Commitment as Extortion?

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July 2019

Abstract

A hyperbolic discounter values commitment. Her willingness to pay depends not just on autarky (non-commitment) consumption, but also on anticipated future commitment contracts. I formalize the consumer's outside option and derive conditions under which monopoly provision of commitment makes her better or worse off than in autarky. If autarky consumption is sufficiently decreasing over time, commitment is strictly beneficial, even when the monopolist can price discriminate. If autarky consumption is sufficiently non-decreasing, commitment is strictly harmful. In this case, the consumer dislikes access to commitment, but adopts it as a response to the threat of her future selves adopting it.

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1 Introduction

Time-inconsistent preferences are widely invoked as one plausible explanation for individuals' apparent failures to make optimal forward-looking decisions, as manifest in under-saving, over-borrowing, eating junk food, failing to go to the gym, and taking ten years to write a paper. Such preferences have the appeal of being psychologically sensible and mathematically tractable, especially when time-inconsistency is modeled using hyperbolic discounting. Under hyperbolic discounting, in any period t, the individual's discounting between periods t and $t+1$ is greater than between any two consecutive future periods.[1] This has the following implication: from the perspective of the individual prior to any period t, in period t she will seek too much instant gratification relative to her future.

Sophisticated hyperbolic discounters are aware of the time-changing nature of their preferences, and therefore make choices that account for their future selves' best responses. Such individuals, while seeking instant gratification in any period, would like to prevent their future selves from doing the same. They might therefore value commitment contracts that restrict their future selves' ability to make self-indulgent choices. This prediction–that individuals are willing to pay for contracts that tie their own hands in the future–is a fundamental distinguishing feature of hyperbolic discounting. Under standard time-consistent preferences (exponential discounting), commitment would be of no value since the individual trusts her future selves to make choices that are aligned with her current preferences.

The study of commitment, especially in banking, has been the focus of much recent empirical work in development and behavioral economics.[2] Thorough analyses of the possibilities and limits of commitment are essential to understanding choices, markets, and welfare under hyperbolic discounting. It is well understood that banking without commitment could have adverse

[1] I use the term 'hyperbolic discounting' to describe what is strictly speaking 'quasi-hyperbolic discounting'.

[2] For examples, see Ariely & Wertenbroch (2002), Thaler & Benartzi (2004), Ashraf *et al.* (2006), Gugerty (2007), Bryan *et al.* (2010), Bauer *et al.* (2012), and Brune *et al.* (2016).

welfare effects. But does banking *with* commitment help or hurt consumers?

Consider a firm that has access to a superior commitment technology than the hyperbolic discounter does. If the cost of providing this commitment is lower than the individual's benefit from receiving it, a surplus-generating transaction between the firm and the individual is feasible. Depending on market conditions, a contract signed in period t generates profits for the firm, higher discounted utility for the period-t individual, or both.[3]

This simple intuition is subject to caveats, as demonstrated in several recent papers. First, the individual might not be sophisticated, and so could have an incorrectly optimistic view of her outside option (O'Donoghue & Rabin (2001), Basu (2018)). Second, the individual might not be sufficiently financially literate to understand the complexities of long-term financial contracts. Third, the available commitment technology might be limited in scope (Laibson (1997), Ashraf *et al.* (2006)). And fourth, most legal regimes permit existing contracts to be voluntarily renegotiated if all signatories are in agreement. This means that a binding contract signed in period t needs to take seriously the possibility that in period $t+1$, the same individual and firm will renegotiate it to satisfy the $t+1$-self's preferences. Basu & Conning (2018) studies how this limits the feasible contract space and gives rise to nonprofit firms.

In this paper, I introduce a consideration that, to the best of my knowledge, has not been addressed but has significant implications for the terms of commitment contracts and consumer welfare. To isolate the mechanism of interest, I start with the following setup: A hyperbolic discounter lives for n periods, earns some (possibly varying but risk-free) income in each period, and might have access to limited borrowing and savings technologies, which she employs to construct an equilibrium consumption path that will be credibly followed by her future selves.[4] This is defined as her *autarky* outcome. Now, consider the emergence of a bank with access to a perfect

[3]Indeed, this contract may leave the individual in periods $t+1$, $t+2$, etc worse or better off than before, so this is not a statement about the welfare of the individual as a whole.

[4]In fact, the consumer may have full access to competitive banking markets, but without commitment.

commitment technology; i.e. it can deliver a consumption path with full consumption-smoothing (as desired by the individual at the time she signs a contract). Under what conditions will the individual accept a commitment contract, what will the the price of the offered contract be, and what are the implications for her (and her future selves') discounted utility relative to autarky?

If the bank is a monopolist that knows the individual's preferences,[5] the answer to these questions will depend on the individual's participation constraint. Suppose the bank were to make a one-time take-it-or-leave-it offer. Then, it would sell the individual a smoothed consumption path with equalized per-period marginal utilities (appropriately adjusted for the individual's discount factor and firm's cost of funds), that left her with the same discounted utility as in autarky. But banks generally cannot be expected to limit themselves to one-time offers. If the individual were to reject an offer in period t, the bank could offer her another contract in period $t+1$. So, the period-t individual's outside option is not determined directly by her autarky outcome; rather, it is determined by the contract that the bank would offer her in $t+1$. The contract that would be offered in $t+1$ depends on the contract that would be offered in $t+2$, and so on.

The contribution of this paper stems from the above observation.[6] The individual's outside option is a compound of future selves' outside options. I formalize this participation constraint for any well-behaved utility function and show how this depends not just on the individual's discounted utility in autarky but on the *distribution* of instantaneous utilities. So, two individuals with identical autarky discounted utilities could fare quite differently under a bank. I derive conditions under which the individual signs a contract that makes her worse/better off than in autarky, and conditions under which the individual in *every* period is made worse/better off than in autarky.

A main result is that under quite common autarky consumption paths (for example, non-decreasing consumption), commitment contracts strictly hurt the individual in every period. This happens not through the natural

[5]A moneylender, for example.
[6]This is discussed briefly in Basu & Conning (2018)

channels of over-borrowing, rolling over debt, unravelling of commitment, etc (which, furthermore, while bad for aggregate notions of welfare, still improve the utility of the individual engaging in the act of instant gratification). Instead, the effect is due to the worsening of the consumer's outside option which happens through the promise of commitment.

I provide some intuition using an example. Consider an individual who lives for four periods. She receives approximately the same income in every period and, lacking credit access, consumes her income as it arrives. Now, we use backward induction to think about the effects of a monopolist bank offering commitment contracts. If no contract has been accepted before period 3 (the second-last period), in that period she would accept a straightforward loan (commitment is irrelevant since only one period remains). So, the period 3 self raises her her own consumption, lowers period 4's consumption, and stays just as happy as in autarky. This prospect is worse than autarky from period 2's perspective (the gain in period 3's instantaneous utility cannot offset the loss in period 4's instantaneous utility). So, in period 2, the individual would now be willing to accept a contract that lowers her utility relative to autarky. By period 1, there will be compounding effects–her outside option is lowered through two channels: first, period 2 is willing to take a loan that is unattractive to period 1; additionally, period 2 herself has a worsened outside option to the threat from period 3. So, period 1 is willing to accept a commitment contract with overall low levels of consumption, leaving her and future selves all worse off.

In this example, a bank that offers commitment creates its own demand--the threat of offering commitment to the individual's future selves drives the individual's current self to purchase commitment (hence the title of this paper). She would prefer not to have access to commitment at all, but would adopt it if available. So, adoption does not mean that the arrival of commitment has made her better off. Commitment, instead of providing a partial amelioration of the problems posed by hyperbolic discounting, makes the individual worse off by pitting her selves against one another.

The above argument gets reversed when autarky consumption paths are sufficiently falling. Now, consider the contract offered in period 3. This leaves the period 3 self with the same discounted utility as in autarky, but actually makes period 2 better off (by moving consumption away from period 3 to period 4). In this case even a perfectly price discriminating monopolist must leave the individual with some surplus. The bank is trapped by its own future existence.

The model has a number of implications. First, in experimental studies, voluntary adoption of commitment should not be viewed as necessarily welfare-improving. Second, there is a fundamental difference between borrowing and saving–when there is a saving motive, the monopolist is forced to leave the consumer better off than in autarky; and when there is a borrowing motive, the monopolist gets to leave the consumer worse off than in autarky. This has relevance for the recent literature that convincingly casts microcredit as a form of commitment.[7] Third, while it is convenient to model the problem in the context of banking, the intuition extends to any other setting where commitment allow costs to be deferred or pulled forward (see Section 4.2). Fourth, this paper provides a new angle on exploitation, beyond naive consumers, predatory lenders, and interlinked markets.[8] This in turn suggests some new directions for consumer protection.

Finally, it is instructive to relate the current paper to the Coase (1972) Conjecture, which posits that a monopolist seller of durable goods must sell at or near the competitive price.[9] Broadly, the argument is that the monopolist's anticipated future price drop lowers consumers' willingness to pay today, thereby lowering today's prices. The model below has a flavor of this interplay between future and present, but the process that determines future 'prices' is fundamentally different, and driven by a single consumer's changing preferences. A goal of this paper is to study this process. Furthermore, I find that the price of commitment could rise *or* fall due to future

[7] See Bauer *et al.* (2012) and Banerjee (2013)

[8] On naivete, see DellaVigna & Malmendier (2004), Heidhues & Koszegi (2010), andArmstrong & Vickers (2012). On predatory lending, see Bond *et al.* (2009) and Mendez (2012). On interlinkages, see Bhaduri (1973) and Bardhan & Udry (1999).

[9] This has spawned a large literature, including Stokey (1981), Bulow (1982), Gul *et al.* (1986), Ausubel & Deneckere (1989), Bagnoli *et al.* (1989), Cason & Sharma (2001), and Board & Pycia (2014).

concerns–unlike under the Coase Conjecture, the firm's arrival could make the consumer unambiguously worse off than before.

2 Setup

Consider an individual who lives from periods 1 to $n \geq 1$.[10] Her instantaneous utility in any period t is given by $u(c_t)$, which will also be referred to as u_t. Assume the utility function is twice differentiable, strictly increasing, strictly concave, and satisfies $\underset{c \to 0}{lim}\, u'(c) = \infty$ (to prevent corner solutions).

Let a consumption stream starting in t be denoted $C_t \equiv (c_t, c_{t+1}, ..., c_n)$. The corresponding stream of instantaneous utilities is denoted $U_t \equiv (u_t, u_{t+1}, ..., u_n)$.

In the absence of a bank offering a commitment contract, the consumer is in *autarky*. In any period t, let the autarky consumption and utility streams be denoted C_t^A and U_t^A, respectively.

In any period t, the consumer evaluates her utility stream using quasi-hyperbolic discounting. Her discounted utility of a stream beginning in the current period is:

$$V_t(U_t) \equiv u_t + \beta \sum_{i=t+1}^{n} \delta^{i-t} u_i \tag{1}$$

In any period t, she evaluates a future utility stream, starting in $q > t$, as:

$$V_t(U_q) \equiv \beta \sum_{i=q}^{n} \delta^{i-t} u_i \tag{2}$$

In addition to a standard exponential discount factor $\delta < 1$, the entire future utility stream is discounted by a quasi-hyperbolic discount factor $\beta < 1$. This generates a present-bias from the perspective of any period.

Consider a bank that has access to funds at an interest rate $r \geq 0$. A contract offered to the individual in period q involves a specified consumption level in each period starting in q, in exchange for which the bank retains the individual's autarky consumption.

[10]The more interesting insights emerge when $n > 3$.

The firm's profits from a contract C_t in period t are given by

$$\Pi_t \left(C_t; C_t^A\right) \equiv \sum_{i=t}^{n} \left(\frac{1}{1+r}\right)^{i-1} \left(c_i^A - c_i\right) \tag{3}$$

Define a contract signed in period q, viewed from t's perspective, as $C_t^{(q)}$, and corresponding utilities $U_t^{(q)}$. This describes the consumer's consumption/utility stream in the event that she signed, or is expected to sign, a contract in period q (with all periods prior to q consuming as in autarky).[11] A contract can only be signed once–in all subsequent periods, the consumer and bank are bound by its terms. As a tie-breaking rule, assume that the bank offers a contract when indifferent and the consumer accepts a contract when indifferent.

Finally, for notational convenience, define $\frac{\delta}{1+r} \equiv \hat{\delta}$.

3 The model

3.1 The profit-maximization problem

The bank offers the consumer a consumption path in exchange for the consumer's autarky consumption. If the consumer were to reject a contract, she would receive her autarky consumption in the current period, but her future selves might sign a contract. Denote these anticipated future consumption and utility streams C_{t+1}^F and U_{t+1}^F, respectively. These will be referred to as her 'future option'.

The offered contract must leave the consumer at least as well off as she would be if she were to reject it. The bank solves the following:

$$\underset{C_t}{max}\ \Pi_t \left(C_t; C_t^A\right) \tag{4}$$

$$\text{s.t. } V_t \left(U_t\right) \geq u_t^A + V_t \left(U_{t+1}^F\right) \tag{5}$$

[11] To minimize notation-related confusion, it might be useful to note that, here and elsewhere in the paper, subscripts always refer to the perspective from which consumption/utility is being viewed. Superscripts, if any, provide additional information.

The profit-maximizing period-t contract has the following properties:

$$u'(c_t) = \beta\hat{\delta}u'(c_{t+1}) = \beta\hat{\delta}^2u'(c_{t+2}) = ... = \beta\hat{\delta}^{n-t}u'(c_n) \tag{6}$$

$$V_t(U_t) = u_t^A + V_t\left(U_{t+1}^F\right) \tag{7}$$

Equation 6 is the first-order condition that determines *relative* consumption across periods. Marginal utilities of consumption, adjusted by the discount factor from period t's perspective, must be equalized. Equation 7 is the participation constraint that determines overall consumption *levels*. The constraint refers to the consumer's outside option, which is as yet unspecified (it consists of immediate autarky utility and her future option).[12]

The bank helps the consumer to smooth consumption, and as payment it receives the surplus generated by smoothing. Figure 1 illustrates this in a two-period setting. The slope of the consumer's indifference curve depends on her discount factors and marginal utilities. The slope of the bank's isoprofit lines depends on the interest rate. Consumption-smoothing entails moving the consumer to a bundle where an indifference curve is tangent to an isoprofit line. The bank achieves this most profitably by keeping the consumer on the same indifference curve as her outside option.

Since there is a one-to-one correspondence between c_t and $u(c_t)$, from this point onwards it will generally be convenient to describe contracts directly in terms of instantaneous utilities. The solution to the profit-maximization problem in period t, $\left(u_t^{(t)}, u_{t+1}^{(t)}, ..., u_n^{(t)}\right)$, is denoted as a function of the future option: $U^{(t)}\left(U_{t+1}^F\right)$.

Before proceeding with a formal discussion of the outside option, we establish the straightforward result that the bank indeed prefers to have the consumer sign a contract as soon as possible.

Lemma 1. *The bank will offer the consumer a contract in period 1, and the consumer will accept it.*

Proof. (a) A contract must be offered and accepted in period $n-1$. (At

[12] I make the simplifying (and non-critical) assumption that if the consumer rejects an offer today, she does not adjust her current consumption in anticipation of the next period's contract. In Section 5 I discuss the implications of removing this assumption.

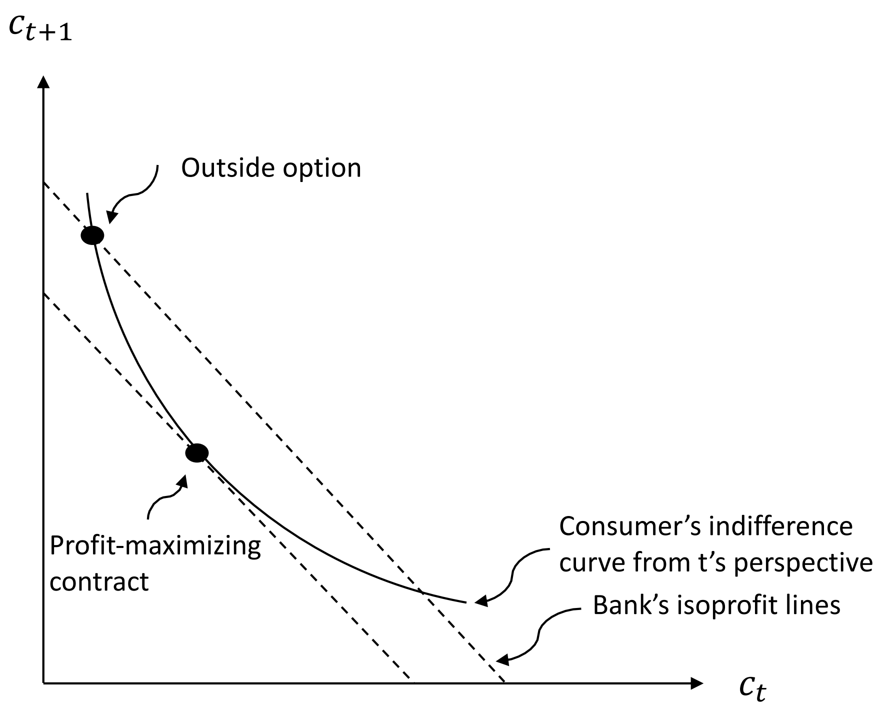

Figure 1: The profit-maximization problem in a 2-period setting

least, the bank could offer the consumer her autarky stream and earn zero profits.) Let $U^{(t)}$ be the profit-maximizing contract in period t. Then, there is always a contract that could be offered in $t-1$ that weakly raises the bank's profits and weakly raises the consumer's discounted utility. (At least, the bank could offer the consumer $\left(u_{t-1}^A, u_t^{(t)}, u_{t+1}^{(t)}, ..., u_n^{(t)}\right)$). Repeating the argument proves the lemma. □

3.2 Characterizing the outside option

Suppose she receives an offer from a bank in period t. She observes that her outside option is not necessarily autarky. Period t's outside option depends on $t+1$'s contract, which depends on $t+2$'s contract, and so on. This chain continues until the $n-1$ self faces the bank, at which point her outside option is autarky. This process of backward induction can be expressed formally as a compound function. Period t's future option is:

$$
\begin{aligned}
U_{t+1}^F &= U^{(t+1)}\left(U_{t+2}^F\right) && (8)\\
&= \left(U^{(t+1)} \circ U^{(t+2)}\right)\left(U_{t+3}^F\right) && (9)\\
&= \left(U^{(t+1)} \circ U^{(t+2)} \circ ... \circ U^{(n-1)}\right)\left(U_n^F\right) && (10)\\
&= \left(U^{(t+1)} \circ U^{(t+2)} \circ ... \circ U^{(n-1)}\right)\left(U_n^A\right) && (11)
\end{aligned}
$$

Any future option can be decomposed into intuitively useful components. I provide two illustrations followed by a general expression. Consider period $n-2$. If the consumer were to arrive in this period without a prior contract, and were to then reject the offered contract, she would not be left in autarky with $\left(u_{n-2}^A, u_{n-1}^A, u_n^A\right)$; rather, her next period self would sign a contract. So her utility stream would be $\left(u_{n-2}^A, u_{n-1}^{(n-1)}, u_n^{(n-1)}\right)$. We can decompose the future option:

$$
\begin{aligned}
U_{n-1}^{F} &= U^{(n-1)}\left(U_{n}^{A}\right) && (12)\\
&= U_{n-1}^{A} + \left[U^{(n-1)}\left(U_{n}^{A}\right) - U_{n-1}^{A}\right] && (13)\\
&\equiv U_{n-1}^{A} + \triangle_{n-1}^{(n-1)} && (14)
\end{aligned}
$$

Period $n-1$'s future option can be decomposed into two components: (a) $n-1$'s autarky utility stream (U_{n-1}^{A}), and (b) the adjustment to $n-1$'s utility stream due to the contract that $n-1$ would sign (denoted $\triangle_{n-1}^{(n-1)}$).

The consumer's outside option in $n-3$ depends on $n-2$'s contract, which depends on $n-1$'s contract. We can now decompose the utility stream that constitutes $n-3$'s outside option:

$$
\begin{aligned}
U_{n-2}^{F} &= \left(U^{(n-2)} \circ U^{(n-1)}\right)\left(U_{n}^{A}\right) && (15)\\
&= U_{n-2}^{A} + \left[U^{(n-2)}\left(U_{n-1}^{A}\right) - U_{n-2}^{A}\right] + \left[\left(U^{(n-2)} \circ U^{(n-1)}\right)\left(U_{n}^{A}\right) - U^{(n-2)}\left(U_{n-1}^{A}\right)\right] && (16)\\
&= U_{n-2}^{A} + \triangle_{n-2}^{(n-2)} + \triangle_{n-2}^{(n-1)} && (17)
\end{aligned}
$$

In period $n-3$, the consumer's future option can be decomposed into three components: (a) $n-2$'s autarky utility; (b) the change to $n-2$'s autarky utility stream that would result from the contract that $n-2$ would have signed if her outside option were autarky; and (c) the additional change to $n-2$'s utility stream that results from the fact that her future option is not autarky but is $n-1$'s contract.

We now have a general formulation of the consumer's future option in period t:

$$
U_{t}^{F} = U_{t}^{A} + \sum_{i=t}^{n-1} \triangle_{t}^{(i)} \tag{18}
$$

where, for $i = t$:

$$
\triangle_{t}^{(t)} = U^{(t)}\left(U_{t}^{A}\right) - U_{t}^{A} \tag{19}
$$

and for $i > t$:

$$\triangle_t^{(i)} \equiv \left(U^{(t)} \circ U^{(t+1)} \circ ... \circ U^{(i-1)} \circ U^{(i)}\right) \left(U_{i+1}^A\right) - \left(U^{(t)} \circ U^{(t+1)} \circ ... \circ U^{(i-1)}\right) \left(U_i^A\right) \tag{20}$$

The purpose of this exercise is to partially un-compound the future option and describe it in terms of what I call 'simple' contracts (the contract the consumer would sign if her outside option were simply autarky). Period 1's future option is then interpretable as: autarky $\left(U_2^A\right)$, plus the 'marginal effect' of period 2's simple contract $\left(\triangle_2^{(2)}\right)$, plus the marginal effect of period 3's simple contract (through period 2's reaction to it) $\left(\triangle_2^{(3)}\right)$, plus the marginal effect of period 4's simple contract (through period 2's reaction to period 3's reaction to it) $\left(\triangle_2^{(4)}\right)$, and so on.

These marginal effects can now be studied in isolation.

3.3 Does commitment help the one who commits?

I now discuss the impact of commitment on the individual, from the perspective of the period in which the contract is signed. The answer to this question depends on the evolution of the outside option relative to autarky.

I first describe the marginal effect of t on $t-1$'s future option. Consider the contract that period t would sign if her outside option were autarky $\left(U^{(t)}\left(U_{t+1}^A\right)\right)$. Suppose t's contract involves higher consumption in period t than under autarky. Then, this must have an adverse effect on $t-1$'s utility. The intuition is the following: from period t's perspective, the contract leaves her exactly as well off as in autarky. But this contract delivers an increase in period t's instantaneous utility and a reduction in future utility. From the perspective of $t-1$, the reduction in future utility cannot be offset by the gain in t's instantaneous utility, because $t-1$ places relatively greater weight on periods beyond t than t does. This is illustrated in Figure 2.

Now, observe that if this makes $t-1$ worse off, it results in a reduced outside option discounted utility for $t-1$, which functions like an income effect: as a result of this, the contract offered to her would involve lower levels of consumption in all periods relative to the contract based on her

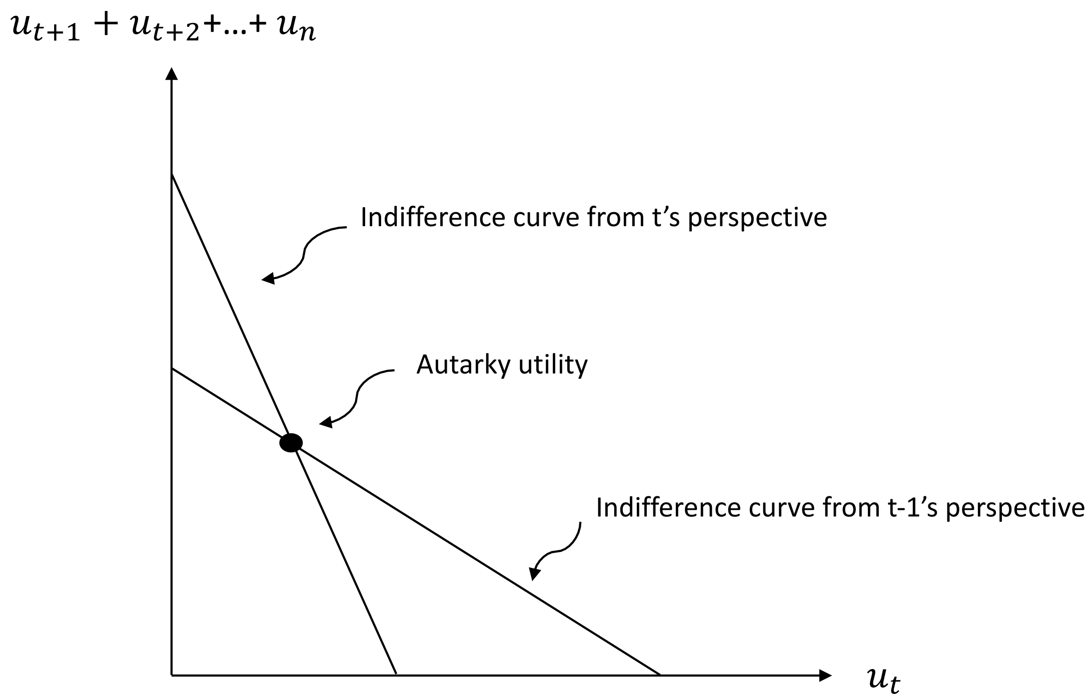

Figure 2: $t-1$'s indifference curve is more vertical than t's indifference curve. Any contract that moves right along t's indifference curve must place $t-1$ on a lower indifference curve. Any contract that moves left along t's indifference curve must place $t-1$ on a higher indifference curve.

autarky utility. This has an adverse effect on $t-2$, $t-3$, and so on.

Lemma 2 summarizes.

Lemma 2. *For any $i > t$, the marginal effect of i's simple contract on t's outside option depends only on whether i borrows or saves:*

(a) $V_t\left(\triangle_{t+1}^{(i)}\right) < 0$ *if and only if* $u_i^{(i)}\left(U_{i+1}^A\right) > u_i^A$.

(b) $V_t\left(\triangle_{t+1}^{(i)}\right) > 0$ *if and only if* $u_i^{(i)}\left(U_{i+1}^A\right) < u_i^A$.

Proof. By the participation constraint of the maximization problem (7),

$$V_i\left(\triangle_i^{(i)}\right) = V_i\left(U^{(i)}\left(U_{i+1}^A\right) - U_i^A\right) \tag{21}$$

$$= \left(u_i^{(i)}\left(U_{i+1}^A\right) - u_i^A\right) + \beta \sum_{j=i+1}^{n} \hat{\delta}^{j-i}\left(u_j^{(i)}\left(U_{i+1}^A\right) - u_j^A\right) \tag{22}$$

$$= 0 \tag{23}$$

Evaluated from the previous period:

$$V_{i-1}\left(\triangle_i^{(i)}\right) = V_{i-1}\left(U^{(i)}\left(U_{i+1}^A\right) - U_i^A\right) \tag{24}$$

$$= \beta\delta\left[\sum_{j=i}^{n} \hat{\delta}^{j-i}\left(u_j^{(i)}\left(U_{i+1}^A\right) - u_j^A\right)\right] \tag{25}$$

Since $\beta < 1$, it follows that:

$$V_{i-1}\left(\triangle_i^{(i)}\right) < 0 \Longleftrightarrow u_i^{(i)}\left(U_{i+1}^A\right) > u_i^A \tag{26}$$

$$V_{i-1}\left(\triangle_i^{(i)}\right) > 0 \Longleftrightarrow u_i^{(i)}\left(U_{i+1}^A\right) < u_i^A \tag{27}$$

Taking the marginal effect of i's naive contract back one period:

$$\triangle_{i-1}^{(i)} = U^{(i-1)}\left(U^{(i)}\left(U_{i+1}^A\right)\right) - U^{(i-1)}\left(U_i^A\right) \tag{28}$$

Combining Equations 24, 26, 27, and 28, it follows that:

$$V_{i-2}\left(\triangle_{i-1}^{(i)}\right) < 0 \Longleftrightarrow u_i^{(i)}\left(U_{i+1}^{A}\right) > u_i^{A}$$
$$V_{i-1}\left(\triangle_{i}^{(i)}\right) > 0 \Longleftrightarrow u_i^{(i)}\left(U_{i+1}^{A}\right) < u_i^{A}$$

Repeating the argument proves the lemma. □

Lemma 2 allows us to establish sufficient conditions under which access to commitment will strictly hurt the discounted utility of the individual signing the contract in period 1. Each marginal effect on period 1's future utility will be negative as long as $u_i^{(i)}\left(U_{i+1}^{A}\right) > u_i^{A}$ for each $1 < i < n$. For this to happen, autarky instantaneous utility in each period t must be sufficiently small relative to periods $t+1$ and above. In other words, each period must have a borrowing motive against all periods that follow it. It is easy to see that this is satisfied if $u_i^{A'} \geq \hat{\delta} u_{i+1}^{A'}$, for all $1 < i < n$.

A similar argument can be made for the opposite case. If autarky instantaneous utility in in each period is sufficiently large relative to future periods, then commitment will improve period 1's discounted utility relative to autarky. Here, we need a savings motive in each period towards all periods that follow it, which emerges if $u_i^{A'} < \beta\hat{\delta} u_{i+1}^{A'}$, for all $1 < i < n$. This is summarized in Proposition 1.

Proposition 1. *(a) Commitment will make the period 1 consumer strictly worse off than in autarky if and only if* $\sum_{i=2}^{n-1} \triangle_2^{(i)} < 0$. *This condition is satisfied if autarky utility is sufficiently increasing over time (*$u_i^{A'} \geq \hat{\delta} u_{i+1}^{A'}$*, for all* $1 < i < n$*).*

(c) Commitment will make the period 1 consumer strictly better off than in autarky if and only if $\sum_{i=2}^{n-1} \triangle_2^{(i)} > 0$. *This condition is satisfied if autarky utility is sufficiently decreasing over time (*$u_i^{A'} < \beta\hat{\delta} u_{i+1}^{A'}$*, for all* $1 < i < n$*).*

This proposition highlights a fundamental difference between borrowing and saving. People born with endowments can expect to do better under commitment, while those expecting later spikes in income do worse. Additionally, under any autarky path involving close to steady consumption, monopoly commitment unambiguously lowers period 1's discounted utility.

3.4 The welfare effects of commitment

Since under hyperbolic discounting the individual's preferences change over time, there is a natural question about how the individual's welfare is evaluated. Some common approaches have the problem of privileging particular 'selves' over others. One way around this is to think in terms of Pareto improvements or worsenings. I derive conditions under which commitment raises/lowers the discounted utility of the consumer from *each* period's perspective.

When will everyone be made worse off by monopoly commitment? First, period 1 should be made worse off, as described in Proposition 1. Second, for periods 2 to n, autarky consumption in each period must be high enough relative to all others that period 1's contract makes them worse off. When will these two conditions be simultaneously satisfied?

For period n, this is easily achieved–the higher period n consumption is in autarky, the more likely that both conditions are satisfied. But for intermediate periods, higher autarky consumption has multiple, opposing, effects: (a) they are more likely to want to save for future periods, thereby improving period 1's future option and raising consumption levels across the board; (b) earlier periods are more likely to want to borrow from them, thereby hurting period 1's future option and lowering consumption levels across the board; (c) any consumption smoothing implemented in period 1 is more likely to hurt them.

These channels are complex but amenable to simple sufficient conditions, as described in Proposition 2. For commitment to make everyone worse off, period 1's outside option must be worsened, and autarky utilities should be sufficiently increasing over time. In such a setting, even if there were no outside option effects, period 1 would borrow from all future periods, thereby making them worse off. Similarly, for commitment to make everyone better off, period 1's outside option must be improved and autarky utilities should be sufficiently decreasing over time. The statement of sufficient conditions is similar to those in Proposition 1, with added restrictions on period 1's autarky utility.

Proposition 2. *(a) Commitment strictly lowers the discounted utility of the individual in each period if* $u_1^{A'} \geq \beta\hat{\delta}$ *and* $u_i^{A'} \geq \hat{\delta}u_{i+1}^{A'}$*, for all* $1 < i < n$*.*

(b) Commitment strictly raises the discounted utility of the individual in each period if $u_i^{A'} < \beta\hat{\delta}u_{i+1}^{A'}$*, for all* $1 \leq i < n$*.*

Proof. (a) Based on Proposition 1, the inequalities ensure that commitment will hurt period 1. The inequalities comparing u_1^A to each future period ensure that under period 1's contract each period from 2 to n will consume less than in autarky. (b) The same argument can be applied. □

Statement (a) shows that under quite common autarky consumption streams (including approximately steady consumption), access to commitment hurts the individual regardless of which time perspective is used. Statement (b) shows that again under reasonable autarky streams (with savings motives), commitment helps the individual from every perspective. In this case, not only is the monopolist unable to extract all surplus from period 1, the commitment contract helps every future self that is being committed.

4 Discussion

4.1 Comparative Statics

The model, combined with functional form assumptions, can be used to generate comparative statics. Such an exercise is conducted in the appendix. Consider an individual with log utility whose consumption is constant in autarky ($c_t^A = 1$ for all $t \in \{1, ..., n\}$). To limit attention to the variables of interest, I assume that $\delta = 0$ and $r = 0$. Under these conditions, at any $\beta < 1$ the consumer has an incentive to borrow. Now, the profit-maximization problem has closed form solutions.

I compare the resulting *actual* contract to the *simple* contract (which takes autarky as the outside option), focusing on period 1 consumption (c_1).

First, I consider variation in β. Both the actual and simple contracts yield the same period 1 consumption at $\beta = 0$ and $\beta = 1$. In the first case, the consumer cares so little about the future that she is willing to give all future consumption to the bank with nothing in return. Threats of future borrowing are irrelevant. In the second case, the consumer is an exponential discounter, and because of time-consistency the future does not pose a threat. The divergence between the actual contract and the simple contract occurs at intermediate values of β – the consumer must be sufficiently present-biased that her future selves threaten to borrow at unfavorable terms, but not so present-biased that her current self is indifferent to this threat.

Next, we can look at the role of the time horizon. Taking two possible values of β, I show how the actual and simple contracts evolve with n.[13] Actual contracts are less sensitive to n than simple contracts are. The relative size of the actual contract (compared to the simple contract) falls in n. This is demonstrated in Figures 2 and 3 of the appendix. It is worth noting here that the gap is transmitted to all future levels of consumption as well, so the actual divergence is not just limited to period 1 consumption.

4.2 Beyond Banking

The model does not rely on banking to generate its results. The basic intuition is more widely applicable: when future selves would use commitment to defer immediate costs, the current self's outside option is hurt; when future selves would use commitment to incur immediate costs, the current self's outside option is improved. Two examples demonstrate this.

Consider an individual who has four consecutive periods to take advantage of an investment opportunity (suppose it be exploited only once and that the investments are non-pecuniary). If she adopts commitment to make the investment, fees are deducted out of the investment returns.

First, suppose the consumer needs to invest today for benefits tomorrow.[14] She would ideally invest tomorrow, but if she rationally anticipates

[13] I use $\beta = .7$ following Angeletos *et al.* (2001), and $\beta = .5$.

[14] This is akin to a task-completion setting as in O'Donoghue & Rabin (1999) and Basu (2018).

that the investment will not occur tomorrow, she will do it today. Using backward induction: in period 4, she would invest; knowing this, in period 3, she would not; knowing this, in period 2, she would invest; knowing this, in period 1 she would not. Here, if commitment is employed it is always to defer the investment from the current period to the next–period 2 is willing to pay to force period 3 to perform the task. But she is willing to pay so much that period 1's outside option worsens. In such a task-completion setting, access to monopoly commitment can only make the consumer worse off.

Second, suppose an individual must decide whether to make sunk investments in two consecutive periods, which yield returns in the third. Suppose that in any period she would like to start investing, but in the following period she would prefer to lose the initial investment than to top it up. So in autarky, no investment is made. With commitment, the consumer can start investing immediately while forcing the next period self to top up. So, a commitment contract will involve immediate costs. If an individual is as happy as in autarky, but while incurring the immediate cost of the initial investment, it must be the case that her earlier selves are happier. Here, commitment always improves earlier selves' outside option.

5 Conclusion

This paper focuses on the effects of commitment through modifications of the consumer's outside option. By setting aside other considerations, I show how threats of future contracts inform current contracts and through this, affect consumer utility.

Section 3 establishes some key results that also suggest several directions for extension. First, the analysis could be extended to other market structures, including competition or nonprofit banks. In these cases, results similar to the ones above can be established if there is a fixed cost of service provision. Second, as shown in Section 4.1, the time horizon matters. But the problem would change substantially in an infinite-time setting, with the possibility of multiple equilibria. Third, how do contracts change when agents are heterogeneous and have private information?

Finally, in the above analysis I have assumed that if an individual were to reject a contract, she is entirely at the mercy of her future selves and the contracts they might sign with the bank. But in reality, it is likely that in the event of rejecting a contract, the individual could also engage in some adjustments to consumption through informal banking means, as a way to exert some influence on future contracts. To make this point more formally: an individual's consumption/informal banking choices in period t could depend to some extent on whether she anticipates remaining in autarky in the future or anticipates signing a commitment contract. If she anticipates signing a contract, she could adjust her current consumption to limit the damage done by the future contract. This would have an additional effect on her outside option today.

Further investigation can reveal which of the above considerations yields distinct and valuable insights.

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Appendix to "Commitment as Extortion?"

Karna Basu

1 Comparative Statics

Consider the following simple setup that illustrates some key points of the paper. Let $u(c) = ln(c)$. I take the autarky consumption stream to be flat at $c_t^A = a = 1$. To focus on the effects of the hyperbolic discount factor and the time horizon, we can allow $r = 0$ and $\delta = 1$.

The profit maximization problem in period $n-1$ is the following:

$$\underset{c_{n-1},c_n}{min}\ c_{n-1} + c_n \tag{1}$$

$$\text{s.t.} ln(c_{n-1}) + \beta ln(c_n) = ln(a) + \beta ln(a) \tag{2}$$

The first-order conditions yield:

$$c_n = \beta c_{n-1} \tag{3}$$

Plugging this into the participation constraint, we get the solution:

$$c_{n-1}^{(n-1)} = a\beta^{\left(\frac{-\beta}{1+\beta}\right)} \tag{4}$$

$$c_n^{(n-1)} a\beta^{\left(\frac{1}{1+\beta}\right)} \tag{5}$$

The solution to the profit-maximization problem in an earlier period t

can be derived recursively:

$$\underset{c_t,\ldots,c_n}{min}\; c_t + ... + c_n \tag{6}$$

$$\text{s.t.} ln\left(c_t\right) + \beta\left[ln\left(c_{t+1}\right) + ... + ln\left(c_n\right)\right] = ln\left(a\right) + \beta\left[ln\left(c_{t+1}^{(t+1)}\right) + ... + ln\left(c_n^{(t+1)}\right)\right] \tag{7}$$

The following closed-form solution can be obtained:

$$c_1^{(1)} = a\beta^{\left[-\sum_{i=1}^{n-1}\left[\left(\frac{\beta}{1+i\beta}\right)\prod_{j=i+1}^{n-1}\left(\frac{j\beta}{1+j\beta}\right)\right]\right]} \tag{8}$$

$$c_2^{(1)} = c_3^{(1)} = ... = c_n^{(n)} = \beta c_1^{(1)} \tag{9}$$

If instead the outside option were autarky, the solution (simple contract) would be:

$$c_1 = a\beta^{\left[\frac{-(n-1)\beta}{1+(n-1)\beta}\right]} \tag{10}$$

Figure 1 compares the simple contract to the actual contract across possible values of β when $n = 4$. It is evident that the divergence is greatest at intermediate values of β.

Figure 2 compares the simple contract to the actual contract across time horizons ($n = 3$ to $n = 100$) when $\beta = .7$.

Figure 3 compares the simple contract to the actual contract across time horizons when $\beta = .5$. The divergence is now greater.

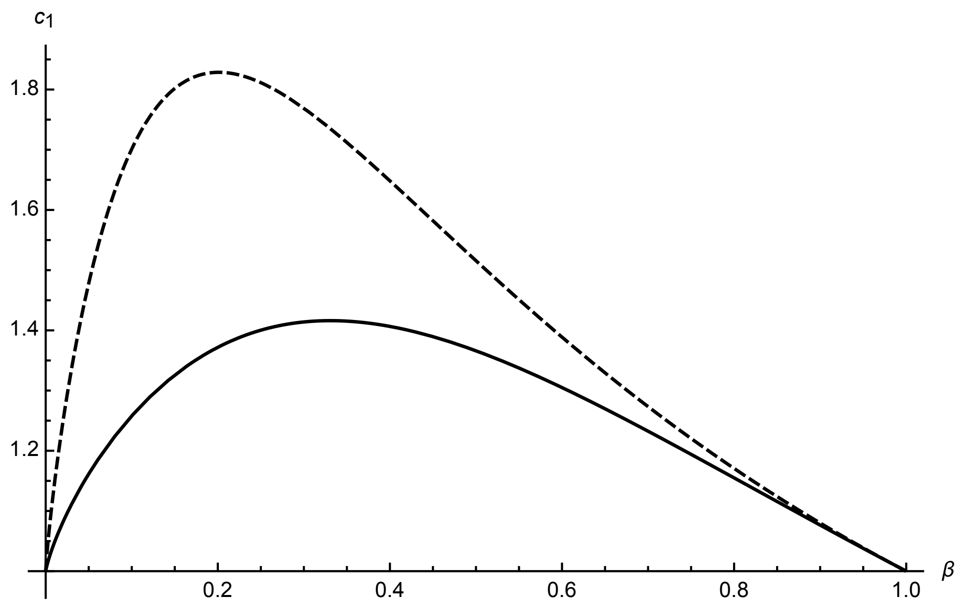

Figure 1: The simple contract (dashes) compared to the actual contract (solid) when $n = 4$.

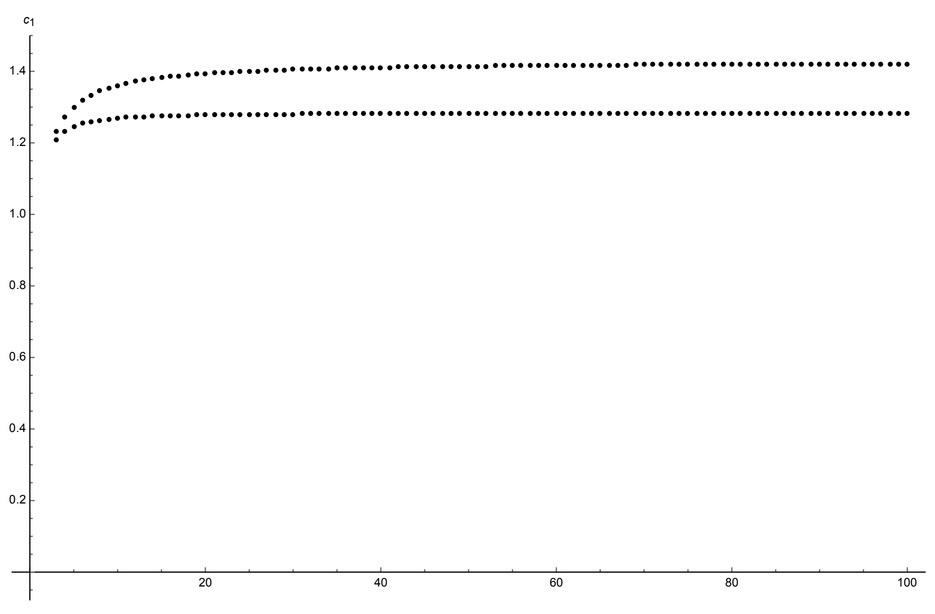

Figure 2: The simple contract (upper dots) compared to the actual contract (lower dots) when $\beta = .7$.

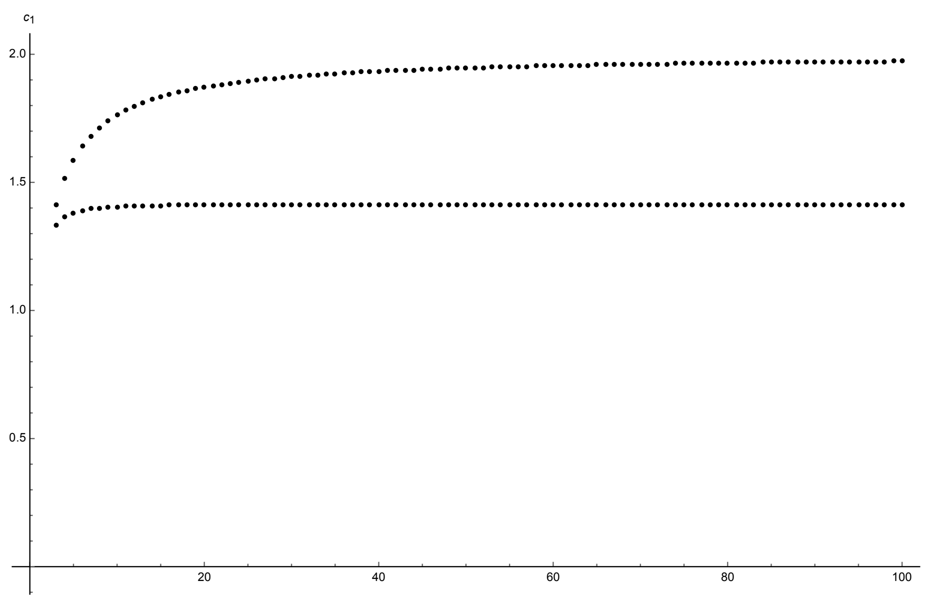

Figure 3: The simple contract (upper dots) compared to the actual contract (lower dots) when $\beta = .5$.