Sticking to the Contract:

Non-Profit vs For-Profit Banks and Hyperbolic Discounters

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Abstract

Motivated by recent concerns about consumer exploitation in banking and borrower over-indebtedness in microfinance, this paper presents a model of lending to hyperbolic discounters. First, we identify a problem of consumer protection that survives even when consumers are sophisticated and fully informed: a borrower would like to commit her future selves to a pattern of repayments, but her future selves are willing to pay to undo this commitment and defer debt obligations. A bank cannot credibly promise to enforce the commitment since it has an ex-post profit incentive to renegotiate the contract. This limits the commitment that can be offered in equilibrium. Second, we show how non-profit banks can offer improved commitment, even if their objectives are the same as for-profit banks. Since non-profits are legally barred from fully enjoying positive profits, they have a weaker ex-post incentive to renegotiate contracts. This allows them to offer borrowers stronger commitment, ex-ante. Third, we show how a bank's decision to turn non-profit depends on market structure. A monopolist's decision depends on a trade-off: as a non-profit, it can earn higher raw profits by providing superior commitment, but its ability to enjoy these profits is restricted. Under competition, the trade-offs disappear. If contracts are exclusive, all active banks will be non-profit. If contracts are not exclusive, for-profit banks must exist in equilibrium and non-profit banks will be unable to provide superior commitment. The model can help explain some stylized facts in consumer banking, and provides a framework to tie together

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recent trends in microfinance (the proliferation of MFIs, the growth of for-profit MFIs, and apparent borrower over-indebtedness). JEL Codes: O16, D03, D18

1 Introduction

This paper analyzes how a financial intermediary's ownership and governance structure might be endogenously determined and how, shaped by the nature of market competition, this affects the terms of lending to hyperbolic discounters. We draw attention to the demand for commitment in multi-period lending contracts, demonstrating that there are circumstances where non-profit lenders, even those that are not motivated by consumer welfare, can offer more effective and credible commitment contracts than for-profit banks. A commercial bank's own strategic decision to operate as a non-profit or transform itself into an investor-led for-profit firm depends on several factors, including the extent of market competition, the ability to enforce exclusivity of contracts, and the nature of legal restrictions imposed on non-profits. Our model helps explain some important stylized facts about credit markets, including broad trends in microfinance today and the historical transformation of consumer finance in developed countries.

In recent years, especially in light of crises in consumer credit markets, there has been a growing emphasis on consumer protection in banking.[1] One particular area of concern has been borrower over-indebtedness, an issue that has been at the center of repayment crises in, and political backlashes against, microfinance in recent years in places as far-flung as Morrocco, Bosnia, Nicaragua and India. Commenting on the recent crisis in the state of Andhra Pradesh in India, Elizabeth Rhyne (2010), a veteran promoter and analyst of microfinance, describes the build up of "rising debt stress among possibly tens of thousands of clients, brought on by explosive growth of microfinance organizations [and how]... In the quest to meet their growth targets, loan officers often sell loans to clients already indebted to other organizations."

Journalistic and scholarly analyses of such situations, including the recent mortgage crisis in the United States and other countries, have often framed the issues as problems of consumer exploitation, suggesting that many lenders designed products to purposefully take advantage of borrowers with limited financial literacy skills and self-control issues. Informed by such interpretations, new regulations introduced in the wake of these crises have swung toward restricting the terms of allowable contracts, for example by setting maximum interest rates, and the use of 'coercive' loan recovery methods.

[1] In the US, the Consumer Financial Protection Bureau was set up in 2011 under the Dodd–Frank Wall Street Reform and Consumer Protection Act. In India, the Micro Finance Institutions (Development and Regulation) Bill of 2012 was designed to increase government oversight of MFIs in response to the credit crisis in the state of Andhra Pradesh.

Our analysis focuses on consumers' stuggles with inter-temporal self-control issues. We argue that these are better understood by allowing borrowers to be more sophisticated in their understanding of their own time-inconsistency than is often assumed. From this perspective, 'predatory lending' behavior may consist not of hidden penalties and misleading interest rates, but of excessive flexibility and refinancing of financial contracts in ways that limit or undermine commitments to long term consumption and debt management paths that borrowers themselves may be attempting to put in place. A sophisticated hyperbolic discounter might fear that his 'future selves' will attempt to take out new loans on top of old ones, or renegotiate the terms of existing loans to further defer debt repayment. This leads to the following question, which serves as the starting point of our analysis: how can a bank credibly promise that it will not renegotiate the terms of the original loan contract, or in other words, that it will help enforce the commitment that the borrower has contracted into?

That hyperbolic discounters should be and are willing to pay for commitment has been demonstrated in several theoretical and empirical papers.[2] In a loan contract, repayment embeds commitment. By agreeing to enter into a contract with a specific time-path of repayments, the consumer is able to ensure that future selves will not skew consumption patterns to privilege instant gratification in the following periods. Viewed this way, fees and punishments are not inherently undesirable to the consumer–for sophisticated hyperbolic discounters, threats of punishment can serve as useful commitment devices.

Nevertheless, the fact that consumers value commitment does not automatically imply that firms will provide it in equilibrium. In fact, there remains an open question about whether markets can be relied upon to supply commitment. The key consideration is the following: if a hyperbolic discounter is willing to pay to commit her future selves, her future selves are willing to pay to undo this commitment. Here, a lender that promises to be rigid and is then flexible could be seen as hurting, rather than helping, the consumer.[3]

We examine, using the framework of loan contracts, the ability of lenders to provide *credible* commitment to sophisticated time-inconsistent borrowers. We find that firm ownership/governance

[2] See, for example, Ashraf, Karlan, and Yin (2006), Carrillo and Dewatripont (2008), Bryan, Karlan, and Nelson (2010), Fischer and Ghatak (2010), Basu (2011), and Basu (2012).

[3] Some recent papers demonstrate how commitment can be undone in related settings. Gottlieb (2008) shows how competition leads to inefficient outcomes in immediate rewards goods. Heidhues & Koszegi (2010) study the mistakes of partially naive borrowers in competitive credit markets. Mendez (2013) analyzes predatory lending with naive consumers. We extend our focus to monopoly, which is a particularly relevant market structure for informal banking in developing economies, and study how the firm's governance interacts with the renegotiation problem.

structure and market structure can matter crucially. In this respect our analysis builds upon and extends a seminal article by Hansmann (1980) which argues that commercial non-profits can be an effective solution to certain asymmetric information problems. In the present analysis we begin by following Hansmann in defining non-profits by the legal restrictions faced by them, setting aside other ways (such as motivation) in which they might be different from for-profit firms.[4] In this view "[a] nonprofit organization is, in essence, an organization that is barred from distributing its net earnings, if any, to individuals who exercise control over it, such as members, officers, directors, or trustees. By 'net earnings' I mean here pure profits–that is, earnings in excess of the amount needed to pay for services rendered to the organization." Glaeser and Shleifer (2000) and others have formalized Hansmann's central argument to show that when a firm cannot commit to maintaining high quality, it might choose to operate as a commercial nonprofit rather than as an investor-led for-profit in order to credibly signal that it has weaker incentives to cheat the consumer on aspects of unobserved product quality. As Hansmann describes it, firm ownership form adapts endogenously as a 'crude form of consumer protection' in unregulated emerging markets where asymmetric information problems are rife. Bubb and Kaufman (2011) modify this model so that the non-contractible quality issue is on hidden penalties, which are incurred with certainty by some borrowers. An important contribution of our paper is to argue that a similar acount of ownership form adaptation can emerge even in environments with no asymmetric information and with sophisticated forward-looking agents. We believe this is an important element for understanding the development of consumer finance in developed countries historically as well as the current shape of microfinance today where non-profit and hybrid (e.g. for-profit in formal status, but controlled by socially minded investors in practice) still dominate the sector in most developing countries (Cull and Morduch, 2009; Conning and Morduch, 2011).

As we explain below, non-profit or hybrid status firms can serve a useful purpose even in the absence of contract failure–the non-profit status allows them to credibly promise to not renegotiate the terms of a commitment contract. While the lessons in our paper apply to a wide range of contracts, our focus is on lending. This modeling approach has the advantage of generating a number of potentially interesting insights about the shapes of equilibrium lending

[4]Hence we abstract away from other considerations for nonprofits, as in Besley & Ghatak (2005) and McIntosh & Wydick (2005). Nonetheless our modeling framework can be adapted to include these considerations and is the focus of related work.

contracts.

1.1 Main Arguments

In our model, there is no asymmetric information, so there is no concern of cheating on a contract. Instead, there is a problem of renegotiation betwen fully informed and optimizing agents. After a loan contract is signed and is in effect, the present-biased borrower would like to discard the old contract and write up a new one which pushes repayment further into the future. Since he is willing to pay to defer repayment, the bank might also be willing to rewrite the contract and thereby raise its profits. However, if the consumer is sophisticated, he will anticipate this potential renegotiation in the initial period. In the absence of a commitment technology this will result in the search for renegotiation-proof loan contracts, which will translate into the bank's inability to extract as much surplus as it otherwise could.

This creates a reason for the bank to possibly choose to become a commercial non-profit. By operating as a non-profit, the bank can demonstrate to the consumer that it is less likely to renegotiate the contract in the future since the bank's managers and outside investors are now face legal restrictions on distributing the fruits of such renegotiation. This allows the bank to credibly offer the consumer an initial contract that delivers the restrictions on future consumption patterns that the consumer demands. This raises consumer surplus, part or all of which can be further extracted by the bank.

A firm's decision about whether to adopt non-profit status rests on a trade-off–as a non-profit, the firm has an opportunity to extract greater surplus from the consumer (by providing commitment), but it is restricted in its ability to enjoy this surplus. This trade-off is sensitive to market structure. In the case of monopoly, the bank will adopt nonprofit status if the following is true: non-profit restrictions should be sufficiently severe that the bank is able to extract more surplus from the consumer, but should not be so severe that it is unable to enjoy the surplus.

Under competition, a lender's ability to provide effective commitment through non-profit status depends on the exclusivity of contracts. When contracts are exclusive, the trade-off disappears and all active firms function as non-profits. This is because of the zero-profit condition–since firms do not make profits anyway, there is nothing to lose from switching to non-profit status. On the other hand, there are profits to be gained–if all other firms are for-profit, a firm could make positive profits by offering superior commitment as a non-profit (this is valuable

even if its enjoyment of these profits is limited).

When contracts are not exclusive, commitment generated through non-profit status is impossible to achieve. Since non-profit firms would make zero profits anyway, each firm has an incentive to switch to for-profit status so it can take advantage of the opportunity to re-finance *other* banks' loans. As a result, for-profit firms must be active in equilibrium, and their presence will eliminate the possibility of non-profit commitment.

This model can partly explain a key difference between traditional non-profit microfinance, which is rigid, and commercial credit card or mortgage lending, which offer refinancing flexibility (credit card and mortage punishments gain salience because they are *less* strict, not more). The analysis also sheds light on other governance structures, like firms with social investors (Conning & Morduch, 2011).

In addition, our model provides a partial (though obviously incomplete) explanation of such trends in global microfinance: the proliferation of lenders erodes the monopoly advantages (through commitment) gained by non-profit status, which results in a competitive equilibrium where firms switch to for-profits and commitment properties of contracts are weakened, resulting in an apparent over-indebtedness.

The problem of consumer protection in banking has been primarily analyzed through two primary channels: naive or uneducated consumers and their failure to correctly anticipate fees and punishments (Armstrong & Vickers, JEL, 2012; Gabaix & Laibson, QJE, 2006), and bank's moral hazard (Dewatripont & Tirole, 1994). We argue that, given the growing evidence of time-inconsistent preferences, a bank's ability to provide credible commitment should also fall under this umbrella. Through this lens, the model can shed some light on ongoing debates and stylized facts in both formal and informal credit markets.

2 The Model: Assumptions

There are three periods, $t \in \{0, 1, 2\}$. In any period t, the consumer's instantaneous utility is given by $u(x_t)$ for $x_t \in [0, \infty)$. The utility function is twice differentiable, strictly concave, and satisfies $u'(0) = \infty$ and $u(0) = 0$. His discounted utility in period t is:

$$U_t \equiv u(x_t) + \beta \sum_{i=t+1}^{2} \delta^{i-t} u(x_i)$$

This describes quasi-hyperbolic preferences, with an exponential discount factor $\delta \in (0,1]$ and a hyperbolic discount factor $\beta \in (0,1]$. The consumer could be sophisticated, naive, or partially naive about the time-inconsistency of their preferences (O'Donoghue & Rabin, 2001).

We assume the consumer has the following income stream over the three periods: $(0, y, y)$, where $y > 0$. This ensures that he is willing to pay to transfer income from the future to the present; i.e. he would like to take a loan $l > 0$. In the absence of financial access, his period-0 reservation utility is:

$$\bar{u} \equiv u(0) + \beta\delta u(y) + \beta\delta^2 u(y)$$

The consumer has the option of contracting with one or many banks, depending on the market structure. Each bank can access funds at a competitive interest rate r. A loan contract looks like (l, m_1, m_2), with a loan of l and repayment of m_1 and m_2 in periods 1 and 2 respectively. We assume the bank can perfectly enforce repayment, so its profits are given by:

$$\pi(l, m_1, m_2) \equiv -l + \frac{m_1}{1+r} + \frac{m_2}{(1+r)^2}$$

If the contract is renegotiated in period 1, the bank incurs a nonmonetary cost, $c \geq 0$, which could be interpreted as its social preferences or a concern for reputation.[5] The bank fully knows the borrower's preferences and can tailor the contract by borrower type.

For simplicity, we will assume $\delta = 1$ and $r = 0$[6], as these are not relevant to the continuing analysis. A short note on the other assumptions is in order. While we explicitly set up our problem as one of borrowing and re-financing, the insights from our model are more broadly applicable: our analysis essentially examines the role of firm organization and market structure in any setting where dynamically inconsistent preferences lead to a contract renegotiation problem. However, we choose to embed this problem in a borrowing framework for two reasons: first, we believe this model can shed light on some "real-world" stylized facts related to household debt; and second, we derive some interesting implications for the specific shapes of equilibrium loan contracts which would have remained hidden in a more general analysis. In continued work, we intend to loosen our assumptions to allow for strategic default and private information about types.

[5] The bank could incur additional monetary costs too. However, we assume these to be 0 as they do not affect the analysis.

[6] Alternatively, we could assume that $\delta = \frac{1}{1+r}$.

In the appendix, we dervie explicit solutions and additional results for a CRRA instantaneous utility function, $u(c) = \frac{c^{1-\rho}}{1-\rho}$.

3 Monopolist Bank

In this section, we analyze the renegotiation problem when a consumer faces a monopolist lender. We first derive properties of the benchmark equilibrium contract in the absence of any renegotiation possibilities. We then describe how the contract must change if renegotiation is possible. Finally, we describe conditions under which a lender will choose to operate as a commercial non-profit.

3.1 Benchmark Contract

This is the canonical case: a hyperbolic discounter would like a borrow in period 0 and repay in periods 1 and 2. The monopolist solves the following problem:

$$\begin{aligned} \max_{l,m_1,m_2} \; & -l + \frac{m_1}{1+r} + \frac{m_2}{(1+r)^2} \\ \text{s.t.} \quad & u(l) + \beta\delta u(y - m_1) + \beta\delta^2 u(y - m_2) \geq \bar{u} \end{aligned}$$

The solution is given by:

$$u'(l) = \beta u'(y - m_1) = \beta u'(y - m_2) \tag{1}$$

$$u(l) + \beta\delta u(y - m_1) + \beta\delta^2 u(y - m_2) \geq \bar{u} \tag{2}$$

Condition 1 is the standard first-order constraint: any contract should equalize marginal utilities of consumption, adjusted for discounting and interest rates. By satisfying this, the bank maximizes the surplus that can be extracted from the consumer. Condition 2 is the indifference constraint: the consumer cannot be left worse off than in autarky.

Let the equilibrium contract be $\left(\bar{l}, \bar{m}_1, \bar{m}_2\right)$. From the first-order constraint, we can immediately see that

$$\bar{m}_1 = \bar{m}_2 \equiv \bar{m}$$

Interestingly, there is no clearly monotonic relationship between loan size and β. As β drops from 1, two things happen: the consumer is willing to accept a smaller loan for any given

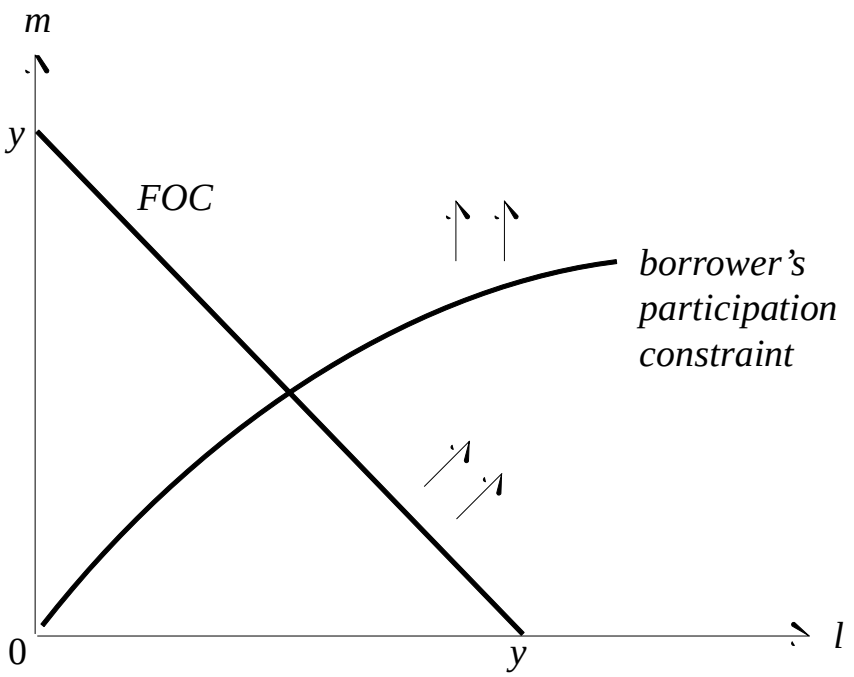


Figure 1: The benchmark monopoly contract is given by the intersection of the two constraints.

repayment (borrower participation constraint), but he is also willing to pay more for larger loans than before (equalization of marginal utilities). Conditions 1 and 2 can respectively be simplified to the following:

$$u'(l) = \beta u'(y - m) \tag{3}$$

$$u(l) + \beta\delta(1 + \delta)\, u(y - m) = \bar{u} \tag{4}$$

Figure 1 plots these constraints for $\beta = 1$. The arrows indicate how the constraints would shift as β drops (consumer becomes more present-biased). The borrower's participation constraint shifts up–as the consumer cares less about the future, he is willing to sacrifice more future consumption for a given loan today. The FOC rotates counterclockwise–for any consumption in the future, the consumer must receive a greater loan today to equalize discounted marginal utilities as β drops.

Since both constraints are shifting up relative to an initial equilibrium, $\bar{m}$ must unambiguously rise as β drops. On the other hand, $\bar{l}$ is not necessarily monotonic in β. Consider the case of the CRRA utility function: $u(c) = \frac{c^{1-\rho}}{1-\rho}$, with $\rho = \frac{1}{2}$ and $y = 1$. The appendix show how the

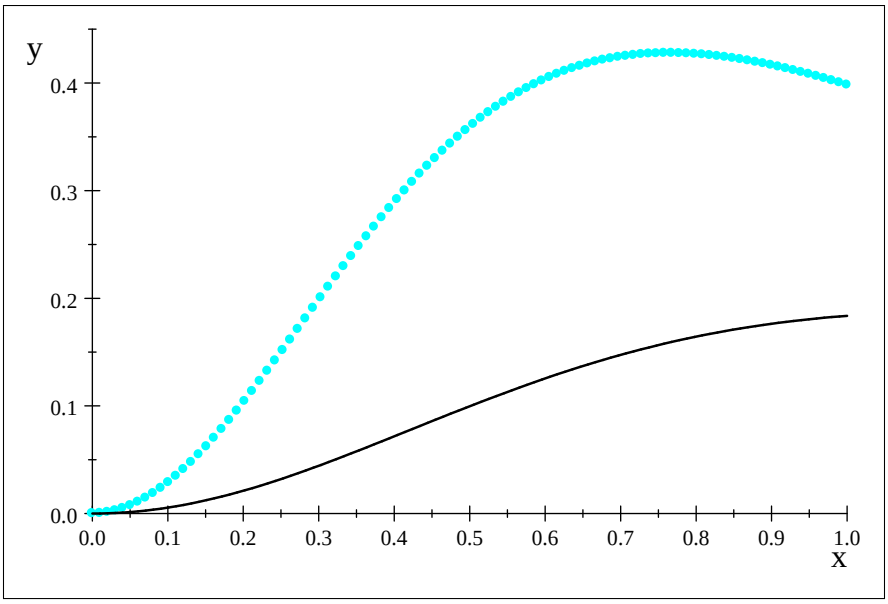


Figure 2: Equilibrium loan size as a function of β for CRRA utility function. The dotted line represents $\delta = .9$ and the solid line represents $\delta = .5$.

closed form solutions $\bar{l} = \left(\frac{\beta\delta(1+\delta)}{1+\beta^2\delta(1+\delta)}\right)^2$ and $\bar{m} = \frac{1+2\beta^2\delta(1+\delta)}{\left(1+\beta^2\delta(1+\delta)\right)^2}$ are derived.

In Figure 2, the dotted line plots $\bar{l}$ as a function of β for $\delta = 0.9$ and the solid line plots $\bar{l}$ as a function of β for $\delta = 0.5$. For high δ, loan size rises, then falls, as β drops. For low δ, loan size monotonically falls throughout as β drops. The intuition for this is the following: As the consumer becomes more hyperbolic, he is initially willing to pay substantially for slight increases in the loan size. As β continues to drop, repayment becomes less salient, so the bank can generate higher profits by lowering the loan size while continuing to raise $\bar{m}$.

Surplus to the lender is generated from two angles: consumer gets high period 0 consumption (instant gratification), and repayment terms ensure balanced consumption in periods 1 and 2 (commitment). All surplus goes to the bank. For the exponential discounter, this would be the end of the matter (commitment would be irrelevant). However, for the hyperbolic discounter there is value to commitment because his future self will want to undo his earlier self's contracted plans. This leads to the renegotiation problem.

3.2 Renegotiation-Proof Contract

When period 1 arrives the consumer's preferences change and he now observes:

$$u'(y - m_1) \geq \beta u'(y - m_2)$$

If he is a hyperbolic discounter with $\beta < 1$, he wishes to increase present consumption by transfering some of the debt burden to period 2. Since this creates an opportunity for the bank to generate new surplus, the bank might be willing to offer such a transfer by, in effect, offering a new loan on top of the existing one. In such cases, both parties voluntarily renegotiate the original contract. If profitable to the bank, it will offer a new repayment plan (n_1, n_2) (essentially a new loan) that satisfies:

$$\begin{aligned} & \max_{n_1, n_2} n_1 + \frac{n_2}{1+r} \\ \text{s.t.} \quad & u(y - n_1) + \beta\delta u(y - n_2) \geq u(y - \bar{m}) + \beta\delta u(y - \bar{m}) \end{aligned}$$

The first-order conditions imply:

$$u'(y - n_1) = \beta u'(y - n_2)$$

Coupled with the new participation constraint, this generates a renegotiated contract: $n_1(\beta; m_1, m_2)$ and $n_2(\beta; m_1, m_2)$. For the continuing analysis, it is useful to define the bank's potential gains from renegotiation:

$$g(\beta; m_1, m_2) \equiv n_1 + \frac{n_2}{1+r} - m_1 - \frac{m_2}{1+r}$$

This is depicted graphically in Figure 3.

The bank and consumer will therefore voluntarily renegotiate the contract if $g \geq c$.

Renegotiation will not be profitable for the bank if β is very high or very low. If β is high, the consumer has little interest in renegotiation. If β is low, $\bar{m}$ is already large enough that there is little left to renegotiate (even though the consumer is more interested in renegotiation as β drops, there is less to be gained for the bank since his utility function is very steep, so period 1 cannot push period 2's consumption down indefinitely). In Figure 4, $g(\beta)$ is plotted for the CRRA utility function (with $\delta = .9$ and log utility).

This problem does not apply to the exponential discounter. It applies to all hyperbolic discounters, but only the sophisticated is fully aware of the issue in period 0. The partially naive underestimates the extent of the renegotiation, and the naif believes he will not give into the temptation to renegotiate.

The sophisticated agent will anticipate that the firm will offer to renegotiate with his future

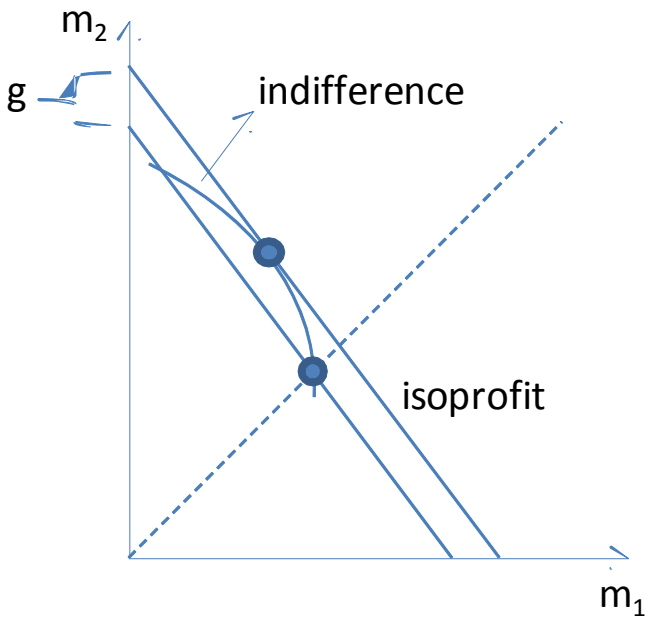
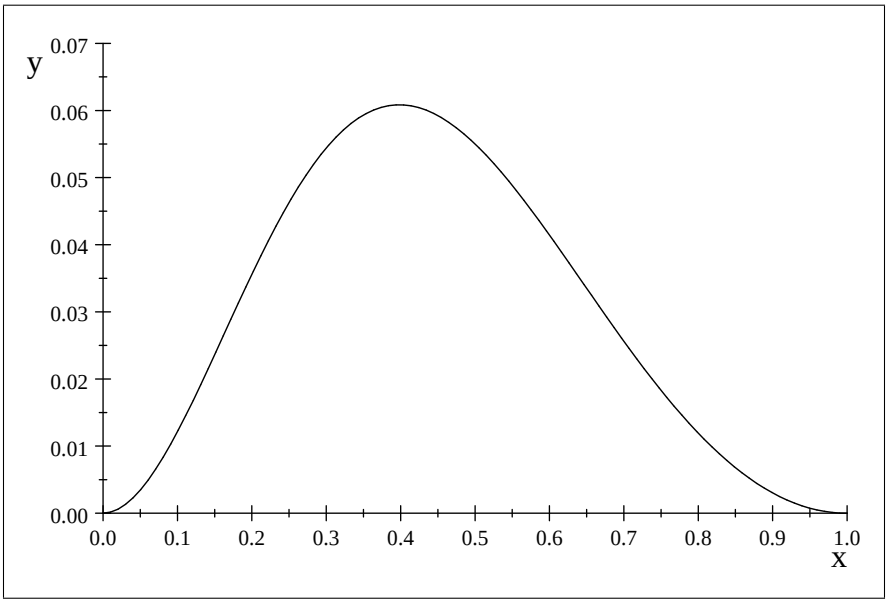


Figure 3: Gains from renegotiating the contract in period 1.



self. So he will not accept the earlier described full commitment contract in the first place since he understands that, when renegotiated, it yields less than reservation utility. The actual contract he signs must allow for m_1 and m_2 to be more imbalanced than he'd like (to remove the possibility of renegotiation by reducing the future surplus to be captured from doing so).

Assume the hyperbolic discounter believes that, in the future, his preferences are characterized by $\tilde{\beta} \geq \beta$. The new contract will have the following property: the repayment patterns will be kept sufficiently imbalanced (in period 1's favor) so that period 0's beliefs about the potential gains to period 1 from renegotiating the contract are just smaller than the costs the bank incurs from renegotiating.[7]

The bank must now solve a maximization problem with two constraints–the borrower's participation constraint, and a constraint that allows it to credibly commit to not renegotiate. The bank would prefer to offer the changes from renegotiation up front so it can avoid future costs.

$$\begin{aligned} & \max_{l,m_1,m_2} -l + \frac{m_1}{1+r} + \frac{m_2}{(1+r)^2} \\ \text{s.t.} \quad & u(l) + \beta\delta u(y - m_1) + \beta\delta^2 u(y - m_2) \geq \bar{u} \qquad (5) \\ & g\left(\tilde{\beta}; m_1, m_2\right) \leq c \qquad (6) \end{aligned}$$

The first-order conditions are the following:

$$\begin{aligned} -1 &= \lambda_1 v'(l) \\ -1 &= \lambda_1 \beta u'(1 - m_1) + \lambda_2 \frac{\partial g}{\partial m_1}(1+r) \\ -1 &= \lambda_1 \beta u'(1 - m_2) + \lambda_2 \frac{\partial g}{\partial m_2}(1+r)^2 \end{aligned}$$

The first restriction on contracts is associated with the indifference constraint, as before. The second is a restriction placed by the fact that marginal utilities in periods 1 and 2 cannot be far apart from period 1's perspective. Notice that the following must be true: $\frac{\partial g}{\partial m_1}(1+r) < 0$ and $\frac{\partial g}{\partial m_2}(1+r)^2 > 0$. This forces a wedge between m_1 and m_2, and the wedge must grow as the constraint gets more restrictive.

[7] The period 0 loan also increases. This can be interpreted as period 0 self contraining his future self by leaving less of the present value of income to his period 1 self to 'raid'.

This yields $(l^{rp}, m_1^{rp}, m_2^{rp})$ which satisfies:

$$v(l) + \beta\delta u(y - m_1^{rp}) + \beta\delta^2 (y - m_2^{rp}) = \bar{u}$$

For the sophisticated hyperbolic discounter, since m_1^{rp} and m_2^{rp} deliver a less smoothed profile than the commitment contract, the bank has to give up some of its surplus to have the client continue to participate. Simply put, bank profits are lower because the bank faces a new constraint on its surplus extraction problem: the bank wishes it could promise to not renegotiate but it simply cannot make such a promise credible without giving up some profits. The problem here is not cheating or contract failure, it is the possibility of a legitimate renegotiation (agreement to tear up old contract) between the consumer and the firm. The sophisticated hyperbolic discounter will correctly anticipate renegotiation, and the bank will end up with lower profits because of this.

Proposition 1 *If the consumer is a sophisticated hyperbolic discounter, and if c is sufficiently small, the bank's profits are lower when it cannot commit to not renegotiate.*

Proof. If c is sufficiently small, the original contract $\left(\bar{l}, \bar{m}, \bar{m}\right)$ will not satisfy the no-renegotiation constraint. Since $\left(\bar{l}, \bar{m}, \bar{m}\right)$ uniquely maximized the bank's profits subject to the indifference constraint, and $(l^{rp}, m_1^{rp}, m_2^{rp})$ maximizes the bank's profits subject to the indifference constraint and the no-renegotiation constraint, and since $(l^{rp}, m_1^{rp}, m_2^{rp}) \neq \left(\bar{l}, \bar{m}, \bar{m}\right)$, bank profits are strictly lower under the renegotiation-proof contract. ■

For exponential discounters and naifs and sophisticates, the bank is not hurt by an inability to commit to not renegotiate. In the case of the exponential discounter, this is because there is never an opportunity to renegotiate in a mutually beneficial manner. In the case of the naif, he *believes* his future self will not have a future incentive to renegotiate. If c is sufficiently small, he will be mistaken in this belief, and the bank will offer the temptation renegotiation. So, for a naive consumer, the bank is making additional profits on two margins: since there is no perceived renegotiation problem, he is willing to accept a contract that is more profitable for the bank up-front; subsequently, renegotiation generates additional profits for the bank.

Finally, consider the partially naive agent: she will take insufficient precautions to prevent getting into situations where the bank will offer to renegotiate. As she gets more naive, her miscalculation worsens: (a) she gets more optimistic in period 0, so is willing to accept a less

advantageous loan; (b) in period 1, if the contract was written to satisfy $g\left(\tilde{\beta}; m_1, m_2\right) = c$ (which would be the case if c was sufficiently small), we will see renegotiation anytime $\beta < \tilde{\beta}$. The relationship between sophistication and outcome is not continuous: under certain conditions, the moment there is the slightest naivete, we will see renegotiation happen, resulting in a discrete drop in welfare.

3.2.1 APR: An Aside

One of the consequences of a renewed focus on potential exploitation through lending contracts has been an attempt to enforce transparency, including requirements that the effective interest rate, or APR, associated with a contract, be made explicit. The presumption is that there is a link between consumer welfare and the effective interest rate. We show here that this is not necessarily so. First, consider the following simple example: suppose, after the initial loan, the consumer is able to renegotiate in period 1 at an interest rate of 0. This clearly lowers the overall APR faced by the individual in the course of the contract. However, there will be a reduction in welfare since he was already smoothing consumption perfectly (from the perspective of period 0).

In the current problem, the bank defers some of the debt from period 1 to period 2 at an interest rate that his higher than 0. The question here is, does the bank defer the debt at a rate that is higher or lower than the implied rate of the original contract? The implied interest rate of the original contract is given by the i that solves:

$$\bar{l} = \frac{\bar{m}}{1+i} + \frac{\bar{m}}{(1+i)^2}$$

It turns out that the implied interest rate of the second loan contract is lower than of the original contract. The renegotiated contract backloads repayments in a way that increases the present discounted value (puts heavy weight on backloaded payments), but the implied APR can fall (higher implied interest, associated with an implied lower discount factor, means that backloaded payments count less).

Proposition 2 *For any CRRA utility function, the implied interest rate will drop if the contract is renegotiated.*

Proof. See appendix. ■

3.3 Monopolist as Non-Profit

Suppose a firm has the option of operating as a nonprofit. In this section, we capture the primary legal restriction placed on nonprofit firms–that profits must be reinvested in the firm– by a function $f(\pi)$ where $f(0) = 0$ and $0 < f'(\pi) < 1$.

There are two implications of adopting nonprofit status: lower enjoyment of profits and lower incentive to renegotiate in period 1. The firm will choose nonprofit status under two possible scenarios: (a) The best renegotiation-proof contract is sufficiently improved for the sophisticated hyperbolic discounter that, despite lower enjoyment of profits, it is better off. (b) The partially naive consumer can be tricked into believing this is now a renegotiation-proof contract.

Consider scenario (a), where the consumer is sophisticated. The solution to the nonprofit firm's profit-maximization problem comes from:

$$\begin{aligned} & \max_{l,m_1,m_2} -l + \frac{m_1}{1+r} + \frac{m_2}{(1+r)^2} \\ \text{s.t.} \quad & u(l) + \beta\delta u(y - m_1) + \beta\delta^2 u(y - m_2) \geq \bar{u} \\ & f(\pi(l, m_1, m_2) + g(\beta; m_1, m_2)) - f(\pi(l, m_1, m_2)) \leq c \end{aligned}$$

The only change to contracts comes from the weakened second constraint. Repayment can be brought closer to what period 0 wishes. This makes period 0 more willing to transfer surplus to the firm. Let the resulting dontract be denoted $(l^{non}, m_1^{non}, m_2^{non})$.

When will we see nonprofit lenders (in the case where borrower is sophisticated)? Administrative costs (c) should not be so high that even for-profits wouldn't renegotiate. The consumer should be sufficiently hyperbolic (β should be low enough) that renegotiation is a tempting possibility. On the other hand, the consumer should not be so hyperbolic that even a nonprofit would like to renegotiate. And finally, the nonprofit discount function f should be severe enough to deter a nonprofit from renegotiating, but not so severe that it deters a firm from becoming a nonprofit.

In other words, the firm will choose nonprofit status if $f(\pi(l^{non}, m_1^{non}, m_2^{non})) \geq \pi\left(l^{prof}, m_1^{prof}, m_2^{prof}\right)$. In such a case, the consumer has been left no worse off than under a for-profit firm, and the firm is made better off. By solving the commitment problem, it is able to extract greater surplus from the consumer.

For naive and exponential borrowers, we should not see nonprofit status because neither of

these consumers perceives a renegotiation problem.

4 Competition

Consider a competitive banking environment where banks must compete to offer lending contracts to the consumer. In this setting, all surplus is returned to the consumer and equilibrium contracts will satisfy a zero-profit condition for the banks. As with the monopoly case, we first describe equilibrium contracts when renegotiation is impossible. We then analyze firms' decisions to operate as nonprofits, which depends on the exclusivity of contracts.

4.1 Benchmark Contract

Consider a competitive banking environment with zero profits in equilibrium. We assume that contracts are exclusive (a consumer can interact with only one bank for the life of a loan) and that banks can commit to not renegotiate. Firms will return all surplus to the consumer, and the equilibrium contract is given by:

$$\begin{aligned} &\max_{l,m_1,m_2} u(l) + \beta\delta u(y - m_1) + \beta\delta^2 u(y - m_2) \\ \text{s.t.} \quad &-l + \frac{m_1}{1+r} + \frac{m_2}{(1+r)^2} \geq 0 \end{aligned}$$

The first-order conditions are same as under monopoly:

$$v'(l) = \beta u'(y - m_1) = \beta u'(y - m_2)$$

The first-order conditions, combined with the zero-profit constraint, yield the equilibrium contract:

$$\hat{l}, \hat{m}_1, \hat{m}_2$$

We continue to have $\hat{m}_1 = \hat{m}_2 \equiv \hat{m}$.

This can be compared to the monopolist's contract along two dimensions. Observe the following comparison between the monopolist's maximization problem and the competitive equilibrium.

The competitive contract must satisfy the zero-profit constraint and the first-order conditions, while the monopoly contract must satisfy the borrower's participation constraint and the

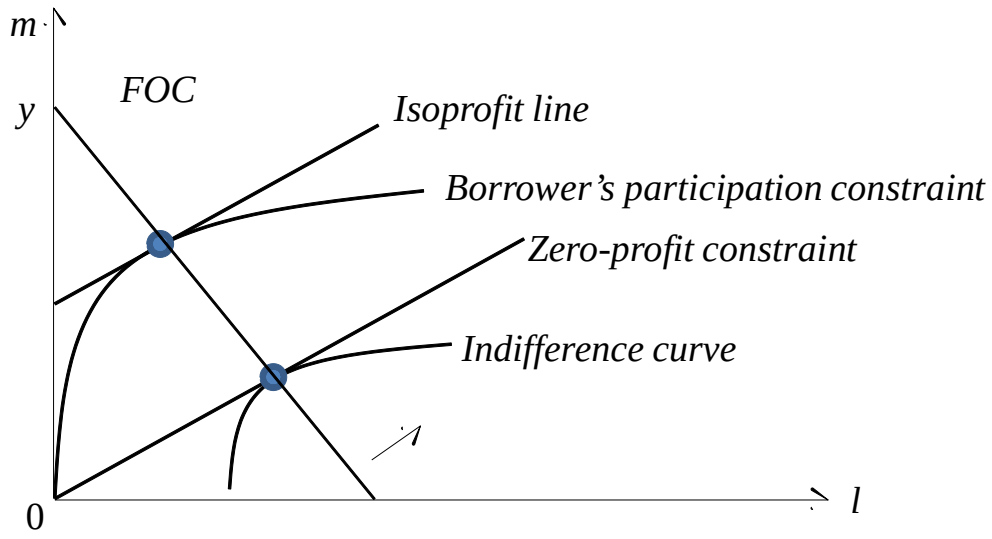


Figure 4: The benchmark contract under competition compared to the benchmark contract under monopoly.

first-order condition. Since the curve associated with the first-order condition is downward sloping, the competitive contract has a higher loan size and smaller repayment. The arrow in Figure 5 indicates the direction in which the first-order condition moves as β drops. This will result in a new contract at a higher point of intersection with the zero-profit constraint, which implies a larger loan size and higher repayment. This gives us the following proposition.

Proposition 3 *(a)Relative to the profit-maximizing monopolist, the competitive equilibrium contract will have a larger loan size and smaller repayment. (b) As β drops, loan size and repayments will rise.*

4.2 Firms as Non-Profit

4.2.1 Exclusive Contracts

Now we consider competitive markets where contracts are exclusive, but firms cannot commit to not renegotiate. For for-profit firms, the problem becomes:

$$\begin{aligned} &\max_{l,m_1,m_2} u(l) + \beta\delta u(y - m_1) + \beta\delta^2 u(y - m_2) \\ \text{s.t.} \quad &-l + \frac{m_1}{1+r} + \frac{m_2}{(1+r)^2} \geq 0 \\ &g(\beta; m_1, m_2) \leq c \end{aligned}$$

Let the contract yielded by this be denoted $\left(\tilde{l}, \tilde{m}_1, \tilde{m}_2\right)$.

If the no-renegotiation constraint is binding, consumer welfare must be lower than when the firms can commit to not renegotiate. Now, firms face a potential incentive to switch to non-profit status. By loosening the second constraint, one firm deviating into nonprofit status can make positive profits. So, if the borrowers are sophisticated hyperbolics, in equilibrium all firms become nonprofit even if the borrowers are *nearly* exponential.

Proposition 4 *In a competitive banking market with exclusive contracts, if consumers are sophisticated hyperbolic discounters and c is small enough, all active firms will be nonprofits.*

Proof. Assume c is small enought that the no-renegotiation constraint binds for the for-profit renegotiation-proof contract, $\left(\tilde{l}, \tilde{m}_1, \tilde{m}_2\right)$. Suppose all firms are for-profit. There is some ε_1 and ε_2 satisfying $0 < \varepsilon_2 < \varepsilon_1$ such that $u\left(\tilde{l}\right) + \beta\delta u\left(\tilde{m}_1 - \varepsilon_1\right) + \beta\delta u\left(\tilde{m}_2 + \varepsilon_2\right) = u\left(\tilde{l}\right) + \beta\delta u\left(\tilde{m}_1\right) + \beta\delta u\left(\tilde{m}_2\right)$ and $f\left(\pi\left(\tilde{l}, \tilde{m}_1 - \varepsilon_1, \tilde{m}_2 - \varepsilon_2\right) + g\left(\beta; \tilde{m}_1 - \varepsilon_1, \tilde{m}_2 + \varepsilon_2\right)\right) - f\left(\pi\left(\tilde{l}, \tilde{m}_1, \tilde{m}_2\right)\right) \leq c$. So, any firm can make positive profits by operating as a non-profit. Therefore, in equilibrium, consumers will borrow only from non-profit firms. ■

In this case, the specific form of $f(\pi)$ does not matter because firms are making zero profits in equilibrium anyway.

For exponential discounters, the possibility of renegotiation is irrelevant, so firms are indifferent between operating as nonprofits and for-profits.

For naive hyperbolics, there is nothing to be gained from going nonprofit since the borrower is not concerned about renegotiation. So, competition will result in banks giving very attractive deals in period 0, knowing that the bank's losses can be recovered from renegotiation in period 1. The contract (if c is small enough) will be given by:

$$\max_{l, m_1, m_2} v(l) + \beta\delta u(y - m_1) + \beta\delta^2 u(y - m_2)$$
$$\text{s.t.} \qquad -l + \frac{n_1(\beta; m_1, m_2)}{1 + r} + \frac{n_2(\beta; m_1, m_2)}{(1 + r)^2} - c \geq 0$$

If c is large, then firms are again indifferent between operating as nonprofits and for-profits.

4.2.2 Non-Exclusive Contracts

In the previous section, we had competition in period 0 but monopoly power in period 1. Now, the period 1 monopoly power disappears. Firms can undercut each other in period 1. For

exponential discounters and naifs, the contract remains unaffected.

To analyze the case with sophisticated hyperbolic discounters, we first ask whether the renegotiation cost, c, applies when a firm undercuts *another* firm's contract. Suppose not. Then, we can see right away that it's impossible to sustain nonprofits for any type of consumer. If there were nonprofits in equilibrium, any one firm could make positive profits by switching to for-profit status and undoing a rival bank's contract in period 1. Alternatively, assume that c applies in the same way to undercutting as it does to renegotiation. Consider sophisticated hyperbolics. As each firm's market share goes down, it is more incentivized to be for-profit since the advantages of undercutting the other firm's contracts outweigh the benefits of promising one's own clients it will not renegotiate.

Proposition 5 *In a competitive banking market with exclusive contracts, if consumers are sophisticated hyperbolic discounters, for-profits must exist in equilibrium.*

Proof. (a) Suppose the renegotiation cost, c, does not apply when a bank offers a period 1 loan on another bank's contract. Firms will compete in period 1 to satisfy $u'(1-n_1) = \beta u'(1-n_2)$. Commitment that comes through nonprofit status becomes worthless. In equilibrium, nonprofits and for-profits will offer identical contracts.

(b) Suppose c does apply, and is small (no-renegotiation constraint binds): If all firms are nonprofit, an individual firm has a strict incentive to switch to for-profit status, and make profits in period 1. Therefore, there must be for-profits in equilibrium, and equilibrium contracts will be constrained by their presence. ■

5 Conclusion

The model presented above formalizes the renegotiation problem in the context of lending to sophisticated hyperbolic discounters. We show how non-profit banks can play a key role in alleviating the problem. For a monopolist, if nonprofit status is sufficiently but not too restrictive, the firm will operate as nonprofit. As firms begin to compete, nonprofit survival is very robust is contracts are exclusive, but very fragile if contracts are non-exclusive. This suggests that, in banking markets that were once served by monopolists, entry of additional banks will serve to both erode commitment and encourage the growth of for-profits.

While the restrictive assumptions of the model serve to illuminate a number of points, they also suggest some natural extensions. In particular, it would be instructive to solve for equilibrium under heterogeneous borrowers with private information, and in richer environments with uncertainty and strategic default. These will be addressed in future work.

6 Appendix: CRRA Utility

The consumer's income is: $y_0, y_1..y_T$. The period 0 self maximizes the discounted present value of utility:

$$u(c_0) + \beta \sum_{t=1}^{T} \delta^t u(c_t) \tag{7}$$

This yields his reservation utility:

$$\bar{u} = u(y_0) + \beta \sum_{t=1}^{T} \delta^t u(y_t) \tag{8}$$

The loan contract can be described as a series of payments to the bank (negative quantities indicate borrowing): m_0, $m_1...m_T$.

A lender recives PDV of payments:

$$\sum_{t=0}^{T} \frac{(y_t - c_t)}{(1+r)^t} \tag{9}$$

.1 Monopoly Full Commitment Contract (T-Periods)

A monopolist chooses $c_0, c_1...c_T$ to maximize (9) subject to the borrower's participation constraint:

$$u(c_0) + \beta \sum_{t=1}^{T} \delta^t u(c_t) \geq \overline{u}(y) = u(y_0) + \beta \sum_{t=1}^{T} \delta^t u(y_t) \tag{10}$$

First order conditions:

$$1/\lambda = u'(c_o) = \beta\delta(1+r)u'(c_1) = ... = \beta\delta^T(1+r)^T u'(c_T)$$

which if $\boxed{\delta = 1/(1+r)}$ implies that at an optimum $c_0 = c_1 = ... = c_T = \bar{c}$. For the CRRA case

where $u(c) = \frac{c^{1-\rho}}{1-\rho}$ we have $u'(c) = c^{-\rho}$ and hence $c_0^{-\rho} = \beta\delta(1+r)\overline{c}^{-\rho}$, so:

$$\overline{c} = \beta^{\frac{1}{\rho}} c_0 \tag{11}$$

With this we can write the borrowers participation constraint (10) to find:

$$\begin{aligned}
u(c_0) + \beta\Lambda(T)u(\overline{c}) &= \overline{u} \qquad \text{where} \quad \Lambda(T) = \left(\frac{\delta - \delta^{T+1}}{1-\delta}\right) \\
\text{from} \quad \Lambda(T) &= (\delta + \delta^2 + ... + \delta^T) = \left(\frac{1-\delta^{T+1}}{1-\delta} - 1\right) \\
u(c_0) + \beta\Lambda(T)u(\overline{c}) &= \overline{u} \\
u(c_0) + \beta\Lambda(T)\beta^{\frac{1-\rho}{\rho}} u(c_0) &= \overline{u} \\
\text{by (11) since } u(\beta^{\frac{1}{\rho}} c_0) &= \beta^{\frac{1-\rho}{\rho}} u(c_0) \\
u(c_0)\left(1 + \beta\Lambda(T)\beta^{\frac{1-\rho}{\rho}}\right) &= \overline{u} \\
c_0 &= [\overline{u}(1-\rho)]^{\frac{1}{1-\rho}} \frac{1}{\left(1 + \beta\left(\frac{\delta-\delta^{T+1}}{1-\delta}\right)\beta^{\frac{1-\rho}{\rho}}\right)^{\frac{1}{1-\rho}}} \\
&\boxed{c_0 = [\overline{u}(1-\rho)]^{\frac{1}{1-\rho}} \frac{1}{\left(1+\beta^{\frac{1}{\rho}}\left(\frac{\delta-\delta^{T+1}}{1-\delta}\right)\right)^{\frac{1}{1-\rho}}}} \\
c_0 &= [\overline{u}(1-\rho)]^{\frac{1}{1-\rho}} \frac{1}{(1 + \beta^{\frac{1}{\rho}}\left(\frac{\delta-\delta^{T+1}}{1-\delta}\right))^{\frac{1}{1-\rho}}} \\
\text{if T=2} \qquad & c_0 = [\overline{u}(1-\rho)]^{\frac{1}{1-\rho}} \frac{1}{(1 + \beta^{\frac{1}{\rho}}\left(\delta + \delta^2\right))^{\frac{1}{1-\rho}}}
\end{aligned}$$

From the FOC it's easy to get:

$$\overline{c} = \beta^{\frac{1}{\rho}} c_0$$

.2 Monopoly: Accounting for Renegotiation (3 Periods)

The contract offered to the period 0 self is denoted: c_0^0, c_1^0, c_2^0. The renegotiated contract offered to period 1 self is c_1^1, c_2^1. The income vector is y. We can think of the bank lender as allowing the borrower to transform their autarky consumption stream (y_0, y_1, y_2) in exchange for a new consumption stream (c_0^0, c_1^0, c_2^0).The first period problem with full commitment is then:

$$\max_{c_0^0,c_1^0,c_2^0} \left(y - c_0^0\right) + \frac{\left(y - c_1^0\right)}{(1+r)^2} + \frac{\left(y - c_2^0\right)}{(1+r)^2}$$
$$\text{s.t. } u(c_0^0) + \beta\left[\delta u\left(c_1^0\right) + \delta^2 u\left(c_2^0\right)\right] \geq u(y_0) + \beta\left[\delta u\left(y_1\right) + \delta^2 u\left(y_2\right)\right] = \overline{u}(y)$$

As shown above when $\delta = 1/(1+r)$ the solutions for the CRRA are given by:

$$\begin{aligned} c_0^0 &= [\overline{u}(y)(1-\rho)]^{\frac{1}{1-\rho}} \frac{1}{\left(1+\beta^{\frac{1}{\rho}}\left(\delta+\delta^2\right)\right)^{\frac{1}{1-\rho}}} \\ c_1^0 &= c_2^0 = \beta^{\frac{1}{\rho}} c_1^0 = \overline{c}^0 \end{aligned}$$

In period 1 however the client's preferences change and he now wants to exchange his existing consumption stream or cashflow (c_1^0, c_2^0) for a new one. The monopolist in effect 'buys' that cashflow in exchange for a new one (c_1^1, c_2^1) so the lender in effect extends the loan $(c_1^0 - c_1^1)$ in exchange for the repayment $(c_2^0 - c_2^1)$. To maximize surplus the lender chooses

$$\max_{c_1^1,c_2^1} (c_1^0 - c_1^1) + \frac{(c_2^0 - c_2^1)}{(1+r)}$$
$$\text{s.t. } u(c_1^1) + \beta\delta u\left(c_2^1\right) \geq u(c_1^0) + \beta\delta u\left(c_2^0\right) = \overline{u}(c_1^0, c_2^0)$$

Let's denote the optimal choice by $(\widehat{c}_1^1(c_1^0, c_2^0), \widehat{c}_2^1(c_1^0, c_2^0))$.

$$\begin{aligned} \widehat{c}_1^1 &= \frac{\left[\overline{u}(c_1^0, c_2^0)(1-\rho)\right]^{\frac{1}{1-\rho}}}{(1+\beta^{\frac{1}{\rho}}\delta)^{\frac{1}{1-\rho}}} \\ \widehat{c}_2^1 &= \beta^{\frac{1}{\rho}} \widehat{c}_1^1 \end{aligned}$$

Note that since the FOC must be satisfied we will always have $u'(\widehat{c}_1^1) = \beta u'(\widehat{c}_2^1)$ which for the CRRA case implies

$$\widehat{c}_2^1(c_1^0, c_2^0) = \beta^{\frac{1}{\rho}} \widehat{c}_1^1(c_1^0, c_2^0)$$

By refinancing the lender stands to earn a surplus:

$$g(c_1^0, c_2^0) = (c_1^0 - \widehat{c}_1^1(c_1^0, c_2^0)) + \frac{(c_2^0 - \widehat{c}_2^1(c_1^0, c_2^0))}{(1+r)}$$

The sophisticated client will, in period 0, insist on a renegotiation-proof contract (i.e. that the monopolist have no incentive to renegotiate in period 1). The monopolist's profit maximizing renegotiation-proof contract is given by $\left(c_0^{r0}, c_1^{r0}, c_2^{r0}\right)$:

$$\begin{aligned}
&\max_{c_0^0, c_1^0, c_2^0} \quad \left(y - c_0^{r0}\right) + \frac{\left(y - c_1^{r0}\right)}{(1+r)} + \frac{\left(y - c_2^{r0}\right)}{(1+r)^2} \\
&\text{s.t. } u(c_1^{r0}) + \beta\left[\delta u\left(c_1^{r0}\right) + \delta^2 u\left(c_2^{r0}\right)\right] \geq \overline{u}(y) \\
&g(c_1^{r0}, c_2^{r0}) \leq H
\end{aligned}$$

The FOC can be written as (we are using $\delta = 1/(1+r)$):

$$\begin{aligned}
u'(c_0^{r0}) &= (1/\lambda_p) \\
\beta u'(c_1^{r0}) &= (1/\lambda_p) + (\lambda_g/\lambda_p)(1+r)g_1 \\
\beta u'(c_2^{r0}) &= (1/\lambda_p) + (\lambda_g/\lambda_p)(1+r)^2 g_2
\end{aligned}$$

.3 Proof that APR Falls in a Renegotiation-Proof Contract

Under the original full commitment contract $(c_0, \overline{c}, \overline{c})$ the APR is given by the i^* that solves

$$c_0 = \frac{\overline{c}}{(1+i^*)} + \frac{\overline{c}}{(1+i^*)^2} = \frac{(2+i^*)}{(1+i^*)}\overline{c}$$

When the contract is renegotiated the initial loan c_0 remains the same but period 1 and period 2 consumption change, and we further know that $u'(c_1^r) = \beta u'(c_2^r)$ which for the CRRA case implies $c_2^r = \beta^{\frac{1}{\rho}} c_1^r$. Note also that if $\beta < 0$ then $\beta^{\frac{1}{\rho}} < 0$ for all $\rho > 0$. The APR for the renegotiated contract is the i^{**} that solves

$$c_0 = \frac{(1 + \beta^{\frac{1}{\rho}} + i^{**})}{(1+i^{**})} c_1^r$$

So we have

$$\frac{(2+i^*)}{(1+i^*)}\overline{c} = c_0 = \frac{(1+\beta^{\frac{1}{\rho}}+i^{**})}{(1+i^{**})}c_1^r$$

Since $\beta^{\frac{1}{\rho}} < 0$ it must also be true that

$$\frac{(2+i^*)}{(1+i^*)}\overline{c} > \frac{(1+\beta^{\frac{1}{\rho}}+i^*)}{(1+i^*)}\overline{c}$$

We also know that

$$\frac{(2+r)}{(1+r)}\overline{c} > \frac{(1+\beta^{\frac{1}{\rho}}+r)}{(1+r)}c_1^r$$

where r is the opportunity cost of funds to the monopolist. This inequality must be true since the monopolist extracts surplus from the renegotiation. From this it follows that

$$\frac{(2+i^*)}{(1+i^*)}\overline{c} > \frac{(1+\beta^{\frac{1}{\rho}}+i^*)}{(1+i^*)}c_1^r$$

Putting these together we get

$$\frac{(1+\beta^{\frac{1}{\rho}}+i^{**})}{(1+i^{**})}c_1^r = \frac{(2+i^*)}{(1+i^*)}\overline{c} > \frac{(1+\beta^{\frac{1}{\rho}}+i^*)}{(1+i^*)}c_1^r$$

from which we can prove that $i^{**} < i^*$ by showing that

$$\frac{(1+\beta^{\frac{1}{\rho}}+i^*)}{(1+i^*)}$$

is monotonically non-increasing (since $\beta^{\frac{1}{\rho}} > 0$) for all $i > 0$.

References

[1] Armstrong, Mark and John Vickers. 2012. "Consumer Protection and Contingent Charges." *Journal of Economic Literature*, 50(2), 477-93.

[2] Ashraf, Nava, Dean S. Karlan, and Wesley Yin. 2006. "Tying Odysseus to the Mast: Evidence from a Commitment Savings Product in the Philippines." *Quarterly Journal of Economics,* 121(2): 635-672.

[3] Banerjee, Abhijit and Esther Duflo. 2011. Poor Economics. New York: PublicAffairs.

[4] Basu, Karna. 2011. "Hyperbolic Discounting and the Sustainability of Rotational Savings Arrangements." *American Economic Journal: Microeconomics*, 3(4), 143-71.

[5] Basu, Karna. 2012. "Commitment Savings in Informal Banking Markets." Working Paper.

[6] Besley, Timothy and Maitreesh Ghatak. 2005. "Competition and Incentives with Motivated Agents." *American Economic Review*, 95(3), 616-36.

[7] Bond, Philip; David K Musto and Bilge Yilmaz. 2009. "Predatory Mortgage Lending." *Journal of Financial Economics*, 94(3), 412-27.

[8] Bryan, Gharad, Dean S. Karlan, and Scott Nelson. 2010. "Commitment Devices." *Annual Review of Economics*, 2, 671-698.

[9] Bubb, Ryan and Alex Kaufman. 2013. "Consumer Biases and Firm Ownership." *Journal of Public Economics*, 105, 39-57.

[10] Carrillo, Juan D. and Mathias Dewatripont. 2008. "Promises, Promises." *Economic Journal*, 118(531), 1453-73.

[11] Conning, Jonathan and Jonathan Morduch. 2011. "Microfinance and Social Investment." *Annual Review of Financial Economics*, 3(1), forthcoming.

[12] Dellavigna, S. and U. Malmendier. 2004. "Contract Design and Self-Control: Theory and Evidence." *Quarterly Journal of Economics*, 119(2), 353.

[13] Demyanyk, Y. and O. Van Hemert. 2009. "Understanding the Subprime Mortgage Crisis." *Review of Financial Studies*, 24(6), 1848-80.

[14] Dewatripont, M. and Jean Tirole. 1994. The Prudential Regulation of Banks. Cambridge, Mass.: MIT Press.

[15] Fischer, Greg and Maitreesh Ghatak.. 2010. "Repayment Frequency in Microfinance Contracts with Present-Biased Borrowers." Economic Organisation and Public Policy Discussion Papers Series, 21.

[16] Gabaix, X. and D. Laibson. 2006. "Shrouded Attributes, Consumer Myopia, and Information Suppression in Competitive Markets." *Quarterly Journal of Economics*, 121(2), 505-40.

[17] Glaeser, Edward L. and Andrei Shleifer. 2001. "Not-for-Profit Entrepreneurs," *Journal of Public Economics*, 99-115.

[18] Gottlieb, Daniel. 2008. "Competition over Time-Inconsistent Consumers." *Journal of Public Economic Theory*, 10(4), 673-84.

[19] Gul, Faruk and Wolfgang Pesendorfer. 2001. "Temptation and Self-Control." *Econometrica*, 69(6), 1403-35.

[20] Hansmann, Henry. 1996. The Ownership of Enterprise. Cambridge and London: Harvard University Press, Belknap Press.

[21] Hansmann, Henry B. 1980. "The Role of Nonprofit Enterprise." *Yale Law Journal*, 89(5), 835-901.

[22] Heidhues, Paul and Botond Kőszegi. 2010. "Exploiting Naïvete About Self-Control in the Credit Market." *American Economic Review*, 100(5), 2279-303.

[23] Laibson, David. 1997. "Golden Eggs and Hyperbolic Discounting." *The Quarterly Journal of Economics*, 112(2): 443-477.

[24] Mcintosh, Craig and Bruce Wydick. 2005. "Competition and Microfinance." *Journal of Development Economics*, 78(2), 271-98.

[25] Mendez, Rodrigue. 2012. "Predatory Lending: A Model of Behavioral Pricing." Paris School of Economics working paper.

[26] Nakajima, Makoto. 2011. "Rising Indebtedness and Temptation: A Welfare Analysis," Federal Reserve Bank of Philadelphia.

[27] O'donoghue, Ted and Matthew Rabin. 1999. "Doing It Now or Later." *American Economic Review*, 103-24.

[28] O'donoghue and Matthew Rabin. 1999. "Incentives for Procrastinators." *Quarterly Journal of Economics*, 114(3), 796-816.

[29] O'donoghue, Ted and Matthew Rabin. 2001. "Choice and Procrastination." *Quarterly Journal of Economics*, 116(1), 121-60.

[30] Rasmusen, Eric. 1988. "Mutual Banks and Stock Banks." *Journal of Law and Economics*, 31(2), 395-421.

[31] Rhyne. 2010. "On Microfinance: Who's to Blame for the Crisis in Andhra Pradesh?" *The Huffington Post*.

[32] Spiegler, R. 2011. Bounded Rationality and Industrial Organization. Oxford University Press.

[33] Willis, Lauren E. 2008. "Against Financial Literacy Education," Paper 208, University of Pennsylvania Law School.