions of a questionnaire to over 150 students at the University of Calgary. This section will outline the method and results of the experiment.

(A) Method

1) Questionnaire Format

Each of the four versions of the questionnaire consisted of two parts. In the first part, participants were given some very basic information regarding a fictitious student loan, including the total amount of the student loan ($1,300), two different monthly payment amounts ($72.00/month or $156.00/month, each representing a different payment stream), the monthly interest rate charged (1.9 percent)[13], and the annual interest rate, compounded monthly (25.34 percent)[14]. The questionnaire also informed participants that there were no service charges and that it was not possible to make any additional payments aside from the monthly payment amount.

Half of the questionnaires (versions 3 and 4) provided *additional* information regarding the amount of each monthly payment amount that was composed of interest charges ($13.36 of each $72.00 monthly payment amount, and $12.88 for each $156.00

[13] Although a monthly interest rate of 1.9% may appear high for a student loan, it is in line with the monthly interest rate used by Ranyard and Craig (2.4%) in their study, and it allows for a significant interest effect in a short period.

monthly payment amount). Furthermore, half of each of these two groups of questionnaires (versions 2 and 4) indicated that the first payment did not have to be made for one full year, and that interest would not accrue during that one year period. Clearly, this one year delay in repayment would not have any effect on the total number of monthly payments that would be required to pay off the entire loan (net of the 12 month delay), if all other factors (total amount of the loan, monthly interest rate, annual interest rate, and monthly payment amounts) did not change.

The above noted breakdown of the different questionnaires implies that there were four different versions of the questionnaire distributed to students, containing various amounts of *additional* information. Table IV-1 summarizes this information:

Table IV-1: Information Provided by Questionnaire Version

Questionnaire Version	Monthly Interest Charges Information	One Year Time Delay information
1	No	No
2	No	Yes
3	Yes	No
4	Yes	Yes

Each participant was administered only one of the four versions at random, and should not have been aware that there were any other versions distributed.

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[14] Equivalent to [{(1.019)^{12} - 1} x 100].

Participants were asked to calculate how many months it would take to pay off the entire loan for *each* of the two monthly payment amounts ($72 and $156), using any strategy they wished. Therefore, they were asked to calculate two separate loan repayments. Each questionnaire contained working space, which the participants were told could be used to do and show any necessary calculations.

Part two of each questionnaire contained a number of demographic questions, including age, sex, year of study at the university level (1 to 5 or more), major field of study (e.g., psychology, management, biology, economics, etc.), degree sought (e.g., B.A., M.A., etc.), and whether the participant had ever had a student loan. Finally, participants were asked how they derived their answers in the form of a multiple choice question, for which the choices were: [a] guess, [b] mental arithmetic, [c] calculator, or [d] other.

2) Participants

A total of 151 questionnaires were distributed to five different classes at the University of Calgary, broken down as follows: 'Anthropology 325', 16 students; 'Anthropology 327', 21 students; 'Sociology 313', 40 students; 'Economics 303', 41 students; and 'Economics 481', 33 students. Three of the 151 questionnaires were eliminated from the analysis due to incomplete responses. (Two participants failed to respond to either of the two main questions regarding loan duration, and one participant failed to complete any of the demographic questions in Part 2 of the questionnaire.) Of the remaining 148 questionnaires, 49 percent were Economics

students ('Economics 303' or 'Economics 481'). For the purpose of the analysis of this experiment, the other 51 percent were labeled as non-Economics students.

Furthermore, 48 percent of respondents were male; 42 percent indicated that they had a student loan (either past or present); 1 percent were in their first year of study, 20 percent in their second year, 39 percent in their third year, 31 percent in their fourth year, and 7 percent indicated that they had been attending university for five years or more. Two percent of participants did not respond to this question. With respect to the method of calculation, 33 percent of respondents stated that they guessed, 35 percent used mental arithmetic, 29 percent used a calculator, and 3 percent did not specify their method of calculation.

Most participants indicated that their major was in the same field as the course they were attending at the time of the experiment. In fact, almost 90 percent of the Economics students who answered this question indicated 'Economics' as their major. Furthermore, 86 percent of the participants stated that they were attending university for the purpose of obtaining their Bachelor of Arts degree. Finally, the average age of the participants was 22.7, and the youngest and oldest participants were 17 and 40 years old, respectively.

It should be noted that, like the studies undertaken by Ranyard and Craig (1993) and Lewis and van Venrooij (1995), the participants of this experiment were chosen based on a quota sample. Ideally, the target population for this experiment would have been a random sample of the adult population. As this was not feasible, a subgroup was chosen based on the more accessibility of university students at the

University of Calgary. From this subgroup, five university classes were chosen, again based on availability, thereby generating a quota sample.

A problem that arises when quota sampling is used is that the sample that is chosen may not be entirely representative of the total population. For example, it may be possible that some non-university students were left out of the sample, because their reason for not choosing to attend university was based on their correct estimation of student loan duration, which suggested that it would take longer than may have originally been anticipated. This would suggest that the university students who participated in the experiment may have provided biased responses. Conversely, it may be the case that some of the participants in the experiment may have been better equipped to answer the loan duration question because they recently learned about discounting in a university class.

Despite the possibility of these discrepancies, there is no strong reason to believe that these biases exist in the current quota sample. However, it should be noted that the use of a quota sample, as opposed to a random sample, decreases the certainty that no biases are present. As such, any broad generalizations arising from the results of this experiment should be made with caution.

3) Procedure

The questionnaires for the current experiment were self-administered in a group setting. In other words, participants were asked to fill out their own questionnaire, as opposed to having the examiner ask the questions directly and fill out

the questionnaires for the participants based on the responses given. There are a number of advantages to having participants fill out questionnaires by themselves in a group setting. Firstly, it is less time consuming, thereby allowing the possibility of including a larger number of participants. A second advantage to relying on a self-administered approach is that administering the questionnaire in a group setting eliminates the effect of the variation in the responses due to the examiner's interaction with the participant. Finally, it is often necessary to rely on several examiners if the one-on-one approach for interviewing is used. If this is the case, there may be a problem with differential treatment among examiners, resulting in variability in responses due to the examiner.

Despite the advantages of using the self-administered method to elicit responses, there are also a number of disadvantages to this approach. The first disadvantage is that some participants may have viewed the process as being less significant, because the examiner was not able to closely monitor each participant's response. In other words, the examiner's inability to oversee the responses of each participant may have caused some participants to put less effort into the estimation process. Second, if there was any confusion regarding the task, the presence of an examiner could have made clarification easier. This problem may have been somewhat alleviated for the current experiment because participants were advised to ask questions if they needed clarification. Third, use of a self-administered questionnaire as compared to a more exhaustive interview may make it more difficult to devise follow-up questions about how decisions were made.

All questionnaires were administered in a classroom setting during regular class-time. Participants were told that they were taking part in an experiment that would form the basis for a Master of Arts thesis. Each participant was given a consent form, which had previously been approved by the University of Calgary Ethics Committee. The consent form contained general information regarding the purpose of the experiment. As well, it informed participants that they would be given 20 minutes to complete the entire questionnaire.

Participants were asked to sign the consent form once they read it and agreed to participate. They were instructed to return the consent form to the investigator along with the completed questionnaire within the time allotted. Participants were further informed that they could use a calculator if they wished. Upon completion and return of the questionnaire and consent form, participants were provided with a copy of the correct method of derivation of the answer for each of the loan repayment schedules. At that time, they were also informed of the aims of the research project. Copies of the consent form were also available after completion of the questionnaire. (See Appendices A, B, and C for a copy of the four questionnaire versions, the consent form, and the derivation of the correct answers, respectively.)

It may be of interest to note that the current experiment relied on a cross-sectional survey as opposed to a longitudinal survey. This was also the approach taken by the previous authors. In a cross-sectional survey "...data are collected at one point in time from a sample selected to describe some larger population at that time" (Babbie,

1990, p. 56). In contrast, a longitudinal survey "...permits the analysis of data over time" (Babbie, 1990, p. 57).

Although it may have been interesting to see how an individual's accuracy of loan duration estimation may change with time or with repeated exposure to the problem, the current experiment primarily focused on differences between individuals who received differing amounts of information about a student loan. Therefore, the focus was not on how time affected accuracy of loan duration estimation, but rather on how supplementary loan information affected loan duration estimation. For the purpose of this thesis, a longitudinal survey was not feasible, given the time constraints.

(B) Results

As noted previously, responses to the two main questions on estimated loan duration were given in the form of months. Like Ranyard and Craig's (1993) approach, the responses were converted to signed percentage error (*spe*) scores. This was done by expressing the number of month in error for each response as a percentage of the correct length of the loan. For example, for a response of 20 months to the loan duration question for which the correct answer is 23 months, the signed percentage error score would be [(20 - 23)/23] = -0.1304. For the purpose of this thesis, *spe1* represents the *spe* score for the answer to the longer loan duration question (23 months), whereas *spe2* represents the *spe* score for the answer to the shorter loan

duration question (10 months). Clearly, a negative score reflects an underestimate, a positive score indicates an overestimate, and a score of '0' reflects a correct answer.

The next step was to determine whether there were any outlying values, which are values that are far removed from the other values. These outlying values will be excluded from the analysis because they may "skew" the results. This is because it is presumed that any extreme values indicate a failure to either understand the task or take it seriously. A "stem and leaf" plot was executed for four sets of responses (questionnaire versions 1 through 4, for each of the two loan duration problems). A "stem and leaf" plot, which is similar to a histogram, is a way of displaying data so that each value is divided into two parts: a stem or leading digit and a leaf or trailing digit. For example, the stem and leaf of the previously mentioned value -0.1304 are -1 and 3, respectively. (Only the first two digits of each value are considered in the stem and leaf plot). The stem and leaf values are then ordered and displayed so that values that are far removed from the rest are easily identified.

To determine which of the far removed values are actually outliers, a boxplot was created. This is done by first identifying the 25^{th} and 75^{th} percentile values of all responses for each of *spe1* and *spe2*. The difference between these two values defines the length of a box, which is then used for further analysis. Clearly, the box contains 50 percent of all the values contained in the data, since the 25^{th} percentile identifies the value below which 25 percent of responses fell and the 75^{th} percentile identifies the value above which 25 percent of responses fell. Outliers are identified as being more than three box-lengths away from the upper and lower boundary of the box containing

the median 50 percent of all the responses. Six outliers were located and both responses (*spe1* and *spe2*) from each of the six outlier respondents were subsequently eliminated from further analysis[15]. Therefore, 142 responses were used for the remainder of the analysis.

(C) Analysis

The first step of the analysis was to test whether the overall mean (u) of each of the two responses (23 month repayment and 10 month repayment) was significantly different from '0'. This was done with a one sample t-test, where the null and alternative hypotheses were as follows:

$$H_o: \quad u = 0$$

$$H_a: \quad u \neq 0$$

Results of this test indicated that the mean *spe1* score was -0.0608. This was found to be significantly different from '0' ($t=-6.68$, $p<0.05$). Interestingly, the mean *spe2* score was 0.0094. This was found *not* to be significantly different from '0' ($t=0.87$, $p=0.387$). Consequently, the null hypothesis was rejected for *spe1* but not for *spe2*.

The next test was to see whether the four versions of the questionnaires produced significantly different results from each other for *spe1* and *spe2*. Table IV-2 shows the *spe* scores for each of the four versions:

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[15] The outlying values that were eliminated were -0.74, -0.48, -0.39 (2 times), and 0.52 for *mpe1*, and -0.50 for *mpe2*.

Table IV-2: Mean SPE Scores by Questionnaire Version

Questionnaire #	*spe1*	*spe2*
1 (**no** monthly interest information, **no** delay)	-0.0503	0.0401
2 (**no** monthly interest information, 1 year delay)	-0.1167	-0.0164
3 (monthly interest information, **no** delay)	-0.0118	0.0261
4 (monthly interest information, 1 year delay)	-0.0618	-0.0113
1 - 4 (average)	-0.0608	0.0094

Table IV-2 shows that the *spe* scores are clearly different between the four versions. As a result, the question that followed is: Are they *significantly* different? Like Ranyard and Craig (1993) and Lewis and van Venrooij (1995) [16], a series of analysis of variance (ANOVA) tests were undertaken to answer this question.[17] Briefly stated,

[16] Ranyard and Craig (1993) conducted a *split-plot* analysis of variance. However, the current experiment is not conducive to such testing, because (1) there is no repeated design (each student only filled out one questionnaire version with one question related to each problem), and (2) questionnaires were allocated to students randomly, and therefore students were not plotted into different questionnaire versions.

[17] It should be noted that an underlying assumption when using analysis of variance is that each of the populations that are being compared are normally distributed with the same variance.

> ANOVA compares the actual variability among the sample treatment means to an estimate of variability expected from random error only. The comparison is summarized as a ratio, with the actual variability among the sample treatment means in the numerator and the standard of comparison in the denominator. The ratio is called the F ratio... Under the null hypothesis, the expected value of F is 1. Under the alternate hypothesis, F should be substantially greater than 1. (Herzog, 1996, pp. 203 and 205).

There are two underlying assumptions when using analysis of variance. Specifically, the distributions of the populations being compared must be normally distributed with the same variance. Even if these assumptions are not met, ANOVA may still be a useful tool because it is a very robust analysis that can tolerate a wide range of variation. This is particularly important because the current experiment (like the previous studies) relied on a quota sample. As such, there should be less confidence in the results, because the difference in responses could partially be attributable to sampling. However, as noted previously, there is no strong reason to expect a sampling bias. In any event, the reality of collecting data is that biases may be present, regardless of the approach or analysis.

Analysis of Variance for the Current Experiment

For the current analysis, the null and alternative hypotheses were:

$$H_o: \quad u_1 = u_2 = u_3 = u_4$$

$$H_a: \quad u_1 \neq u_2 \neq u_3 \neq u_4$$

where u_x is the mean of questionnaire version x. Contrasting results were found for the two responses. For *spe1*, the responses to the four versions were significantly different

($F=6.214$, $p<0.05$), whereas this result was not echoed in the responses for *spe2* ($F=1.702$, $p=0.170$). Therefore, the null hypothesis was rejected for *spe1* but not for *spe2*. In other words, whereas the responses to the longer loan duration question were found to be significantly different across the different questionnaires, the responses to the shorter loan duration question were *not* found to be significantly different.

Since the computed value of the F statistic in the single-factor ANOVA ($F=1.702$, $p=0.170$) was found not to be significant for the shorter loan duration response (*spe2*), the analysis for this variable was terminated, because no *significant* differences between the four means had been identified. However, since H_o was rejected for *spe1*, further tests were done to determine *which* of the four means were in fact significantly different from one another. In order to do this, two multiple comparison procedures were undertaken: 'Tukey's b', and 'Scheffé'. The 'Scheffé' method is a more conservative multiple comparison test than the 'Tukey's b', because it requires a larger difference between means in order for it to be significant. Each of these two tests finds the difference between any two (x and y) of the four means of this experiment to be significant if:

$$(u_x - u_y) \geq 0.0719 \times \text{RANGE} \times \text{SQRT}\,(1/N_x + 1/N_y),$$

where SQRT is the square root, and RANGE is a function of the degrees of freedom and is defined somewhat differently for each of the methods. For this experiment, the null hypothesis, which finds that there is no significant difference between the means (i.e., the two means fall within the defined maximum range at $p=0.05$) is as follows:

$$H_o: \quad (u_x - u_y) < 0.0719 \text{ x RANGE x SQRT } (1/N_x + 1/N_y)$$

For the tests of this experiment, the RANGE is 3.68 for the 'Tukey's b' method and 4.00 for the 'Scheffé' method. For example, using the 'Scheffé' method to see whether u_1 and u_2 are significantly different for *spe1*, we reject the null hypothesis of equality if:

$$((-0.0503) - (-0.1167)) \geq 0.0719 \text{ x } 4 \text{ x SQRT } (1/36 + 1/35)$$

$$(0.0664) \geq (0.0683)$$

Since this is not true, the null hypothesis of equality can not be rejected, implying that u_1 and u_2 are *not* significantly different for *spe1*.

The 'Tukey's b' procedure found the average response to questionnaire version 2 (no interest information, 1 year delay) to be significantly different from (lower than) the average response to questionnaire version 1 (no interest information, no delay) and questionnaire version 3 (interest information, no delay) at the 0.05 significance level. Not surprisingly, the 'Scheffé' test only found the average response to questionnaire version 2 to be significantly different from (lower than) the average response to questionnaire version 3 at the same significance level.

Consequently, depending on which multiple comparison procedure is considered, the least that can be said about the responses to the four different questionnaire versions is that *spe1* is significantly different between questionnaire version 2 (*spe*=-0.1167) and questionnaire version 3 (*spe*=-0.0118), and that *spe1* is possibly significantly different between questionnaire version 2 and questionnaire version 1 (*spe*=-0.0503).

Next, in an attempt to isolate the effects of the two main differences between the four questionnaires, the *spe* scores for questionnaire versions 1 and 2 were combined and compared to the combined *spe* scores for questionnaire versions 3 and 4. This combination separates the effect of the provision of the monthly interest information since only questionnaire versions 3 and 4 contain this information. Similarly, the *spe* scores for questionnaire versions 1 and 3 were combined and compared to the combined *spe* scores for questionnaire versions 2 and 4. This combination separates the effect of the provision of the one year delay information since only questionnaire versions 2 and 4 contain this information. Table IV-3 shows the combined *spe* scores for each of the combinations:

Table IV-3: Mean SPE Scores by Combined Questionnaire Version

Combined Questionnaire #'s	*spe1*	*spe2*
1 & 2 (no monthly interest information)	-0.0831	0.0122
3 & 4 (monthly interest information)	-0.0375	0.0063
1 & 3 (no delay)	-0.0319	0.0336
2 & 4 (1 year delay)	-0.0893	-0.0138

A series of single-factor ANOVA tests were undertaken with the following results: *spe1* was found to be significantly lower (more of an underestimate) for questionnaire versions 1 and 2 combined as compared to 3 and 4 combined ($F=6.504$, $p<0.05$), whereas this result was not echoed in the responses for *spe2* ($F=0.075$, $p=0.785$). Therefore, whereas the responses to the longer loan duration question were found to be significantly affected by monthly interest information, the responses to the shorter loan duration question were *not* found to be significantly affected by this additional information.

Furthermore, *spe1* was found to be significantly lower (more of an underestimate) for questionnaire versions 2 and 4 combined as compared to 1 and 3 combined ($F=10.629$, $p<0.05$). Interestingly, this result was also found to be significant in the responses for *spe2* ($F=4.93$, $p<0.05$). Therefore, the responses to the longer *and* shorter loan duration questions were found to be significantly affected by the one year delay information. The combination of the above test results implies that a one delay appears to have a *stronger negative* effect on loan duration estimation than does the lack of monthly interest information.

The final part of the analysis looked at which demographic factors were significant determinants of the various responses. This was done by conducting a series of single-factor ANOVA tests. Results indicated that there were no significant differences found (at the 5 percent significance level) for the following independent variables: sex ($F=3.399$, $p=0.067$ for *spe1*; $F=0.632$, $p=0.428$ for *spe2*), year of study ($F=2.243$, $p=0.068$ for *spe1*; $F=1.313$, $p=0.268$ for *spe2*), and whether or not the

participant had ever had a loan ($F=0.009$, $p=0.925$ for *spe1*; $F=3.257$, $p=0.073$ for *spe2*). In other words, these factors did not contribute to any differences in responses to either *spe1* or *spe2*. Furthermore, Economics students did not fare better than non-Economics students on the shorter loan duration question, *spe2* ($F=0.080$, $p=0.777$). Similarly, method of calculation did not have any significant effect on *spe2* ($F=2.046$, $p=0.133$).

Although most demographic factors were not found to contribute significantly to differences in responses, two notable exceptions were that for *spe1*, Economics students, and students who indicated that they guessed derived significantly different responses. Specifically, the mean *spe1* for Economics students was -0.0413, while the mean *spe1* for non-Economics students was -0.0795. This difference was found to be significant ($F=4.519$, $p<0.05$). Moreover, testing for interaction between the variables for questionnaire version (1 to 4) and Economics students revealed that although the independent effects of these two variables were found to be significant, the combination of the values of the two variables was not found to be a significant indicator of mean score ($F=1.749$, $p=0.160$). This implies that there was no interaction between the effects of questionnaire version (1 to 4) and type of student (Economics versus non-Economics).

With respect to the method of calculation question, the mean *spe1* for students who indicated that they guessed was -0.1187; the mean *spe1* for students who indicated that they used mental arithmetic was -0.0508; and the mean *spe1* for students who indicated that they used a calculator was -0.0115. This difference was found to be

significant ($F=12.813$, $p<0.05$). Further tests were done to determine which of the methods were in fact significantly different from one another. Like before, two multiple comparison procedures were undertaken: 'Tukey's b' and 'Scheffé'. Both procedures found the responses of the guessers to be significantly different from those who used mental arithmetic or a calculator to derive their answer ($p=0.05$). Therefore, the *spe1* score for those who guessed was found to be significantly less than those who at least attempted to do more detailed calculations. Finally, testing for interaction between the variables for questionnaire version (1 to 4) and method of calculation revealed that although the independent effects of these two variables were found to be significant, the combination of the values of the two variables was not found to be a significant indicator of mean score ($F=0.963$, $p=0.453$).

A final caution should be made regarding the reliability and validity of the test procedure of the current experiment. According to Herzog (1996), "...reliable measures contain very little random error or noise and thus provide a fairly accurate account of the variable being measures" (p. 42). In order to minimize random error resulting from unreliable measures, Herzog (1996) suggests that very clear operational definitions of the observed variable be provided. For example, if an examiner is measuring beauty, it is obvious that a very narrow and specific description of beauty is provided so that if a second examiner measures beauty, the results would be the similar. This is particularly important if the examiner is dealing with subjective variables such as eye colour, aggression, beauty, nervousness, confidence, etc. For the current experiment, however,

the variables used for the analysis were easily defined as they were numerical. Therefore, random error from unreliable measures were likely minimized.

Validity refers to whether the variable that is being measures indeed represents what is meant to be measured. In the case of the current experiment, the issue is whether the questionnaire versions accurately depict how individuals may estimate loan duration in the real world. Herzog (1996) suggests that a pilot study be undertaken to resolve the issue of validity. The previous studies may have served as a pilot study to the current experiment. However, since the current experiment conducted a similar survey to the previous studies, it is unclear whether the validity issue (if one exists) has been resolved. As such, repeated studies would not make a difference.

V. DISCUSSION

In order to discuss the results of the experiment, reference will be made to each of the three hypothesis set forth in section II of this thesis. First, however, it is of interest to note one important result, which was that the one sample t-test that was conducted on the overall average of the *spe1* score indicated that responses to the longer loan duration question (23 months) were negative and significantly different from '0'. This implies that participants in this experiment systematically underestimated loan duration for the longer loan. In contrast, this significant difference

was not found for the *spe2* scores for the shorter loan duration question (10 months). Although this finding is interesting and will be expanded on when discussing Hypothesis 2, it unfortunately eliminates certain analyses, which would have followed if a significant difference had been found.

This next section will review the hypotheses introduced in section II, in order to reflect on our results. This will be followed by a brief discussion on the differences found for the various demographic factors that were tested.

Hypothesis 1

The first hypothesis speculated that the numerical responses to the loan duration estimation question given by participants who did not receive MIC information would be lower, on average, than the numerical responses of participants who did receive MIC information.

With respect to the longer loan duration question, significant differences were found between the combination of questionnaire versions 1 and 2 (*spe1*=-0.0831) and the combination of questionnaire versions 3 and 4 (*spe1*=-0.0375). The difference between these two groups was not found to be significant for the shorter loan duration question. These results appear to suggest that additional monthly interest charges information may be more helpful to individuals the larger the amount of the principal amount borrowed and the smaller the monthly payments (i.e., the longer the loan duration). Therefore, at least for the longer loan duration question, Hypothesis 1 is supported by the data of the current experiment. This result provides support for the

adjustment and anchoring theory, which postulates that individuals do not make sufficient adjustments after anchoring their answers to an initial value.

Hypothesis 2

The second hypothesis conjectured that, on average, the numerical answer for the shorter loan duration (10 months) would be less of an underestimate (or would be an overestimate), whereas the numerical answer for the longer loan duration (23 months) would be an underestimate of the correct answer.

As was mentioned previously, the overall *spe2* scores were not found to be significantly different from '0', whereas the overall *spe1* scores were significantly less than '0'. Thus, results of the current experiment support this second hypothesis, because the average response for the shorter loan duration question was found to be neither a significant underestimate or overestimate, whereas the average response for the longer loan duration question was indeed a significant underestimate of the correct answer. This result provides support for the hyperbolic discounting procedure previously observed by other authors, because as time passed, it was observed that individuals tended to use lower discount rates than were appropriate when discounting the future.

Hypothesis 3

The final hypothesis speculated that the numerical answers of the participants who had a questionnaire that involves a time delay would be an underestimate, on

average, relative to the numerical answer of the participants who had a questionnaire that did not involve a time delay.

With respect to both the longer and shorter loan duration questions, significant differences were found between the combination of questionnaire versions 1 and 3 (*spe1*=-0.0319, and *spe2*=0.0336) and the combination of questionnaire versions 2 and 4 (*spe1*=-0.0893, and *spe2*=-0.0138). These results imply that a delay in repayment may have a negative effect on the accuracy with which individuals estimate loan duration. Therefore, Hypothesis 3 is supported by the data of the current experiment for both the longer and shorter loan duration question.

This finding is in line with the observations that individuals rely on hyperbolic discounting, because a time delay implies that individuals may start discounting today as opposed to a year from today, suggesting that the initial high discount rates occur in the first year when no payments are made. Therefore, when the first payment eventually commences, an individual may use a lower discount rate than is appropriate or correct.

Demographic Factors

The analysis in section IV revealed that most of the demographic factors did not have a significant effect on *spe1* and *spe2* scores. Specifically, age, sex, year of study, and previous loan experience[18] did not contribute to any significant differences in responses

[18] It is of interest to note that while the previous experiment found that participants with student loan experience underestimated loan duration, results from Lewis and van Venrooij's (1995) study suggested

for either loan duration response. Furthermore, for the shorter loan duration question, major field of study and method of calculation also did not affect the difference in responses.

However, there were two demographic factors which did reveal significantly different results. Specifically, non-Economics students were found to score significantly lower for the longer loan duration question than Economics students. (Economics students were those participants who were attending either 'Economics 303' or 'Economics 481' at the time they completed the survey.) This could be due in part to Economics students being more familiar with interest rate or loan structures, as these types of concepts are often referred to in Economics literature and courses.

Second, participants who indicated that they guessed when estimating their answers similarly scored significantly lower for the 23-month-loan-duration question, but not for the 10-month-loan-duration question. The reasons for this differences could stem from the fact that for the longer loan duration question, a bigger interest adjustment had to be made in order to derive the correct answer, whereas for the shorter loan duration question, it is more likely that even a small adjustment would have lead to the correct answer. Although results suggest that guessers tended to underestimate the larger adjustment, it is not clear, of course, whether participants who guessed did not know how to do the adjustment correctly, or simply did not bother to do so.

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that people with experience of debt *did not* underestimate loan duration. In fact, their study revealed that individuals with debt experience tended to *overestimate* loan duration.

VI. CONCLUSION

This thesis examined how accurately a small sample of students (approximately 150) at the University of Calgary were able to estimate the duration of loan repayments, given various amounts of information regarding the principal amount, monthly interest rate, annual interest rate, monthly payment amount, and time delay of a fictitious student loan. This experiment expands on studies previously undertaken in the United Kingdom by Ranyard and Craig (1993) and Lewis and van Venrooij (1995), which similarly "...investigated the accuracy with which people could estimate loan duration, varying the supplementary information that was provided" (Ranyard and Craig, 1993, p. 317). Whereas the previous studies focused on instalment credit, the current experiment examined student loans.

Aside from this difference, the underlying question was the same: do individuals systematically underestimate loan duration? Results discussed in section V of this thesis show that, under certain circumstances, this does indeed seem to be the case, particularly when individuals are provided with limited information to work with when estimating loan duration. Like the results obtained from the studies conducted by the previous authors, the current experiment found that the degree of underestimation decreased as the length of the loan decreased and as more specific interest information was provided to the individual.

In an attempt to stay in line with the analysis of the previous authors, the current experiment conducted univariate analyses of variance (ANOVA). However, it

should be noted that a multi-variate analysis (MANOVA) was also undertaken, but did not reveal any further insight into the data. Specifically, the MANOVA involved lumping the *spe1* and *spe2* scores together, to determine whether the combination of the two responses showed any significant results. The null hypothesis was that there was no difference between the effect of the 4 questionnaire versions on the combination of the *spe1* and *spe2* variables. The results suggested that the null hypothesis be rejected in favour of there being a significant difference. Furthermore, the univariate results which are derived from the MANOVA test revealed the same outcome as the single-factor ANOVA conducted for this thesis. That is, *spe1* responses (longer loan duration) were found to be significantly different but *spe2* responses (shorter loan duration) were not.

Lewis and van Venrooij (1995) raise an interesting concern regarding the results:

> The underestimation of the lowest payment regime [and therefore the longest loan duration], which in terms of total repayment constitutes the most expensive option, is worrying if one is concerned about reducing debt problems and increasing appropriate and responsible borrowing; it is usually the less wealthy who choose the lowest repayments.

The implication is that the less wealthy are less equipped to handle the consequences of any errors they may have made in their estimation process.

It is important to note that, like Ranyard and Craig (1993) and Lewis and van Venrooij (1995), this thesis provides support for the amendment of borrowing legislation since it implies that borrowers should be able to make more informed decisions if they are provided with more complete information. The new Canada

Student Loan Program (revised in August of 1995) appears to have done so by forcing banking institutions to be more accountable to students (see section III of this report).

From the results obtained in the current experiment, a number of suggestions can be made regarding the type of information that should be provided to potential student loan candidates. First of all, students should be better informed about the exact amount of interest they will be paying over the lifetime of a loan. This information should initially be provided before the student obtains a loan in order that a realistic repayment scenario will be seen by the student *before* the principal amount has been decided. This information should be provided *again* before the student begins to repay the loan in order that a realistic repayment scenario will be seen by the student *before* the monthly repayment amount has been decided. The provision of monthly interest information becomes more important as the length of a loan increases, as length of a loan was found to have a negative effect on accuracy of loan duration estimation in the current experiment.

Second, students should be made aware that any grace period that is granted to the student upon graduation (i.e., six months to one year before the first payment needs to be made) has absolutely *no* effect on the total amount of time it will eventually take to pay off the loan (aside from the grace period). This is important, because students typically do not commence repayment of a student loan until a number of years after their first student loan has been obtained (likely in the first year of study).

(A) Extensions of the Student Loan Issue

There are many other credit areas where there could potentially be benefits from providing customers with more complete lending and/or borrowing information. This section will address some of those areas. First, however, it is useful to discuss the life-cycle income and consumption model, which stresses the concept of "rational" choice regarding borrowing, lending, and the inter-temporal distribution of income and consumption over one's lifetime.

1) General Extension

The life-cycle income and consumption model contains certain implications regarding how individuals view savings and expenditures over their lifetime. According to Shefrin and Thaler (1988), "...the life-cycle (LC) model makes some simplifying assumptions in order to characterize a well-defined optimization problem which is then solved. The solution to that optimization problem provides the core of the theory" (p. 609). In essence, given (i) a well-defined utility function over current and future consumption, (ii) a single real price of transferring funds between periods (by borrowing or lending), and (iii) rational expectations about future earnings, an individual can derive a utility maximizing stream of consumption, borrowing, and lending.

One key element of the life-cycle theory is that *current* consumption, borrowing, and lending decisions are just the first part of a rational consumption plan. However, if individuals are unable to accurately foresee the implications of *current* borrowing decisions (by underestimating the duration of loans, for example), then they will not be planning *future* consumption streams rationally. For example, underestimation of loan duration implies an overestimate of future consumption possibilities, and a tendency to over-consume in the current period. This, of course, reduces net savings and tends to make repayment of loans more difficult. It follows then that the underlying assumptions that must be made according to the life-cycle model (i.e., that individuals foresee and plan the future in a rational manner) may not necessarily hold true. Therefore, it is pertinent that some of these common assumptions be investigated further, which is what the current experiment attempted to do.

Attempts to revise the life-cycle theory have already been made in order to make it "...more behaviourally realistic, ...since few consumers are capable of making the present value calculations implicit in the theory" (Shefrin and Thaler, 1988, p. 609-10). The current experiment examined to what extent individuals are incapable of making such calculations, and what types of systematic errors are made, in the narrowly defined context of the estimation of student loan duration.

2) Specific Extensions to Other Credit Areas

The theory behind the life-cycle model suggests that individuals make utility maximizing savings, borrowing, and consumption decisions throughout their life-time. This implies that there are many other areas to which the conclusions of Ranyard and Craig's (1993) studies, Lewis and van Venrooij's (1995) study, and the current experiment might be applied. For example, the same mental processes that are applied to instalment credit and student loan estimation would likely also be used by individuals who are confronted with obtaining other types of credit or loans. Some examples are car loans, personal loans, credit cards, and even mortgages. If the same mental processes are indeed applied to other types of borrowing decisions, then the ambiguities that are found in instalment credit and student loan estimation would likely also occur in the estimation of other loans, given incomplete information about the repercussions of these loans.

Furthermore, an increasingly accepted method of financing, which has gained tremendous popularity in the last few years, is leasing (in particular car leasing). Clearly, the concept of time plays an extremely important role in calculating the potential benefits from leasing versus buying, but the short-term benefits (e.g., low monthly payments) may appear so appealing that the long-term consequences (longer time period before a car will actually be owned and future additional payments) are overshadowed. It is likely that conclusions drawn from this experiment and the related previous studies can be extended to these types of credit decisions, because the same mental process is required to estimate the ramifications of such decisions.

Finally, on the other side of the coin, it may be that the problems that people have in estimating the consequences of borrowing decisions can also be applied to savings decisions. For example, when people make decisions regarding long term savings, or investments (e.g., RRSP's), they may not be fully aware of the accumulation of interest. If individuals tend to underestimate loan duration, because they underestimate the interest that will accumulate over the duration of the loan, then it follows that individuals may also underestimate the amount of interest that will accumulate as a result of saving or investing.

This brief discussion suggests that results from the current experiment as well as the findings from the studies conducted by Ranyard and Craig (1993) and Lewis and van Venrooij (1995) may be extended to a variety of financial decisions that people must make on a regular basis throughout their life-times. However, the extent to which these results can be generalized will require further studies that investigate savings decisions.

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APPENDIX A

Questionnaires

Questionnaire Version 1

Part 1

You are given the following information regarding a fictitious student loan:

Total Amount of Initial Loan Received: $1,300.00
Monthly Payment Amount (MPA): $72.00/month *or* $156.00/month
Monthly Interest Rate: 1.9%

Interest is compounded monthly at 1.9%, implying an annual interest rate of 25.34%. There are no service charges and you are unable to make additional payments aside from the MPA.

Question: How many months will it take to pay off the *entire* loan for *each* of the above MPA's ($72.00 and $156.00)? You may use any strategy you wish to derive your answer. Please use the space below to do any necessary calculations. **Enter your answer below!**

Answer to Part 1:
MPA is $72.00: _____ months MPA is $156.00: _____ months

Part 2 (*general information*)

Age: _____ Sex: Female/Male Year of Study *(circle one)*: (1) (2) (3) (4) (5 or more)

Major Field of Study *(eg., Psychology, Biology, Management, etc...)*: _____

Degree Sought *(circle one)*: (B.A.) (M.A.) (Ph.D.) (Other *(please specify)*: _____)

Have you ever had a student loan *(either past or present)*? Yes / No

What method did you use to derive your answer in Part 1 *(circle one)*?

(a) guess (b) mental arithmetic
(c) calculator (d) other *(please specify)*: _____

Questionnaire Version 2

Part 1

You are given the following information regarding a fictitious student loan:

Total Amount of Initial Loan Received: $1,300.00
Monthly Payment Amount (MPA): $72.00/month *or* $156.00/month
Monthly Interest Rate: 1.9%

You do not have to make your first payment for one year. Interest will not accrue for one year. After one year, interest is compounded monthly at 1.9%, implying an annual interest rate of 25.34%. There are no service charges and you are unable to make additional payments aside from the MPA.

Question: How many monthly payments will it take to pay off the *entire* loan for *each* of the above MPA's ($72.00 and $156.00)? You may use any strategy you wish to derive your answer. Please use the space below to do any necessary calculations. **Enter your answer below!**

Answer to Part 1:
MPA is $72.00: _____ months MPA is $156.00: _____ months

Part 2 (*general information*)

Age: _____ Sex: Female/Male Year of Study *(circle one)*: (1) (2) (3) (4) (5 or more)

Major Field of Study *(eg., Psychology, Biology, Management, etc...)*: _____

Degree Sought *(circle one)*: (B.A.) (M.A.) (Ph.D.) (Other *(please specify)*: _____)

Have you ever had a student loan *(either past or present)*? Yes / No

What method did you use to derive your answer in Part 1 *(circle one)*?

(a) guess (b) mental arithmetic
(c) calculator (d) other *(please specify)*: _____

Questionnaire Version 3

Part 1

You are given the following information regarding a fictitious student loan:

Total Amount of Initial Loan Received: $1,300.00
Monthly Payment Amount (MPA): $72.00/month *or* $156.00/month
Monthly Interest Rate: 1.9%

On average, $13.36 of each $72.00 MPA consists of interest. Similarly, $12.88 of each $156.00 MPA consists of interest. Interest is compounded monthly at 1.9%, implying an annual interest rate of 25.34%. There are no service charges and you are unable to make additional payments aside from the MPA.

Question: How many months will it take to pay off the *entire* loan for *each* of the above MPA's ($72.00 and $156.00)? You may use any strategy you wish to derive your answer. Please use the space below to do any necessary calculations. **Enter your answer below!**

Answer to Part 1:
MPA is $72.00: _____ months MPA is $156.00: _____ months

Part 2 (*general information*)

Age: _____ Sex: Female/Male Year of Study *(circle one)*: (1) (2) (3) (4) (5 or more)

Major Field of Study *(eg., Psychology, Biology, Management, etc...)*: _____

Degree Sought *(circle one)*: (B.A.) (M.A.) (Ph.D.) (Other *(please specify)*: _____)

Have you ever had a student loan *(either past or present)*? Yes / No

What method did you use to derive your answer in Part 1 *(circle one)*?

(a) guess (b) mental arithmetic
(c) calculator (d) other *(please specify)*: _____

Questionnaire Version 4

Part 1

You are given the following information regarding a fictitious student loan:

Total Amount of Initial Loan Received: $1,300.00
Monthly Payment Amount (MPA): $72.00/month *or* $156.00/month
Monthly Interest Rate: 1.9%

On average, $13.36 of each $72.00 MPA consists of interest. Similarly, $12.88 of each $156.00 MPA consists of interest. **You do not have to make your first payment for one year. Interest will not accrue for one year.** After one year, interest is compounded monthly at 1.9%, implying an annual interest rate of 25.34%. There are no service charges and you are unable to make additional payments aside from the MPA.

Question: How many monthly payments will it take to pay off the *entire* loan for *each* of the above MPA's ($72.00 and $156.00)? You may use any strategy you wish to derive your answer. Please use the space below to do any necessary calculations. **Enter your answer below!**

Answer to Part 1:

MPA is $72.00: _____ months MPA is $156.00: _____ months

Part 2 (*general information*)

Age: _____ Sex: Female/Male Year of Study *(circle one)*: (1) (2) (3) (4) (5 or more)

Major Field of Study *(eg., Psychology, Biology, Management, etc...)*: _____

Degree Sought *(circle one)*: (B.A.) (M.A.) (Ph.D.) (Other *(please specify)*: _____)

Have you ever had a student loan *(either past or present)*? Yes / No

What method did you use to derive your answer in Part 1 *(circle one)*?

(a) guess (b) mental arithmetic
(c) calculator (d) other *(please specify)*: _____

APPENDIX B

Consent Form

UNIVERSITY OF CALGARY
CONSENT FORM

Research Project Title: *Estimation of Loan Duration*
Investigator: Annemarije A. van der Wal

This consent form, a copy of which has been given to you, is only part of the process of informed consent. It should give you the basic idea of what the research is about and what your participation will involve. If you would like more detail about something mentioned here, or information not included here, please ask. Please take the time to read this form carefully and to understand any accompanying information.

1. The purpose of this project is to determine how accurately people are able to project the duration of a loan. It is part of a thesis that is being written for the Department of Economics.
2. You will be asked to read the attached questionnaire and answer the questions as truthfully and accurately as possible within the time allotted (20 minutes).
3. You will *not* be faced with any risks, either physically or psychologically, as a result of this project.
4. The first part of the questionnaire contains a fictitious problem which you will be asked to solve. In the second part of the questionnaire, you will be asked to disclose certain demographics. These demographics will then be used in the analysis of the results. You will be given 20 minutes to complete the entire questionnaire.
5. Your responses will be grouped with those of other students in order to generate aggregated results, and *at no point will your identity be revealed.* You will not be asked to disclose your name on the questionnaire, thereby ensuring anonymity. You will only be identified by the demographic information you will disclose in the questionnaire. Only the investigator and thesis supervisor(s) will have access to the raw data. The raw data will be destroyed once the responses have been transferred to computer disk. Like the raw data, the computer disk will not contain any information to positively identify you.

Your signature on this form indicates that you have understood to your satisfaction the information regarding participation in the research project and agree to participate as a subject. In no way does this waive your legal rights nor release the investigators, sponsors, or involved institutions from their legal and professional responsibilities. You are free to withdraw from the study at any time. Your continued participation should be as informed as your initial consent, so you should feel free to ask for clarification or new information throughout your participation. If you have further questions concerning matters related to this research, please contact:

Annemarije A. van der Wal
237-9919

If you have any questions concerning your participation in this project, you may also contact the Office of the Vice-President (Research) and ask for Karen McDermid, 220-3381.

Participant	Date
Investigator/Witness	Date

A copy of this consent form has been given to you to keep for your records and reference.

APPENDIX C

Answer Key

Answers to Loan Duration Questionnaire

If Monthly Payment Amount is $72.00:
The only way to accurately calculate the answer is outlined in the following table. Note that **the correct answer is 23 months.** If you were given a questionnaire in which the description of the loan included what amount of each monthly payment consists of interest averaged over all payments (in dollars and cents), then you could also have subtracted this amount from the monthly payment, and subsequently divided the amount of the initial loan by the difference. [i.e., $1,300/($72.00-$13.36)=22.2]. You would then round this figure up to the nearest whole number (23) in order for the entire loan to be paid off. If you were given a questionnaire in which the description of the loan included a deferment of the first payment, this should not have made any difference in your calculations. The final payment is 12 months later, of course, or 35 (=23+12) months from today.

Course of a $1,300 loan
(Repaid at $72.00 per month, interest charged at 1.9% per month)

Month	*Starting Balance*	*Interest Charged*	*Repayment*	*End of Month Balance*
1	$ 1,300.00	$ 24.70	$ 72.00	$ 1,252.70
2	1,252.70	23.80	72.00	1,204.50
3	1,204.50	22.89	72.00	1,155.39
4	1,155.39	21.95	72.00	1,105.34
5	1,105.34	21.00	72.00	1,054.34
6	1,054.34	20.03	72.00	1,002.37
7	1,002.37	19.05	72.00	949.42
8	949.42	18.04	72.00	895.46
9	895.46	17.01	72.00	840.47
10	840.47	15.97	72.00	784.44
11	784.44	14.90	72.00	727.34
12	727.34	13.82	72.00	669.16
13	669.16	12.71	72.00	609.87
14	609.87	11.59	72.00	549.46
15	549.46	10.44	72.00	487.90
16	487.90	9.27	72.00	425.17
17	425.17	8.08	72.00	361.25
18	361.25	6.86	72.00	296.11
19	296.11	5.63	72.00	229.74
20	229.74	4.36	72.00	162.10
21	162.10	3.08	72.00	93.18
22	93.18	1.77	72.00	22.95
23	22.95	0.44	23.39	0.00
Total		**$307.39**	**$1,607.39**	
Monthly Average		**$13.36**		

If Monthly Payment Amount is $156.00:
The only way to accurately calculate the answer is outlined in the following table. Note that **the correct answer is 10 months.** If you were given a questionnaire in which the description of the loan included what amount of each monthly payment consists of interest, averaged over all payments (in dollars and cents), then you could also have subtracted this amount from the monthly payment, and subsequently divided the amount of the initial loan by the difference. [i.e., $1,300/($156.00-$12.88)=9.1]. You would then round this figure up to the nearest whole number (10) in order for the entire loan to be paid off. If you were given a questionnaire in which the description of the loan included a deferment of the first payment, this should not have made any difference in your calculations. The final payment is 12 months later, of course, or 22 (=10+12) months from today.

Course of a $1,300 loan
(Repaid at $156.00 per month, interest charged at 1.9% per month)

Month	*Starting Balance*	*Interest Charged*	*Repayment*	*End of Month Balance*
1	$ 1,300.00	$ 24.70	$ 156.00	$ 1,168.70
2	1,168.70	22.21	156.00	1,034.91
3	1,034.91	19.66	156.00	898.57
4	898.57	17.07	156.00	759.64
5	759.64	14.43	156.00	618.07
6	618.07	11.74	156.00	473.81
7	473.81	9.00	156.00	326.81
8	326.81	6.21	156.00	177.02
9	177.02	3.36	156.00	24.38
10	24.38	0.46	24.84	0.00
Total		**$128.84**	**$1,428.84**	
Monthly Average		**$12.88**		

Aim of research project

The aim of the project which you have participated in is to determine how accurately people are able to project the duration of a loan, given various amounts of information. In order to do this, four versions of a questionnaire have been distributed, each containing different amounts of information, but leading to the same answer. You have been given one of these four versions, and your response will be compared to others'.

Thank you for your participation!