Consumer Exploitation and Notice Periods

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Abstract

Firms often set long notice periods when consumers cancel a contract, and sometimes do so even when the costs of changing or canceling the contract are small. We investigate a model in which a firm offers a contract to consumers who may procrastinate canceling it due to naive present-bias. We show that the firm may set a long notice period to exploit naive consumers.

JEL Codes: D04, D18, D21, D40, D90, L51

Keywords: notice periods, procrastination, present bias, time inconsistency, consumer naivete

1 Introduction

Subscriptions to services and products such as Internet access and services, cell-phone contracts, and electricity contracts often come with long notice periods, despite a small cost for firms to adjust their provision. Several countries regulate the maximum length of notice periods.[1] Furthermore, Austria has recently reduced the maximum notice period for cell-phone contracts from three to one month.[2]

Building upon models with naive present-biased consumers (O'Donoghue and Rabin 1999a, O'Donoghue and Rabin 1999b), we show that firms have an incentive to set a long notice period to exploit such consumers. Intuitively, long notice periods put the effective date of a consumer's cancellation in the distant future, thereby reducing the perceived benefit of the cancellation for time-inconsistent consumers and making them procrastinate the cancellation. Our result indicates

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[1] For example, in Germany, any kind of subscription (except for insurance policies) cannot have a notice period exceeding three months. See `https://www.gesetze-im-internet.de/bgb/__309.html` (accessed May 10th, 2018).

[2] See, e.g., `https://www.arbeiterkammer.at/beratung/konsument/HandyundInternet/Handy/AK-Erfolg_T-Mobile_verkuerzt_Kuendigungsfrist.html` (accessed May 10th, 2018).

a sharp implication with regard to consumer protection policy: when adjustment costs of contracts would be negligible, a contract with a long notice period for cancellation could be exploitative.

This paper contributes to the literature on behavioral industrial organization which studies how firms may exploit naive and time-inconsistent consumers (DellaVigna and Malmendier 2004, Heidhues and Kőszegi 2010). In particular, we complement the literature on optimal regulations for subscriptions and automatic contract renewals (Murooka and Schwarz 2018, Johnen 2017) by explicitly analyzing the length of notice periods.[3]

2 Model

Time is infinite and discrete: $t = 0, 1, 2, \cdots$. A risk-neutral firm with a discount factor $\delta \in (0, 1)$ offers a service contract (e.g., Internet connection or data roaming of cell phones) to a measure one of risk-neutral consumers. The firm's marginal cost of providing the service is $c > 0$. The firm offers a two-part tariff contract: $f \geq 0$ is a sign-up fee charged in $t = 0$ and $p \geq 0$ is a per-period fee for the service charged in each $t \geq 1$.[4] The firm also sets the length of a notice period for canceling the service contract $s \in \mathbb{N}_0$, where $s = 0$ means that a contract can be canceled immediately and $s \geq 1$ means that a contract will be canceled in s period(s) after a cancellation application.

In $t = 0$, consumers may sign a contract. In $t = 1$, all consumers who have signed a contract receive a benefit $v_1 > c$. Then, a fraction $1 - q$ of consumers learn that they no longer need the service: with probability $1 - q$ they realize that their consumption value of the service in $t \geq 2$ is $\underline{v} < c$, whereas with probability q, they realize that their consumption value of the service in $t \geq 2$ is $\overline{v} > c$.[5] We denote by $v_e = q\overline{v} + (1 - q)\underline{v}$. At the end of each period, consumers can apply to cancel the contract (effective in $s \geq 0$ periods) at a switching cost $k > 0$. The consumer's reservation utility of not taking up a contract is assumed to be zero. We also assume that the switching cost does not make cancellation inefficient for time-consistent consumers: $k < \frac{\delta}{1-\delta}(c - \underline{v})$.

Figure 1 displays the timeline. We characterize the optimal contract with a focus on stationary pure-strategy equilibria (i.e., given each state of the realization, consumers' plan for the cancellation decision and its action are identical across periods).

[3] For the effects of cancellation terms, deadlines, and commitments, see also O'Donoghue and Rabin (1999b), Ariely and Wertenbroch (2002), DellaVigna and Malmendier (2004), Herweg and Müller (2011), Inderst and Ottaviani (2013), Christensen and Nafziger (2016), and Ericson (2016).

[4] The non-negative constraint on the per-period fee is not binding in equilibrium. Following the idea that firms may be unable to profitably set overly low prices in practice (Heidhues, Kőszegi and Murooka 2017), we assume that there is a non-negative constraint on the initial sign-up fee.

[5] One interpretation is that the service is an experience good: a fraction q of consumers find that they like the service and would like to keep using it, whereas a fraction $1 - q$ of consumers realize that they do not like it. Another interpretation is that an alternative service will be launched after $t = 1$ and some consumers will prefer to switch the service. All of the following results are qualitatively robust when the timing of the shock on the consumption value of the service differs across customers.

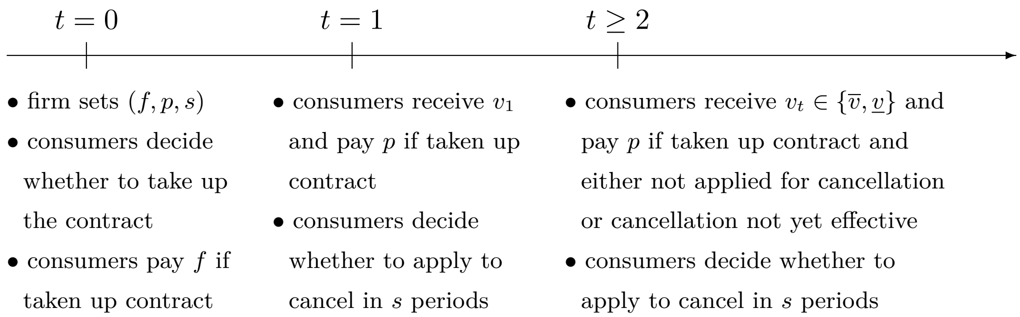

Figure 1: Timeline of the model.

3 Analysis

3.1 Benchmark: Time-Consistent Consumers

We first investigate the case in which consumers are time consistent: in t, they choose their action based on $\sum_{\tau=t}^{\infty} \delta^{\tau-t} u_\tau$ where u_τ is their instantaneous period-τ utility.

By the assumption of $\overline{v} > c$, it is straightforward that in the optimal contract consumers do not cancel if the realization is $\overline{v}$. Given that $\underline{v}$ is realized, time-consistent consumers cancel in $t = 1$ if and only if the benefits until the cancellation minus the direct switching cost is greater than subscribing the contract forever, i.e., $-k + \sum_{t=1}^{s} \delta^t (\underline{v} - p) > \sum_{t=1}^{\infty} \delta^t (\underline{v} - p)$.[6] Note that this condition is simplified to $p > \underline{v} + \frac{1-\delta}{\delta^{s+1}} k$.

Suppose first that $p > \underline{v} + \frac{1-\delta}{\delta^{s+1}} k$. Because the consumers cancel the service if the realization is $\underline{v}$, they take up a contract in $t = 0$ if and only if

$$-f + \delta(v_1 - p) + q \sum_{t=2}^{\infty} \delta^t (\overline{v} - p) + (1 - q) \left[-\delta k + \sum_{t=2}^{s+1} \delta^t (\underline{v} - p) \right] \geq 0. \tag{IR-C}$$

The firm's profit-maximization problem in this case is:

$$\max_{f \in \mathbb{R},\, p \in \mathbb{R},\, ,s \in \mathbb{N}_0} \pi^C = f + \delta(p - c) + q \sum_{t=2}^{\infty} \delta^t (p - c) + (1 - q) \sum_{t=2}^{s+1} \delta^t (p - c) \quad \text{s.t. (IR-C).}$$

Substituting (IR-C) with equality into the objective function yields

$$\delta \left\{ v_1 - c + q \sum_{t=1}^{\infty} \delta^t (\overline{v} - c) - (1 - q) \left[k + \sum_{t=1}^{s} \delta^t (c - \underline{v}) \right] \right\}.$$

Since $\underline{v} < c$, the firm sets $s = 0$. There are multiple optimal pricing schemes in which $\frac{f}{\delta} + \frac{1-\delta+q\delta}{1-\delta} p = v_1 + q \frac{\delta}{1-\delta} \overline{v} - (1 - q)k$. The firm's profits in this case are $\delta \left[v_1 - c + q \frac{\delta}{1-\delta} (\overline{v} - c) - (1 - q)k \right]$.

Suppose second that $p \leq \underline{v} + \frac{1-\delta}{\delta^{s+1}} k$. In this case, the consumers do not cancel the service. When $k < \frac{\delta}{1-\delta} (c - \underline{v})$, however, the profits of the contract in which consumers will immediately cancel the service upon low realization are higher:

[6] As conventionally, we define $\sum_{t=k}^{s} x_t = 0$ for any $x_t \in \mathbb{R}$ and $s < k$.

Proposition 1. *Suppose that consumers are time consistent. In the optimal contract, there is no notice period:* $s^* = 0$.

Intuitively, the firm extracts all of the social surplus by using a two-part tariff. Because setting a notice period yields an efficiency loss due to $\underline{v} < c$, the firm will set no notice period.

3.2 Naive Time-Inconsistent Consumers

We now investigate our main case in which consumers face self-control problems and are naive about own future self-control problems (O'Donoghue and Rabin 1999a, O'Donoghue and Rabin 1999b). Formally, in period t, they choose their action based on $u_t + \sum_{\tau=t+1}^{\infty} \beta\delta^{\tau-t} u_\tau$ where $\beta \in (0,1)$. Further, these present-biased consumers are naive about their future self-control problems: they believe that they will behave as if they were time consistent in any future period.[7]

We solve the game by backward induction. By the assumption of $\overline{v} > c$, it is straightforward that in any optimal contract consumers do not cancel if the realization is $\overline{v}$. Suppose that $\underline{v}$ is realized. As in Section 3.1, if consumers do not cancel the service now, they (erroneously) think that they will do it in the next period if and only if $p > \underline{v} + \frac{1-\delta}{\delta^{s+1}} k$.

We first characterize the case in which consumers procrastinate canceling the service when $\underline{v}$ is realized. Suppose that $p > \underline{v} + \frac{1-\delta}{\delta^{s+1}} k$. In each period, consumers prefer to cancel the service in the next period rather than to cancel it now if

$$-k + \sum_{t=1}^{s} \beta\delta^t (\underline{v} - p) \leq -\beta\delta k + \sum_{t=1}^{s+1} \beta\delta^t (\underline{v} - p) \quad \Longleftrightarrow \quad p \leq \underline{v} + \frac{1-\beta\delta}{\beta\delta^{s+1}} k. \tag{1}$$

Because the consumers (erroneously) think that they will apply to cancel the service in $t = 1$ if the realization is $\underline{v}$, they take up a contract in $t = 0$ if and only if

$$-f + \beta\delta(v_1 - p) + q \sum_{t=2}^{\infty} \beta\delta^t (\overline{v} - p) + (1-q) \left[-\beta\delta k + \sum_{t=2}^{s+1} \beta\delta^t (\underline{v} - p) \right] \geq 0. \tag{IR-P}$$

The firm's profit-maximization problem in this case is

$$\max_{f \geq 0,\, p \geq 0,\, s \in \mathbb{N}_0} \pi^P = f + \sum_{t=1}^{\infty} \delta^t (p - c) \quad \text{s.t. (1) and (IR-P).}$$

Suppose for now that $s \in \mathbb{R}$. In the optimal contract, (IR-P) binds; otherwise, the firm could increase f without violating any constraint. Also, (1) binds; otherwise, the firm could increase s — which relaxes (IR-P) — and hence could simultaneously increase f. Thus, (1) pins down s^* as a function of p. Solving (1) for δ^{s+1} and plugging it into (IR-P) pins down f^* as a function of p. By plugging this into the profit function, we can confirm that the profits are increasing in p and hence $f^* = 0$ by (IR-P). Therefore, given $s^* \in \mathbb{R}$, $f^* = 0$ and

$$p^* = (1-\delta)v_1 + \delta v_e + (1-q)\frac{1-\beta}{\beta} k.$$

[7] Analysis under more general time-inconsistent preferences is available upon request.

Note that p^* pins down $s^* \in \mathbb{R}_+$ as follows:

$$s^* = \max\left\{\log\left(\frac{(1-\beta\delta)k}{\beta\delta(1-\delta)v_1 + \beta\delta^2 v_e - \beta\delta\underline{v} + \delta(1-q)(1-\beta)k}\right)/\log(\delta),\ 0\right\}. \tag{2}$$

For expositional simplicity, in what follows we focus on parameters where s^* in (2) takes an integer value.[8]

It can be shown that the above procrastination case constitutes an optimal contract if $\beta < \frac{k}{\delta(c-\underline{v})}$.[9] Proposition 2 summarizes the result:

Proposition 2. *Suppose that consumers are naive present-biased, $s^* \in \mathbb{Z}$, and $\beta < \frac{k}{\delta(c-\underline{v})}$. In the optimal contract, the notice period length is characterized by* (2).

Proposition 2 demonstrates that the optimal notice period length s^* can be positive and arbitrarily large. Intuitively, the firm has an incentive to set high p^* and low f^* for two reasons: these consumers discount future payments more than the firm does and also (erroneously) expect to cancel the service after a realization of a low value.

Last but not least, we discuss the effect of notice-period regulations on consumer welfare.[10] Note that consumers never cancel the contract in Proposition 2 independent of the length of the notice period. Due to the binding constraint (1), regulating the maximum notice period length can reduce the per-period fee p^*, and the increase in f^* would only partially compensate the reduction of the per-period fee. Hence, consumer welfare increases if the regulation decreases the notice period length in the optimal contract:

Corollary 1. *Suppose that consumers are naive present-biased and $s^* \in \mathbb{Z}$. A policy that enforces a maximum notice period to $\overline{s} \in [0, s^*)$ weakly increases consumer welfare. If $\beta < \frac{k}{\delta(c-\underline{v})}$, then the policy strictly increases consumer welfare.*

Corollary 1 implies that in the absence of high adjustment costs for firms, prohibiting long notice periods could mitigate consumer exploitation due to procrastination and hence could improve consumer welfare.

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[8] In general, the optimal notice period becomes $\lfloor s^* \rfloor$, where $\lfloor x \rfloor$ is the greatest integer less than or equal to x. The analysis when the above s^* does not take an integer value is available upon request.

[9] Note that $f^* = 0$ also holds in the remaining cases, where consumers' expectations are correct and they either cancel in $t = 1$ or never. The optimal per-period prices in these cases are $\frac{(1-\delta)[v_1-(1-q)k]+q\delta\overline{v}}{1-\delta+q\delta}$ and $(1-\delta)v_1 + \delta v_e$, respectively. If $\beta < \frac{k}{\delta(c-\underline{v})}$, the profits in these cases are lower than $\pi^P = \delta\left[v_1 - c + \frac{\delta}{1-\delta}(v_e - c) + (1-q)\frac{1-\beta}{(1-\delta)\beta}k\right]$.

[10] Here, we evaluate consumer welfare based on the consumers' long-run utility, i.e., $\sum_{t=0}^{\infty}\delta^t u_t$.

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