The effect of focusing on loan decisions

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Abstract

In this paper we investigate some implications of recent results about salience on loan decisions. Using the framework of focus-weighted utility we show that consumers might take out loans even when that yield them negative utility. We claim however, that consumers are more prudent in their decisions and might be less likely to take out such loans when the usual fixed- and increasing-installment plans are coupled with a decreasing-installment option. We argue that harmful loan consumption, especially in the case of loans with increasing-installments (e.g. alternative mortgage loans), could be decreased if a policy would prescribe presentation of loan repayment schedules in a way that employs this effect. Moreover, using the model of focus-weighted utility we give a possible explanation for the unpopularity of decreasing-installment plans, the success of increasing-installment plans and their higher default rate during the financial crisis.

Keywords: focus weighted utility, loan decisions, welfare analysis

1 Introduction

Suppose you are about to purchase a laptop, worth a \$1000. A shop offers a loan plan which lets you to repay its price in two equal installments of \$500 each. An other shop would offer you the same loan plan with a choice of either two equal-size repayments of \$500 each (same as the first shop's offer), or two decreasing installments of \$750 and \$250, respectively. Given you would have purchased the laptop at the first shop, would it mean that you would also purchase it at the second shop if you happened to see their offer first?

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Based on the classical discounted utility model, rational decision-makers would consider the second shop's offer at least as good as the first's one. That is, if one would choose to purchase the item based on the first shop's offer, she would definitely purchase it when she is facing the options offered by the second shop.

However, a growing body of evidence from laboratory and field experiments suggests that this might not necessarily be the case. Provocative examples are presented for example in Schkade and Kahneman (1998) or in Dunn et al. (2003). In these articles the authors find strong support for the observation that decision-makers tend to overweight few attributes of a decision relative to the others leading to counterintuitive results.[1]

The concept of disproportionate weighting of attributes has been recently formalized for both risky decisions (Bordalo et al., 2012a) and intertemporal choices (Kőszegi and Szeidl, 2013).[2] The intuition behind these approaches is that people tend to assign greater weight to the importance of an attribute in which their alternatives differ more. These models are successful in explaining several puzzles in different fields of economic decisions. More specifically, the model of Bordalo and his collegues can account for decoy effect (Bordalo et al., 2013a), probability weighting (Bordalo et al., 2012a), stereotypes (Bordalo et al., 2014), endowment effects (Bordalo et al., 2012b) and asset prices (Bordalo et al., 2013b). Furthermore, the model of Kőszegi and Szeidl (2013) explains time-inconsistent behavior, both present bias and overcommitment to future goals at the same time, price sensitivity in health decisions (Abaluck, 2011), loan financing without budget constraints (Bertaut et al., 2009; Stango and Zinman, 2009) and lump-sum preferences compared to annuity in retirement and health decisions (Brown et al., 2008).

While the model of Kőszegi and Szeidl (2013) shows obvious similarities to the one presented in Bordalo et al. (2012a,b, 2013a,b, 2014) it assumes a weight function which is not option-specific in contrast to the option-specific characterisation suggested by Bordalo and his colleagues and thus is more suitable to draw welfare conclusions and regulatory implications. The framework builds on a time-separable utility function where each attribute measures the consumption in a given time period and welfare is the sum of the utilities of the respective consumption. The decision-maker maximizes her focus-weighted utility in which the utility of a time period is weighted by a focus function. However, this framework doesn't specify the focus function in the presence of discounting. In this paper we apply this framework and present a model about loan decisions. To make the framework suitable for analysing intertemporal decisions we introduce discounting and consider a more general case of the model of focusing. We analyze two different specifications of the focus function:

[1] More related examples can be found in Huber et al. (1982), Simonson (1989), Tversky and Simonson (1993) or Roelofsma and Read (2000). For a detailed review of related experimental findings see for example Camerer et al. (2004). More recently, Bertrand et al. (2010) presented field experiment evidence about how context specific information changes the decision-maker's behaviour.

[2] For earlier works on this literature see Tversky (1969), Tversky and Simonson (1993), González-Vallejo et al. (1996), Roelofsma and Read (2000), González-Vallejo (2002), Scholten and Read (2010) or González-Vallejo et al. (2012).

decision-makers either focus on the nominal values of the utility or on the discounted values of the utility. We show that a decision-maker's disproportionate focus on the initial benefit a loan entails (e.g. when receiving money or a purchased good) can lead to decisions which yield negative utility.[3] However, as we will show in this paper this can be counterbalanced by introducing a specific alternative repayment schedule. In particular, we claim that the introduction of a decreasing-installments plan in addition to a fixed-installments plan makes the decision-maker less likely to take out loans which would yield her negative utility. That is, adding well designed new alternatives to the choice-set decreases the bias towards taking out loans and as a consequence increases welfare. This might have important implications for policy making regarding loan consumption. We also find that even tough decreasing repayment plans have a positive effect on loan decisions they are always dominated by fixed-installment plans. This result is consistent with the empirical findings of Cox et al. (2014) that decreasing repayment plans (e.g., equal principal repayment plan) are not popular in the loan market. Furthermore, we show that in some specific cases the introduction of an increasing-installments plan can further increase the focusing bias. This may explain why alternative mortgages had gained a large market share both in the US and Europe (Demyanyk and Hemert, 2011; Cox et al., 2014). Based on this result one may claim that the high focusing bias generated by the increasing-installments plans may account for the higher default rate among alternative mortgages.[4]

In what follows we present our model, derive its propositions and finally interpret our results.

2 The Model

Let the intertemporal consumption choice set be given by C^{T+1}, where $T > 1$. Adapting the framework of Kőszegi and Szeidl (2013) we assume that the consumer maximizes her focus-weighted utility given by $\overline{U}(c) = \sum_{t=0}^{T} g_t u_t(c_t)$, where $g_t \equiv g(\max_c u_t(c_t) - \min_c u_t(c_t))$ is a focus weight on period (attribute) t with $g(\cdot)$ as a positive, strictly increasing function. However, by consuming $c = (c_0, c_1, \dots c_T) \in C^{T+1}$ she realizes a consumption utility of $U(c) = \sum_{t=0}^{T} u_t(c_t)$.

In order to make the model more specific and relevant to intertemporal choices, we introduce discounting and consider focus-weighted utility given by $\overline{U}(c) = \sum_{t=0}^{T} \delta(t) g_t u_t(c_t)$, with $\delta(t) \equiv \delta^t$ as the discount function, where $\delta \in (0, 1]$ is the per period discount factor. Furthermore, we consider personal welfare as $U(c) = \sum_{t=1}^{T} \delta^t u_t(c_t)$. It is important to note

[3]This result is in line with the empirical observation that people tend to underestimate the burden of a loan (Hoelzl et al., 2009; Akers, 2014).

[4]Mayer et al. (2009) findings suggest that the sharp increase of mortgage loans with initial fixed interest rates followed by a period of adjustable-rates, could be one of the main causes for the rise in mortgage defaults in the late 2000s. As the authors show, a vast majority of these loans had become seriously delinquent, especially after the initial fixed rate period had ended, and many cases eventually resulted in default. Similar results are presented by Demyanyk and Hemert (2011) and Amromin et al. (2011).

that with this specification of the focus weights, the decision-maker's focus is based on the nominal values instead of the discounted values. In section 3 we will show the consequences of the model when the focus weight is based on the discounted values.

We make the following assumptions:

Assumption 1 $u_t(c_t) = c_t$, *i.e., the utility function is a money metric measure.*

Assumption 2 *The loan free status quo is always in the choice set.*

Assumption 3 *The fixed-installments plan is always in the choice set.*

These assumptions might seem to be too restricting, however the model of focusing doesn't lose its explanatory power by assuming linear utility, since the model allows for any arbitrary functional form of the focus function (see Kőszegi and Szeidl, 2013). We assume that not taking out a loan is always an option. Furthermore, since the fixed-installments plan is the most typical loan, we assume that this repayment plan is always available in the choice-set.

Now, consider the following two consumption profiles: $c_A = (L, -x, -x, \ldots, -x)$ where $L, x \geq 0$ and $c_0 = (0, 0, 0, \ldots, 0)$. We can think of c_A as a loan with fixed-installments (i.e., flat plan or annuity) and c_0 as the loan-free status quo.[5]

Based on the aforementioned framework, a consumer is going to choose c_A instead of c_0, whenever $\overline{U}(c_A) \geq \overline{U}(c_0)$, i.e when:

$$\sum_{t=0}^{T} \delta^t g_t u_t(c_t) \geq 0 \tag{1}$$

which, using assumption 1, results in

$$g(L)L - \sum_{t=1}^{T} \delta^t g(x)x \geq 0 \tag{2}$$

Note, however, that consuming c_A could lead to a negative consumption utility, while (2) is satisfied. To illustrate that this may be the case, consider the following example.

Example 1 *Let* $T = 3$, $\delta = 0.9$ *and* $g_t = \max_{c_t} u_t(c_t) - \min_{c_t} u_t(c_t)$, *with* c_A *and* c_0 *as follows:*

	0.	*1.*	*2.*	*3.*
c_A	*1000*	*-600*	*-600*	*-600*
c_0	*0*	*0*	*0*	*0*
$g_t = \max_{c_t} u_t(c_t) - \min_{c_t} u_t(c_t)$	*1000*	*600*	*600*	*600*

[5]Notice that we do not restrict our analysis to the case of fair loans only. Throughout the paper a loan is considered as a consumption profile, which can yield negative or non-negative utility to the consumer.

In this case the consumer chooses c_A, since $\overline{U}(c_A) = 1000 \cdot 1000 - 0.9 \cdot 600 \cdot 600 - 0.9^2 \cdot 600 \cdot 600 - 0.9^3 \cdot 600 \cdot 600 = 121960 > 0$. However, c_A yields a consumption-based utility of $U(c_A) = 1000 - 0.9 \cdot 600 - 0.9^2 \cdot 600 - 0.9^3 \cdot 600 = -463.4 < 0$. Hence, a consumer focusing on the closer-to-the-present attributes may be tempted to choose a consumption profile which yields a negative utility for her.

Assumption 4 *All installments are strictly smaller than the lump-sum value, i.e., $x_i < L$ for $i = 1, \ldots, T$.*

The implication of assumption 4 is that the loan is repaid in several installments.

Definition 1 *For a given repayment plan the fair lump-sum value (L_W) is the value for which the consumption utility is zero, i.e., $L_W + \sum_{t=1}^{T} \delta^t u_t(c_t) = 0$.*

Definition 2 *For a given repayment plan the fair focus-weighted utility lump-sum value (L_{FWU}) is the value for which the focus-weighted utility of the loan is zero, i.e., $L_{FWU} + \sum_{t=1}^{T} \delta^t g_t u_t(c_t) = 0$.*

Remark 1 *Notice that for a given repayment plan, the decision-maker is willing to accept a lower lump-sum value based on his focus-weighted utility than based on his consumption utility, since $L_{FWU} < L_W$.*

Thus, it is always possible to create a loan contract which seems to be positive for the decision-maker even though it yields negative utility for her.

Definition 3 *For a given repayment the focusing bias in loan decisions (B) is the difference between the fair lump-sum values, i.e., $B = L_W - L_{FWU}$*

Now, let us introduce one more consumption profile: $c_B = (L, -x_1, -x_2, \ldots, -x_T)$, where $x_i \leq x_j$ whenever $i \geq j$ and $x_i \geq 0$, $(i, j = 1, 2, \ldots, T)$. We assume that $\sum_{t=1}^{T} \delta^t x_t = \sum_{t=1}^{T} \delta^t x$, where x refers to the installments of c_A. One can think of c_B as a decreasing loan repayment plan with a present value equal as c_A. In this case, the consumer's maximization problem can be written as:

$$\max_{c_i} \overline{U}(c_i) \qquad \text{for} \quad c_i \in \{c_0, c_A, c_B\}. \tag{3}$$

Proposition 1 *Introducing a decreasing loan repayment plan to a flat repayment plan decreases the focus-weighted utility of the flat plan.*

Proof: First, let us define $k \equiv \min\{i|x_i \leq x\}$. If $x_1 \geq x$ and $x_T \leq x$, then $k \in \{1, 2, \ldots, T\}$ is well defined, as it is the case for loan repayment plans. We need:

$$\begin{aligned} g(L)L - \sum_{t=1}^{T} \delta^t g(x)x &\geq g(L)L - \sum_{t=1}^{k-1} \delta^t g(x_t)x - \sum_{t=k}^{T} \delta^t g(x)x \\ -\sum_{t=1}^{k-1} \delta^t g(x)x &\geq -\sum_{t=1}^{k-1} \delta^t g(x_t)x \end{aligned}$$

which is equivalent to

$$\sum_{t=1}^{k-1} \delta^t [g(x_t) - g(x)]x \geq 0 \tag{4}$$

Since $g(\cdot)$ is a positive, strictly increasing function and $\delta > 0$, this inequality holds if $x_1, \ldots, x_{k-1} \geq x$, which is the case by definition. ■

Remark 2 *Note that Proposition 1 also holds when any other type of loan repayment plan is introduced. In this case we have to order the installments based on the difference between the two plans, starting with the installments where the alternative repayment plan's installments is the highest. In this case, we get back to the same equations.*

The consumer chooses c_A if $\overline{U}(c_A) \geq \max\{0, \overline{U}(c_B)\}$, or c_B whenever $\overline{U}(c_B) \geq \max\{0, \overline{U}(c_A)\}$. Otherwise, the optimal choice is c_0. This yields an interesting result. If the consumer's profile set consists only of c_A and c_0, she chooses c_A, whenever (2) is satisfied. Yet, if c_B is part of the set as well, she may prefer c_0.

To demonstrate this, consider the next example.

Example 2 *Let $T = 3$, $\delta = 0.9$ and $g_t = \max_{c_t} u_t(c_t) - \min_{c_t} u_t(c_t)$ again and the consumption profiles as follows:*

	0.	*1.*	*2.*	*3.*
c_A	*1000*	*-600*	*-600*	*-600*
c_0	*0*	*0*	*0*	*0*
c_B	*1000*	*-780*	*-670*	*-300*
$g_t = \max_{c_t} u_t(c_t) - \min_{c_t} u_t(c_t)$	*1000*	*780*	*670*	*600*

In this case $\overline{U}(c_A) = 1000 \cdot 1000 - 0.9 \cdot 780 \cdot 600 - 0.9^2 \cdot 670 \cdot 600 - 0.9^3 \cdot 600 \cdot 600 = -9260 < 0$, $\overline{U}(c_0) = 0$ *and* $\overline{U}(c_B) = 1000 \cdot 1000 - 0.9 \cdot 780 \cdot 780 - 0.9^2 \cdot 670 \cdot 670 - 0.9^3 \cdot 600 \cdot 300 = -42389 < 0$. *Therefore the optimal choice is* c_0.

Formally:

Proposition 2 *If $C = \{c_0, c_A, c_B\}$, then $c_A \succ c_B$, i.e., if a flat and a decreasing plan are both available to a consumer with a focus-weighted utility, then the former is always preferred.*

Proof: We shall prove that:

$$\sum_{t=1}^{k-1} \delta^t g(x_t)x + \sum_{t=k}^{T} \delta^t g(x)x \leq \sum_{t=1}^{k-1} \delta^t g(x_t)x_t + \sum_{t=k}^{T} \delta^t g(x)x_t \tag{5}$$

Define $y_i \equiv x_i - x$. Note that $y_i \geq 0$ if $i = 1, 2, \ldots, k-1$ and $y_i \leq 0$ otherwise. Thus (5) can be written as:

$$\sum_{t=1}^{k-1} \delta^t g(x + y_t)x + \sum_{t=k}^{T} \delta^t g(x)x \leq \sum_{t=1}^{k-1} \delta^t g(x + y_t)(x + y_t) + \sum_{t=k}^{T} \delta^t g(x)(x + y_t)$$

This simplifies to:

$$0 \leq \sum_{t=1}^{k-1} \delta^t g(x + y_t)y_t + \sum_{t=k}^{T} \delta^t g(x)y_t \tag{6}$$

or

$$0 \leq \sum_{t=1}^{k-1} \delta^t g(x + y_t)y_t + g(x) \sum_{t=k}^{T} \delta^t y_t \tag{7}$$

Since $\sum_{t=1}^{T} \delta^t x = \sum_{t=1}^{T} \delta^t (x + y_t)$, we have that $\sum_{t=1}^{T} \delta^t y_t = 0$. Using this, (7) can be written as:

$$0 \leq \sum_{t=1}^{k-1} \delta^t g(x + y_t)y_t - g(x) \sum_{t=1}^{k-1} \delta^t y_t$$

that is

$$0 \leq \sum_{t=1}^{k-1} \delta^t [g(x + y_t) - g(x)]y_t \tag{8}$$

As $y_t > 0$ for $t = 1, 2, \ldots, k-1$ and $g(\cdot)$ is strictly positive and increasing, this inequality always holds. Moreover, the inequality is strict whenever $\exists i \in \{1, 2, \ldots, T-1\}$ for which $y_i > 0$, in other words when $c_A \neq c_B$. ■

Remark 3 *Proposition 2 holds even if* c_B *is not a decreasing but any other type of loan repayment plan. In this case, inequality (7) can be rewritten as* $0 \leq \sum_{t \in K} \delta^t g(x + y_t) y_t + g(x) \sum_{t \notin K} \delta^t y_t$*, where* K *is the set of indices for which the non-flat installment is higher than the respective repayment of the flat schedule.*

Proposition 3 *Introducing any type of repayment plan in addition to a fixed-installments plan decreases the bias* B*.*

Proof: According to Proposition 1 introducing an alternative repayment plan with the same present-value as the flat plan makes the fixed-installment plan less attractive. Thus L_{FWU} increases compared to the original settings. However, we also know from Proposition 2 that the fixed-installments plan is preferred to the other repayment plan. Thus by introducing a new repayment plan L_{FWU} is increasing while L_W doesn't change. As a consequence, the bias B decreases. $\blacksquare$

Proposition 4 *Introducing any number of repayment plans in addition to a fixed-installments plan decreases the bias* B*.*

Proof: We have seen in Proposition 3 that introducing any new repayment plan would increase L_{FWU}. Now, consider the case where there are several new repayment plans additional to the original fixed-installments plan. Take one of the new repayment plans and for the sake of simplicity label it as the *second repayment plan*. Based on Proposition 2 we know that the second repayment plan is dominated by the fixed-installments plan when only two of them are in the choice-set with the loan-free status quo. There are two possibilities in this case. One, the decision-maker still chooses the fixed-installments plan, in which case we know that L_{FWU} has increased because of the new repayment plan from previous propositions. Second, the decision-maker chooses the second repayment plan, in which case, the L_{FWU} of the repayment plan is higher than the L_{FWU} of the fixed-installments plan when there are only two repayment plans available. We also know that this L_{FWU} is greater than the L_{FWU} when only the fixed-installments plan is available. Thus, the L_{FWU} of the second repayment plan is greater than the L_{FWU} of the fixed-installments plan in the original setting. Since we have chosen the second repayment plan arbitrarily from the new repayment plans, it is true for all of them. As a consequence, the bias B decreases. $\blacksquare$

3 Focus weights based on discounted values

So far, we considered cases using focus weights based on nominal values of the repayment plans. Let us now examine our results when the focusing is based on discounted values, that is when $g_t \equiv g(\delta^t(\max_c u_t(c_t) - \min_c u_t(c_t)))$. In the following we will show that if we define focus weights in terms of discounted values Proposition 1 to 4 still hold for decreasing-installment plans, although not necessarily for other installments such as increasing-installment plans.

Proposition 5 *When the decision-maker focuses on the discounted values, introducing a decreasing loan repayment schedule makes a flat plan less attractive for the consumer.*

Proof: In this case (4) changes to:

$$\sum_{t=1}^{k-1} \delta^t g(\delta^t x_t)x - \sum_{t=1}^{k-1} \delta^t g(\delta^t x)x \geq 0 \tag{9}$$

Since $x_1, \ldots, x_{k-1} \geq x$, $g(\cdot)$ positive and strictly increasing, while $\delta \in (0,1]$ this inequality always holds. ■

Remark 4 *Note that Proposition 5 is true whenever any type of loan repayment schedule is introduced instead of a decreasing one. In order to show this we have to re-index the installments based on the differences between the two plans, starting with the installment when the alternative repayment plan's installment is the highest compared to the flat plan's installment.*

Proposition 6 *When the decision-maker focuses on the discounted values and $C = \{c_0, c_A, c_B\}$ then $c_A \succ c_B$, i.e., if a flat and a decreasing plan are both available to a consumer, then the former is always preferred.*

Proof: In this case (6) can be written as:

$$0 \quad \leq \quad \sum_{t=1}^{k-1} \delta^t g(\delta^t(x + y_t))y_t + \sum_{t=k}^{T} \delta^t g(\delta^t x)y_t \tag{10}$$

Notice that $\sum_{t=k}^{T-1} \delta^t g(\delta^t x)y_t$ is negative, since $y_t < 0$ for any $t = k, \ldots, T$. That is, by replacing δ^t with δ^k for each $t = k, \ldots, T$, we have that the right-hand side of (10) is never lower than $\sum_{t=1}^{k-1} \delta^t g(\delta^t(x + y_t))y_t + \sum_{t=k}^{T} \delta^t g(\delta^k x)y_t$. Hence:

$$\begin{aligned}
\sum_{t=1}^{k-1} \delta^t g(\delta^t(x + y_t))y_t + \sum_{t=k}^{T} \delta^t g(\delta^t x)y_t \quad &\geq \textstyle\sum_{t=1}^{k-1} \delta^t g(\delta^t(x + y_t))y_t + \sum_{t=k}^{T} \delta^t g(\delta^k x)y_t & (11) \\
&= \textstyle\sum_{t=1}^{k-1} \delta^t g(\delta^t(x + y_t))y_t + g(\delta^k x) \sum_{t=k}^{T} \delta^t y_t & (12)
\end{aligned}$$

Since $\sum_{t=1}^{T} \delta^t y_t = 0$, we have that

$$\sum_{t=1}^{k-1} \delta^t g(\delta^t(x+y_t))y_t + g(\delta^k x) \sum_{t=1}^{k-1} -\delta^t y_t = \sum_{t=1}^{k-1} \delta^t g(\delta^t(x+y_t))y_t - \sum_{t=1}^{k-1} \delta^t g(\delta^k x) y_t \tag{13}$$

which can be written as

$$\sum_{t=1}^{k-1} \delta^t [g(\delta^t(x+y_t)) - g(\delta^k x)] y_t \tag{14}$$

As $y_1, \ldots, y_{k-1} \geq 0$ and $g(\cdot)$ is positive and strictly increasing, this latter expression is always non-negative, that is (10) always holds. ■

Proposition 6 is not necessarily true if c_B is not a decreasing repayment plan, but for instance, an increasing plan. To demonstrate this consider the following example.

Example 3 *Let* $T = 3$, $\delta = 0.9$, $g_t = \delta^t[\max_{c_t} u_t(c_t) - \min_{c_t} u_t(c_t)]$ *and the consumption profiles be as follows:*

	0.	*1.*	*2.*	*3.*
c_A	*1000*	*-600*	*-600*	*-600*
c_0	*0*	*0*	*0*	*0*
c_i	*1000*	*-542*	*-602*	*-669*
$\max_{c_t} u_t(c_t) - \min_{c_t} u_t(c_t)]$	*1000*	*600*	*602*	*669*
g_t	*1000*	*540*	*487.62*	*487.7*

In this case $\overline{U}(c_A) = 1000 \cdot 1000 - 0.9 \cdot 540 \cdot 600 - 0.9^2 \cdot 487.62 \cdot 600 - 0.9^3 \cdot 487.7 \cdot 600 = 258096.26$, $\overline{U}(c_0) = 0$ *and* $\overline{U}(c_i) = 1000 \cdot 1000 - 0.9 \cdot 540 \cdot 542 - 0.9^2 \cdot 487.62 \cdot 602 - 0.9^3 \cdot 487.7 \cdot 669 = 260962.47$. *Therefore the optimal choice is* c_i.

Thus the welfare effect of introducing any repayment plan is ambiguous. However, introducing a decreasing repayment plan still provides welfare improvement which could be shown with the same arguments as we used in the case of nominal values.

Remark 5 *Notice that for the propositions to hold we don't need a real decreasing-installments plan in the sense that* $x_i \geq x_j$ *whenever* $i \geq j$, *we only need a repayment plan with a* k *for which* $x_i > x$ *if* $i < k$ *and* $x_i \leq x$, *otherwise.*

4 Discussion

Our propositions in both specifications suggest that introducing a new repayment plan increases the L_{FWU} of a flat plan. One might argue that this may possibly deter the decision-maker from taking out a loan which could result in positive consumption utility. This, however, cannot be the case. Whenever the consumption utility of a loan is positive the focus-weighted utility of it is positive as well.

Remark 6 *If $U(c) > 0$, then $\overline{U}(c) > 0$ also holds. To show this consider the following. The focus-weighted utility of $c = (L, -x_1, -x_2, \ldots, -x_T)$ can be written as $g_0 L - \delta g_1 x_1 - \delta^2 g_2 x_2 - \cdots - g_T \delta^T x_T$, where g_t is the focus weight for period t. Since $x_i < L$ $(i = 1, \ldots, T)$, we have that $g_0 \geq g_t$ for any $t = 1, \ldots, T$. Thus $g_0 L - \delta g_1 x_1 - \delta^2 g_2 x_2 - \cdots - g_T \delta^T x_T \geq g_0 L - \delta g_0 x_1 - \delta^2 g_0 x_2 - \cdots - g_0 \delta^T x_T = g_0(L - \sum_{t=1}^{T} \delta^t x_t)$. This is always positive, since $U(c) > 0$ and $g_0 > 0$.*

Proposition 7 *Our results remain valid in the case of quasi-hyperbolic discounting (Laibson, 1997).*

Proof: Using $\beta\delta(t)$ instead of $\delta(t)$ the relevant expressions increase β-fold, where $\beta \in (0, 1]$ is the parameter for present bias. By dividing them with $\beta > 0$ we obtain exactly the same inequalities we derived in the above proofs. ■

Independently from the specification of the focusing function, our results suggest that introducing a decreasing repayment plan decreases the focusing bias. In other words, a loan is always less attractive based on its focus-weighted utility compared to its consumption utility when a new decreasing plan is introduced and as a consequence the bias $B = L_W - L_{FWU}$ decreases. We have also shown that the decrease of the bias caused by the introduction of new repayment plan cannot deter the decision-maker from taking out a loan with positive consumption utility. Moreover, introducing quasi-hyperbolic discounting for modeling present biased behavior does not affect our results.

It is important, however, to investigate which of the specifications is more descriptive for loan decisions. The main testable difference in implications is the attitude towards increasing repayment plans. This is especially relevant nowadays because of the various new types of mortgages. Interest-only mortgages and deferred amortization mortgages could all be examples of different types of increasing repayment plans. These financial innovations, however, have unclear impact on loan decisions and one might think that they have a negative effect on the decision-maker's judgment. According to some experimental and empirical findings increasing repayment plans are less preferred than other types of repayment plans which suggests that the specification of focusing on nominal values might be more descriptive for loan decisions. For example, empirical findings by Hoelzl et al. (2011) suggest that subjects prefer fixed-installment plans over increasing-installment plans and this preference is robust both in presence and in absence of interest rate. On the other hand, the popularity of alternative mortgages (see Mayer et al., 2009) indicate that the model with focusing on discounted values might be more robust than the one with nominal values.[6] Furthermore, one may reason that the higher default rate observed among those who choose increasing-installment plans (Amromin et al., 2011) might be due to its stronger focusing bias. This again supports the specification with focusing on discounted values.

5 Conclusion

In this paper we have investigated the effects of focusing in the presence of discounting and provided two specifications. In the first case we defined the focus weights based on nominal values of the attributes, while in the second case we defined the focus weights on discounted values. In the first specification we have shown that any extension of the choice set might improve consumer welfare. However, in the second specification, it is possible that an extension of the choice set with an increasing-installments plan leads welfare loss.

Based on the results we conjecture that adding a decreasing installment plan to the choice set would make the decision-maker less likely to take out loans which yield them negative utility. Furthermore, we propose that people would prefer the fixed-installments plan from this choice set. However, further empirical studies are needed to test these results.

We argue that by exploiting the aforementioned effect of focus, people could make more deliberate loan decisions. If banks for example would present a loan in fixed- and decreasing-installments options, they could end up getting more prudent decisions from their clients. This obviously boils down to policy making. Namely, a policy could prescribe that financial institutions present a loan repayment schedule also in a decreasing-installment option, and not only in fixed- or increasing-installment one. The induced focus on the decreasing-installments plan could dampen the increased focus on getting the loan, thereby discouraging the decision-maker from taking out a loan which might yield her a negative utility. This might be especially important in the case of loans with increasing-intallments plans (e.g. mortgages with initial 'teaser' rates), since these instruments could generate the highest focusing bias, and as a consequence, might motivate harmful loan consumption the most.

[6] However, van Leeuwn and Bokeloh (2012) argue that the popularity of some specific increasing repayment plans (i.e., interest-only mortgages and deferred amortization mortgages) in different countries might be only due to tax refund possibilities. This is supported by the empirical findings of Cox et al. (2014), who claim that in the Netherlands the increasing repayment plans were taken out by wealthier, less risk averse and more financially literate people suggesting that these loans are not preferred due to misperception, but for some other reasons.

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