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PROCRASTINATION AND COMPETITION FAILURE

Peter Andre
Paul Heidhues
Botond Kőszegi
Takeshi Murooka

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The Institute of Social and Economic Research
The University of Osaka
6-1 Mihogaoka, Ibaraki, Osaka 567-0047, Japan

Procrastination and Competition Failure[*]

Peter Andre
SAFE, Goethe University

Paul Heidhues
DICE, Heinrich Heine Universität Düsseldorf

Botond Kőszegi
University of Bonn

Takeshi Murooka
University of Osaka

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Abstract

We develop a model of price competition with procrastinating consumers in which market discipline is supposed to arise from both the initial selection of providers and the possibility of switching providers. As in other theories, consumers may forego large gains by sticking with their initially chosen offer, so competition at the switching stage is weak. Unlike in other theories, consumers — who falsely expect to switch soon — may also fail to select the best starting offer, so competition at the initial stage is weak as well. This mechanism can translate temporary product differentiation into permanently high prices, greatly enhance the price effect of persistent differentiation, or generate high markups even with perfect substitutes. Reflecting the same mechanism, sign-up deals do not serve their classically hypothesized role of returning ex-post profits to consumers, but instead often exacerbate the failure of price competition. We complement our analysis with a tailored survey of consumers, confirming the logic of procrastination underlying our model. Consumer procrastination thus emerges as a novel source of competition failure that applies where other theories do not, helping to explain high average prices in many markets with switching costs.

Keywords: procrastination, price competition, competition failure, switching, subscription markets, present bias
JEL Codes: L11, L13, D11, D41, D43, D91

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1 Introduction

A large literature starting from Akerlof (1991) recognizes that procrastination — the repeated postponement of planned beneficial tasks — is common among individuals and often severely harmful to their welfare. Such behavior is consistent with a central stylized fact about markets with switching costs, that many consumers stay on unfavorable terms for extended periods (Handel, 2013, Hortaçsu et al., 2017, Kiss, 2019, Galenianos and Gavazza, 2022, Gravert, 2025). Motivated by these observations, our paper embeds procrastinating consumers in a standard switching-cost framework, and studies the implications for market equilibrium. We find that procrastination impedes competition at all stages of a contract, helping to explain the high average markups observed in many of the markets at hand (Ausubel, 1991, Starc, 2014, Competition & Markets Authority, 2016a, Ho et al., 2017, Galenianos and Gavazza, 2022).

Our main prediction emerges because in our model, competition from switching opportunities both works poorly and undermines competition at the initial contracting stage. Paralleling previous research, we predict that consumers often fail to switch to better options after signing up, so at that ex-post stage competition is soft (e.g., DellaVigna and Malmendier, 2004, Farrell and Klemperer, 2007). Existing theories, however, imply that weak switching competition is alleviated by stronger competition when consumers make their initial provider choices, and average prices may remain unchanged or even decrease (Taylor, 2003, Cabral, 2016, Ericson, 2020). By contrast, our model predicts that competition is weak at the beginning as well — precisely because options to switch to will be available. Intuitively, since consumers falsely expect to switch soon, they are insensitive to long-run aspects of an offer that ultimately matter a lot; and since consumers underrespond to improvements in an offer, firms have little incentive to compete. With linear prices, this mechanism can seal temporary differences between products into permanently high prices. With introductory deals, it can greatly amplify the price effect of product differences and lead to positive markups even with perfect substitutes. Thereby, consumer procrastination not only leads to costly mistakes conditional on available offers, but also worsens offers, further lowering procrastinators' welfare.

Motivating Evidence We start in Section 2 with motivating evidence. We briefly describe previous findings consistent with procrastination, and then present a new survey of U.S. consumers tailored to our theory. We ask consumers which internet, mobile, video streaming, or audio streaming contracts they hold and which they plan to switch away from in the next two months. Two months later, we recontact consumers and take stock.

Two patterns stand out. First, in line with procrastination, fewer than half of planned switches — 39% — are carried out. Second, despite their later failure to switch, many procrastinating consumers also fail to take initial offers that would lower the prices they pay. Most would decline a low-cost service that ensures immediate switching with no effort cost, which only makes sense if they expect to switch themselves later. Similarly, many would opt for a more expensive provider offering an initial rebate over a provider with a cheaper regular price. They explain that they would do so because they expect to switch after the discount ends, despite their history of procrastination. These patterns illustrate what we will identify as the central mechanism of our model: procrastinating consumers underrespond to better initial offers for non-switchers because they mistakenly expect to switch in the future.

Model Setup We present our basic model, a variant of standard models of markets with switching costs, in Section 3. Consumers need a service from time 0 to infinity, and pay for it per unit of time. At time 0, consumers choose between firms 0 and 1, which are temporarily or permanently differentiated with a Hotelling parameter (transport cost) of d. The two initial firms have a production cost of zero, discount at rate r, and commit to constant flow prices. At evenly spaced points in time, a consumer can pay an immediate cost of s to switch to one of two alternative offers, each of which has price p^s and is a perfect substitute for an initial offer.

Crucially, we consider not only classical time-consistent consumers, but also procrastinating consumers, whom we model using the now standard framework of naive present bias. Both types discount at rate r, but naively present-biased consumers apply an additional discount factor $\beta < 1$ to delayed outcomes, while believing that their future selves will not. We investigate symmetric pure-strategy Nash equilibria of the game played between the firms, assuming that they correctly understand consumer behavior. We focus mainly on the empirically relevant equilibria in which consumers do not switch, and we discuss only this case in the introduction.

Our model captures the competitive landscape of many markets with switching costs. For instance, consumers subscribing to a service such as internet or mobile typically choose from a limited set of providers, but later have many opportunities to switch to a competitor. Similarly, consumers planning a credit-card purchase must choose a card for the transaction, but can later transfer their balance to another card, or repay their loan. In most cases, there is some differentiation between the initial offers — either temporary, as when local marketing or existing infrastructure makes one service faster to begin using, or permanent, as when two providers offer different ongoing perks.

Competition Failure We analyze our model in Section 4, starting with two points that set up our main results. First, we show — mirroring previous work — that procrastinating consumers may forego large benefits by failing to switch. Formally, consider the highest price for which a consumer stays with the initial firm, p^{stay}. At this threshold, a time-consistent consumer's discounted benefit from switching equals the switching cost, but a present-biased consumer's discounted benefit (including discounting by β) can far exceed it. Still, the latter consumer does not switch because she procrastinates, perpetually thinking that she will act next time.

Second, we note two benchmarks. With switching competition but no initial competition — i.e., a single firm offering both goods at the initial stage — the price equals the stay threshold p^{stay}. Since p^{stay} is higher for present-biased consumers, procrastination impedes switching competition, but its effect is equivalent to that of a high switching cost that yields the same p^{stay}. Conversely, with only initial competition but no switching opportunities, standard Hotelling logic applies. Hence, consumers pay a price equal to the (r-discounted) average differentiation, $\overline{d}$, irrespective of whether they are time-consistent or present-biased.

Our main case of interest, however, is when both initial and switching competition are operational. Then, procrastination has qualitatively different implications from high switching costs. In particular, suppose that differentiation is temporary (which implies $d > \overline{d}$), and the stay threshold is relatively high ($p^{\text{stay}} > \overline{d}$), so that switching competition is weaker than initial competition. Not only is this more likely for present-biased than for time-consistent consumers, but the consequences are more severe. Time-consistent consumers correctly respond to average product differences, so initial competition sets the price at $\overline{d}$, and switching competition is not harmful. But with present-biased consumers, a competition paradox can arise, wherein the price exceeds $\overline{d}$, so switching competition *is* harmful. Intuitively, consumers' expectation to switch induces them to focus on short-run product differences, allowing the initial firms to charge a high price ($\min\{d, p^{\text{stay}}\}$, which is higher than $\overline{d}$). Consumers' failure to switch, in turn, makes the high price permanent.

We show that competition failure can keep occurring even when standard logic would imply extreme competition. Specifically, prices remain bounded away from the competitive level if differentiation becomes short-lived and thereby products approach perfect substitutes, while a switching opportunity arises quickly. In some cases, this high-price equilibrium is unique; in others, a low-price equilibrium also exists. In the latter case, consumers expect not to switch, and — evaluating products from a long-run perspective — are price-sensitive, forcing firms to compete.

A good empirical example for our model is the credit-card market of the 1980s, which was characterized by high prices despite essentially free entry and thousands of firms (Ausubel, 1991). According to our competition-paradox account, consumers expected to transfer or repay their balance after a short period, so they responded more to pre-approved mailers and other short-lived differences than to interest rates. This weakened competition in interest rates, which in fact applied long-term due to consumers' failure to switch.

The model's logic also implies that policy levers focused on the switching stage have ambiguous effects. Lowering the switching cost s or alternative price p^s strengthens switching competition, and thus always benefits time-consistent consumers. But the same intervention can make present-biased consumers more optimistic about switching and thus more short-sighted at sign-up — potentially eliminating the low-price equilibrium while leaving the high-price equilibrium intact. Increasing the frequency of alternative offers can further raise prices by intensifying procrastination. These predictions help to explain the puzzle that seemingly pro-competitive interventions often fail to deliver lower prices in practice.

While intuition and conventional wisdom suggest that introductory deals help restore competition, we demonstrate the opposite. Leaving other assumptions unchanged, we suppose that each initial firm chooses an introductory price p^1, a period B for which p^1 applies, and a post-introductory price p^2. Counterfactually, a firm selling to time-consistent consumers does not strictly prefer to offer a promotion (where $p^1 < p^2$). Consistent with observed practice, however, present-biased consumers receive a free but possibly very short introductory period ($p^1 = 0$ and low B), as well as a post-introductory price equal to the stay threshold ($p^2 = p^{\text{stay}}$). This means that the post-introductory price can be even higher than without introductory deals (the case above), while the introductory period is too short to compensate consumers. Intuitively, consumers falsely expect to switch, so they are completely insensitive to p^2 and only partially sensitive to B. The former arises because a consumer does not think she will ever pay p^2. More subtly, the latter arises because a consumer perceives a longer promotion partly as just a delay in having to pay the switching cost, and not as a price cut.

Calibrating the model using estimates of present bias by Laibson et al. (forthcoming) and assuming switching opportunities arise once per year yields an average markup that is roughly 90 times as high as with time-consistent consumers, or as differentiation would suggest. The effect on mark-ups is smaller when the long-run discount rate r is high, but even higher when switching opportunities are more frequent. This helps to explain why credit cards remained expensive after the introduction of teaser deals (Galenianos and Gavazza, 2022).

Extensions In Section 5, we consider a few variants of our model with introductory periods, showing robustness and making additional points. We first allow consumers' switching options to be endogenously chosen by competing firms. Then, consumers expect to but fail to switch between introductory deals, and our insight regarding competition failure remains essentially unchanged.

We also consider non-exclusive contracting with the possibility of cancellation, such as when consumers sign up for two streaming services. To make our point most sharply, we assume that marginal costs are positive, products are perfect substitutes ($d = 0$), and the marginal value of a second service is below cost. We show that present bias can turn the market from perfectly competitive to essentially monopolistic. If consumers are time-consistent, they realize that only one service is worth buying, so firms compete aggressively for their business. But if consumers are present-biased, they sign up for both deals expecting but failing to cancel one, so firms do not compete at all.

Competition can fail even when initial firms offer unconditional cash bonuses. In a non-competitive equilibrium, consumers expect to switch and take advantage of both bonuses, ending up with their favorite product. As a result, they are prone to starting with, and (due to procrastination) staying with, their non-favorite product irrespective of which bonus is higher. This implies both that bonuses are small and that consumers are inefficiently matched to firms.

Finally, we argue in Section 6 that the mechanisms limiting competition are robust to alternative psychological assumptions behind procrastination. If the consumer is partially rather than fully naive as modeled by O'Donoghue and Rabin (2001), then prices often remain unchanged. And procrastination due to underestimation of future switching costs (e.g., Tasoff and Letzler, 2014) or overconfidence about memory (e.g., Ericson, 2011) gives rise to the same basic predictions, and may drive additional pricing practices.

We conclude in Section 7 by discussing some tentative policy implications of our results. Our analysis suggests that soft-touch interventions aimed at improving switching behavior may be difficult to implement effectively, and can even backfire. By contrast, active-choice requirements and policies that strengthen competition at the initial stage — such as managed competition or pre-specification of switching preferences — may be more successful.

Related Theoretical Literature Our paper is the first to study the market effects of procrastination in switching, to predict a procrastination-induced competition failure, and to generate a failure of competition in transparent linear prices or sign-up deals for near-homogeneous consumers. In previous models with switching costs, high average or post-introductory prices require that firms cannot commit to future prices when consumers first sign up (e.g., Farrell and Klemperer, 2007); and even if firms cannot commit but can offer different deals to new and existing consumers, initial competition mitigates the lack of effective switching competition (e.g., Taylor, 2003, Cabral, 2016). Our model predicts competition failure at both stages despite commitment to future prices and (with introductory periods) different deals for new customers. Moreover, the mechanisms do not rely on adverse selection (Ausubel, 1991, Ellison, 2005), choice complexity (e.g., Piccione and Spiegler, 2012, Spiegler, 2016), or other previously identified limits to competition.[1]

The above differences mean that our model can explain high prices in some important environments where previous accounts do not apply. For credit cards and utilities, for instance, firms compete on sign-up deals, yet maintain high average margins. Why does a firm not compete more fiercely by extending its introductory deal for longer? Since firms already commit to prices well beyond the introductory period, the classical literature on switching costs predicated on the inability to commit completely fails to provide an explanation. Since there is no obvious reason for profitable consumers to be relatively unresponsive to an extended deal, and there is evidence of advantageous selection in the credit-card market (Ausubel, 1999, Agarwal et al., 2010), models of adverse selection also have questionable applicability. And since consumers are likely to understand that a longer introductory period is better, theories based on choice complexity do not work either.

Starting with O'Donoghue and Rabin (1999a), a large literature has explored the implications of naive present bias. Many papers focus on the implications for individual decisionmaking, but do not study market settings at all. In particular, the starting point of our analysis, that naive present bias induces procrastination, is well-understood in the literature (e.g., O'Donoghue and Rabin, 1999a,b,c, 2001, 2008). In addition, O'Donoghue and Rabin (1999c) show that falsely expecting to take a better investment option later may induce a person not to take a good option now, leaving her stuck with the worst option. This resembles the logic underlying consumer behavior at the initial stage of our model.

Others have considered the implications of partially or fully naive present bias (e.g., DellaVigna and Malmendier, 2004, Eliaz and Spiegler, 2006, Heidhues and Kőszegi, 2010, Murooka and Schwarz, 2018, Johnen, 2019, Gottlieb and Zhang, 2021), default effects (Ericson, 2020), and hidden prices (e.g., Gabaix and Laibson, 2006, Armstrong and Vickers, 2012) on contracting in some of the same markets motivating our analysis. These models predict high margins ex post, but also increased

[1] Johnen (2020) identifies a completely different limitation on ex-ante competition with naive consumers. If a firm competes aggressively and attracts too many of its rivals' consumers, then the rival may educate them to win them back.

price competition ex ante — with net profits often being zero.

2 Motivating Evidence

We begin with evidence for our model's two key behavioral mechanisms: (1) consumers form plans to switch that go unrealized; and (2) they underrespond to offers that are beneficial for non-switchers.

Previous research provides both direct and indirect evidence for (1). Direct evidence comes from Gravert's (2025) survey experiment on the electricity-contract choices of a large representative sample of the Danish population. Depending on the treatment, 9–36% of consumers plan to switch in the next three months, but only 3–4% do. Indirect evidence comes from a substantial literature documenting failures to switch despite large potential gains. For example, Gravert (2025) estimates that the average household could save €216–€642 annually by switching to the cheapest electricity provider, while Handel (2013) finds that inertia in health-insurance choices costs the average employee $2,032 per year.[2] Rational models can explain such patterns only by assuming implausibly high switching costs (or unrealistically low discount factors or strong product preferences).[3] By contrast, models with procrastination — such as those by O'Donoghue and Rabin (1999b,c, 2001, 2008), DellaVigna and Malmendier (2004), and ours — often predict severely costly procrastination, thus accounting for the evidence with realistic preferences.

We complement the above findings with new survey evidence. We confirm (1) in our sample, and provide evidence for (2). In collaboration with the survey company Prolific, we survey 3,449 U.S. consumers in two waves: May 2025 (Wave 1) and July 2025 (Wave 2). The sample broadly resembles the adult U.S. population in gender, age, income, and region, although it overrepresents college-educated consumers.[4] To conserve space for our theoretical analysis, we keep the discussion concise. Online Appendix B provides full details.

(1) Naive Switching Plans Our first goal is to study whether consumers' switching plans are realistic. In the first wave, respondents list their current subscriptions for four service categories:

[2] For similar findings, see Competition & Markets Authority (2016a), Hortaçsu et al. (2017), and Ito et al. (2023) on energy, Handel and Kolstad (2015) and Polyakova (2016) on health insurance, Shui and Ausubel (2005) and Stango and Zinman (2015) on credit cards, Shcherbakov (2016) on cable/satellite TV, Shy (2002) on mobile-phone subscriptions, and Einav et al. (2025) on canceling subscriptions.

[3] Accordingly, switching-cost estimates that assume rational, time-consistent behavior are often implausibly large. For instance, in Kiss (2019), a switching cost of $373 is necessary to explain Hungarian drivers' failure to switch auto-insurance providers; Galenianos and Gavazza (2022) estimate that borrowers' average cost of examining *one* credit-card offer they receive starts at $200 and is increasing in the number of examined offers; and Andersen et al. (2020) estimate a mortgage-refinancing cost of $1,716.

[4] All results are robust to reweighting and correcting for imbalances along these dimensions (see Appendix B.2).

home internet, mobile-phone service, video streaming, and audio streaming. On average, consumers report 4.8 active contracts: 1 for internet, 1 for mobile service, 2.3 for video streaming, and 0.6 for audio streaming. For nearly half of these contracts, consumers state that they could switch to a cheaper provider offering similar quality or simply cancel and be better off. For simplicity, we refer to both actions as "switching" (to another provider or an outside option). For these contracts, we ask whether consumers plan to switch within the next two months, explicitly instructing them to select "Not sure" if uncertain. Consumers plan to switch 9% of all their contracts. Expected switching is higher for video streaming (12%) and audio streaming (12%) than for internet (6%) and mobile service (6%).

Two months later, in Wave 2, we ask respondents whether they still hold the contracts listed in Wave 1. Comparing answers across waves lets us test whether switching expectations are naive.

Consumers switch only 39% of the contracts they expect to switch (Figure 1). Switching is lowest for internet contracts (18%) and highest for audio streaming contracts (47%), but for all contract types, consumers switch significantly less than they planned.[5]

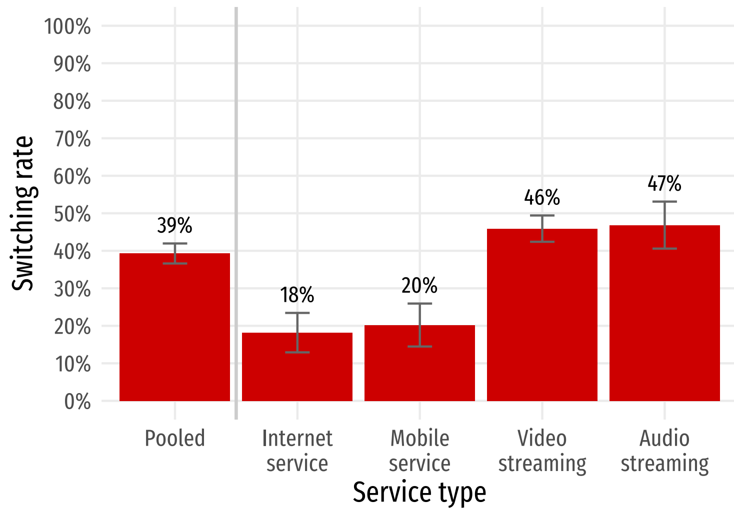
Empirical Result 1 (Naive Switching Plans)**.** *Consumers often do not follow through with their plans to switch in the future.*

(2) Underresponsiveness to Better Offers The second goal of our survey is to investigate the extent to which consumers who plan to but do not switch respond to offers that would lower the prices they pay. Underresponsiveness to such offers would provide confirming evidence that consumers falsely expect to switch, and, crucially, constitutes the key mechanism underlying our competition-failure results. If procrastinating consumers indeed underrespond, however, then firms have little incentive to make beneficial offers, so these may not be observable in equilibrium. Therefore, we study consumers' responsiveness to beneficial offers in two sets of hypothetical scenarios.

(a) Delegating switching. The first set examines consumers' valuations for a switching service. In Wave 1, we ask respondents to imagine an agency to which they can delegate all tasks related to switching a contract. We interpret delegation as eliminating (most of) the switching cost, which allows us to study two related issues.

[5] Here and below, we find similarly low switching rates if we restrict the analysis to respondents who pass all attention indicators, respondents who report above-median potential savings from switching, and responses made early on in the survey, thus less affected by potential survey fatigue or order effects (Appendix Figures B.4 and B.5). Therefore, the results are unlikely to be driven by consumers who may have reported their plans inattentively. Moreover, Wave 2 does not remind respondents of their earlier switching plans, though some might remember. If anything, this could create a desire to appear consistent, biasing our results against finding naive switching expectations.

Figure 1: **Consumers do not switch despite planning to**



Notes: This figure shows the switching rate for contracts which consumers planned to switch. The gray lines indicate 95% confidence intervals with standard errors clustered at the consumer level.

Less importantly, we quantify respondents' switching costs by asking them for the highest fee they would be willing to pay for the service in two months if they planned to switch then. Median valuations are low: \$20 for internet contracts, and even lower for other contract types. This is inconsistent with a model of high switching costs, but consistent with our model.

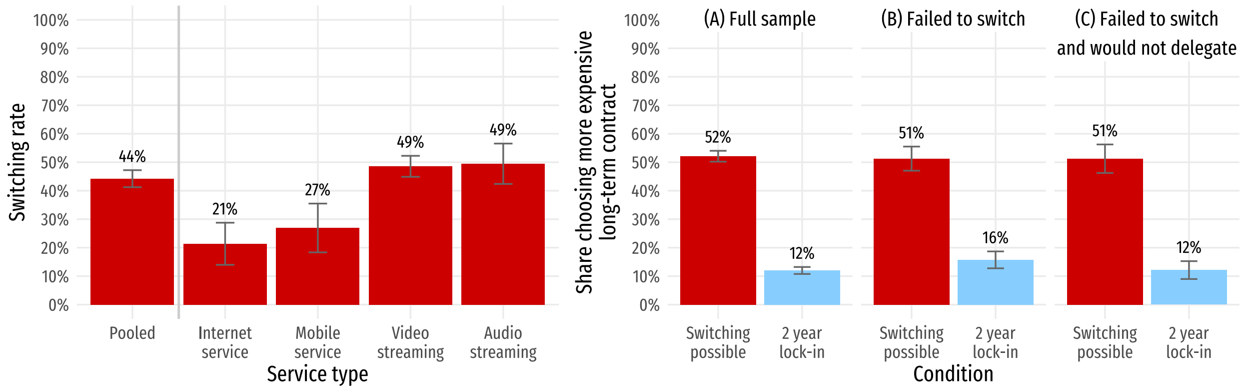
More importantly, we ask whether consumers would take the service *now* at the fee they answered above, plus 20% of the extra savings from switching during the first two months (with the extra fee also payable in two months). Because consumers can keep most of the savings, this offer is beneficial for any consumer who would not switch soon on their own with high probability. Specifically, Appendix B.5 shows that taking the service is better for a consumer unless her actual switching rate is at least 80%. The threshold is even higher if the consumer does not switch immediately on her own, or she dislikes the risk of whether and when she will switch.

Multiple measures show that consumers substantially underrespond to the beneficial offer. First, since the overall switching rate among contracts that consumers expect to switch is 39%, the share of contracts with an actual switching rate of at least 80% cannot be large. Very conservatively, $39/80 \approx 49\%$ is the highest possible share of contracts with an actual switching rate at or above 80%. Hence, consumers should delegate for at least 51% of the contracts they plan to switch. Instead, consumers delegate for only 23%. Second, we can examine the 77% of contracts for which consumers do not delegate. For these, the actual switching rate is far below 80% — only 44% — so consumers would be better off taking the service for all of them rather than for none (Figure

Figure 2: **Underresponsiveness to Better Offers**

(a) Low actual switching rates even when consumers do *not* delegate

(b) Consumers choose initially discounted, ultimately costlier contract



Notes: Panel (a) shows switching rates for contracts that consumers planned to switch but were unwilling to delegate the switching process at an additional cost of 20% of the savings. Panel (b) shows the share of consumers choosing the more expensive contract with an initial discount. Results are reported for two treatment conditions: switching allowed at any time (red bars) and switching allowed only after a two-year lock-in period (blue bars). Column A presents results for the full sample, Column B for consumers who failed to switch at least one contract they had planned to switch, and Column C further restricts the sample to consumers who failed to switch at least one contract they had planned to switch and were unwilling to delegate switching. Gray lines indicate 95% confidence intervals with standard errors clustered at the consumer level.

2a). Finally, when asked to explain their rejection of the service, most consumers say it costs too much or that switching independently is not difficult (Appendix B.4.1) — although our data show that few ultimately carry out the task.

(b) Initial contract choice. The second set of scenarios to study responses to beneficial offers examines whether the anticipation of future switching leads consumers to choose (what can ultimately be) the inferior initial deal. Consumers are asked to imagine that they are moving to a new home and must select a new provider for either home internet, mobile service, video streaming, or audio streaming. They can choose between two providers offering identical service quality. Provider A charges a 33% higher regular price than Provider B, but offers the first three months for free. We randomly vary whether contracts can be canceled at any time or only after a two-year lock-in period. If cancellation is flexible, consumers can sign up with Provider A and switch to Provider B after the discount period. Consumers' attempt to exploit such promotions — and then not switch — is central to our competition-failure results with introductory deals.

We find that 52% choose the initially discounted, ultimately costlier contract when cancellation is possible at any time (Figure 2b). By contrast, only 12% make this choice with a two-year lock-in. This 40-percentage-point difference suggests that many consumers choose the more expensive contract in anticipation of future switching. Consumers' explanations confirm this interpretation:

when switching is possible at any time, 38% of consumers state that they choose the more expensive contract because they will be able to switch after the discount ends (Appendix B.4.2).

This strategy only pays off if consumers follow through and switch — yet our earlier findings show that they often do not. What happens if we focus on consumers with a history of procrastination in our data? Columns B and C in Figure 2b show that the same pattern holds among consumers who failed to switch a contract they expected to switch (Column B) and even among those who also declined the switching service (Column C).

Empirical Result 2 (Underresponsiveness to Better Offers)**.** *The mistaken belief about future switching makes consumers underrespond to better offers.*

3 Basic Model of Markets with Switching Costs

We introduce our basic framework, which builds on standard theories of price competition with switching costs and horizontal product differentiation in the tradition of von Weizsäcker (1984) and Klemperer (1987a,b). We incorporate consumer procrastination using the now standard, empirically supported framework of naive present bias, and explain in Section 6 that alternative foundations yield identical results.[6]

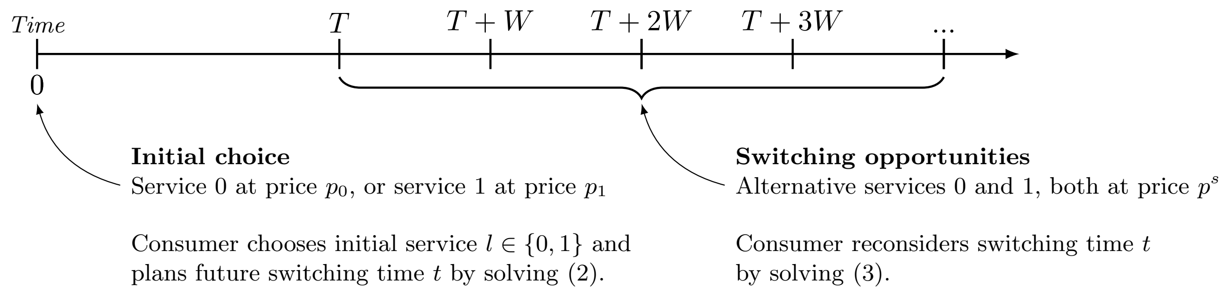
3.1 Setup

Consumers need a service from time 0 to ∞ and acquire it as follows (see Figure 3). At time 0, a consumer chooses between firms 0 and 1, which are located at the ends of the unit interval and offer constant flow prices of p_0 and p_1, respectively. The consumer can then switch providers at times $T, T+W, T+2W, \ldots$, where $T > 0$ is the delay until the first opportunity and $W > 0$ is the "wait time" between opportunities. At these moments, two alternative offers with an exogenously given price of $p^s \geq 0$ are available at the same locations as the firms. If the consumer switches, she pays an immediate switching cost $s > 0$, and receives the selected alternative forever after.

Consumers' tastes y are distributed uniformly on the unit interval. If at time τ consumer y

[6] Evidence for present bias includes DellaVigna and Paserman (2005), DellaVigna and Malmendier (2006), Paserman (2008), Fang and Silverman (2009), Meier and Sprenger (2010), Carter et al. (2022), and Laibson et al. (forthcoming), while evidence for at least partial naivete includes Skiba and Tobacman (2008), Acland and Levy (2015), Fang and Wang (2015), Fedyk (2025), Augenblick and Rabin (2019), Chaloupka et al. (2019), Bai et al. (2021), Kuchler and Pagel (2021), and Carrera et al. (2022), though Allcott et al. (2022) document substantial sophistication among payday borrowers. Notably, Blumenstock et al. (2018) study switching from a default savings plan and find that present bias explains the failure to switch better than other proposed explanations.

Figure 3: **Timeline of the Model**



subscribes to a service at $l \in \{0,1\}$ and pays price p^τ, her flow consumption utility is

$$u^\tau = \underbrace{v}_{\substack{\text{gross}\\\text{value}}} - \underbrace{p^\tau}_{\text{price}} - \underbrace{d\ |l-y|\ \mathbb{1}(\tau \leq T^d)}_{\text{mismatch disutility}}, \tag{1}$$

where $T^d \geq T$. This says that products are differentiated with Hotelling degree of differentiation $d > 0$ until time T^d, and then they become identical; $T^d = \infty$ denotes permanent differentiation.[7] We call product l a consumer's "favorite product" if it is the closer product to her location.

At any time $t \geq 0$, a consumer discounts outcomes at time $\tau > t$ using the factor $\beta e^{-r(\tau-t)}$, where $\beta \in (0,1]$ is her short-run discount factor and $r > 0$ is her long-run discount rate. If $\beta = 1$, consumers are time-consistent, and if $\beta < 1$, they are present-biased.[8] We study present-biased consumers who are naive: at each point in time, they expect to carry out the plan that is optimal from the perspective of that moment, i.e., they expect to behave like a time-consistent consumer in the future. Hence, whenever they are called upon to choose, they maximize their discounted utility over all current and future decisions, and take the current choice in their solution. This can differ from the plan they made earlier.

To apply these definitions, observe that if the consumer switches, she prefers to switch to her favorite of the two equal-priced alternatives. This maximizes consumption utility at every moment afterwards, and hence it also maximizes discounted utility. Consequently, the consumer always makes, as well as expects to make, such a switching decision. We can therefore write u^τ as a function $u^\tau(l, h^\tau)$ of the product l the consumer chose initially and an indicator $h^\tau \in \{0,1\}$ of whether she switched before time τ. It follows that at time 0, the consumer chooses an initial

[7] The condition $T^d \geq T$ is without loss. If $T^d < T$, then we can redefine d as the average product differentiation until T and set $T^d = T$. Since consumers cannot switch before T, their evaluation of all choices remains unchanged.

[8] Consistent with the notion of "instantaneous gratification" in Harris and Laibson (2013) and Maxted (2025), the consumer discounts any future outcomes — including ones arbitrarily close to t — using β. As in previous work, this extreme assumption facilitates tractability.

provider l and plans a future switching time t to solve

$$\max_{\substack{l\in\{0,1\}\\ t\in\{T,T+W,\ldots,\infty\}}} \underbrace{-\beta e^{-rt}s}_{\substack{\text{(planned)}\\ \text{switching cost}}} + \underbrace{\beta\int_0^\infty e^{-r\tau}u^\tau(l,\mathbb{1}(t<\tau))d\tau}_{\text{utility from (planned) contract(s)}}, \tag{2}$$

where $t=\infty$ denotes never switching. Further, if she chose product l initially and has not switched until the opportunity at time T', then she looks for a (current or planned) switching time t to solve

$$\max_{t\in\{T',T'+W,\ldots,\infty\}} \underbrace{-\beta^{\mathbb{1}(t>T')}e^{-r(t-T')}s}_{\text{(planned) switching cost}} + \underbrace{\beta\int_{T'}^\infty e^{-r(\tau-T')}u^\tau(l,\mathbb{1}(t<\tau))d\tau}_{\text{utility from (planned) contract(s)}}. \tag{3}$$

In both expressions, the first term is the discounted switching cost, and the second is the discounted consumption utility implied by the consumer's intended behavior. Initially, the consumer can choose either product without paying a cost, so that all relevant utility occurs in the future and is therefore downweighted. If the consumer switches immediately at a switching opportunity ($t=T'$ in (3)), however, then her switching cost s receives a weight of 1. We impose the tie-breaking rule that the consumer switches only if she strictly prefers to.

The prices p_0 and p_1 are chosen simultaneously — and with commitment — by the initial two firms, who have a flow cost of zero and maximize discounted profits with discount rate r. We investigate symmetric pure-strategy Nash equilibria of the game played between the firms, assuming that they correctly predict consumer behavior. Our main interest is in the empirically relevant equilibria in which consumers stick with their initial providers. We call these non-switching equilibria.

3.2 Discussion of Assumptions

Our model captures the essential elements of many markets with switching costs. For example, when a consumer subscribes to services such as electricity, gas, internet, or streaming, she typically chooses from a limited set of providers, but opportunities to switch to others periodically arise. In another application, the consumer buys a good on credit and has access to a limited set of cards on which she can initially charge the purchase. Later, she receives balance-transfer offers from other issuers. The prices p_0, p_1, and p^s denote the interest rates on the cards.

We assume horizontal product differentiation both because it is realistic and because its effects on markups reveal competition failure in a natural way. Similarly, we allow differentiation to be temporary both because of realism and to show an economically relevant interaction with procrastination. As examples of permanent differentiation ($T^d = \infty$), two internet providers may offer different ongoing perks, and two mobile service plans may have slightly different network coverage. As examples of temporary differentiation ($T^d < \infty$), a consumer may obtain earlier access to high-speed internet with a provider whose cable is already installed; or she may momentarily prefer one streaming service because of a particular show. But once the necessary cable is in place or the show ends, the services are in expectation the same. In many applications motivating our analysis, differentiation is modest (d is small) or short-lived ($T^d \ll \infty$). This makes high prices puzzling — exactly the puzzle we aim to explain.[9]

We take the alternatives the consumer can switch to as exogenous because our main question is not how they arise, but how they affect ex-ante competition. A simple interpretation is that the alternatives are offered by a competitive fringe that serves another customer base — such as time-consistent consumers or consumers with no switching costs — and cannot reach our consumers at the initial stage. In Section 5.1, we derive the switching options endogenously from the interaction of profit-maximizing firms that make initial offers to new present-biased consumers of the same type. In some situations, however, a consumer's best alternative is not another firm, but an outside option. For instance, a consumer may be better off canceling her video streaming service rather than switching to another provider, and she may be better off repaying rather than transferring her credit-card balance. Consistent with either case, we can think of $v - p^s$ as the flow value of the consumer's favorite outside option.

In most applications, switching entails not only the cost of executing the change, but also the cost of searching for an appropriate provider. While we frame the cost s as the former, it could include the latter, so long as the consumer knows the distribution of offers available in the market. For instance, suppose that there are many alternative offers in the market, some priced at p^s and some more expensive, and it is optimal to look for a former type of offer. Then, a consumer is prone to procrastination in searching just as she is prone to procrastination in switching in our model. Hence, our insights apply to some search-cost models of price competition as well.

We think of the wait time W between switching opportunities as a parameter that captures both individual- and market-level determinants of how frequently a consumer considers switching.

[9] While we model temporary differences as fully disappearing at T^d, the logic of our arguments only requires that initial differentiation is greater. Relatedly, we assume that consumers can switch to alternative products that are perfect substitutes to the initial products. This allows us to confirm — consistent with the literature — that procrastination can undermine even extreme forms of competition from switching opportunities.

This frequency can be shaped by market prompts, such as mailers, app notifications, or sales calls; individual routines, such as how often a person revisits her financial situation; and institutional or legal rules, such as open-enrollment windows.

For notational and presentational simplicity, we assume that firms' marginal costs of production are zero. In our basic model with linear prices, this is merely a normalization. As we explain below, with introductory periods (and non-negative prices) or conditional cash bonuses, the same assumption amounts to imposing that firms cannot make potentially money-losing offers. We analyze unconditional cash bonuses, with which firms can make losses, in Section 5.3.

In contrast to most of the switching-cost literature, we suppose that firms commit to future prices. Empirically, commitment is realistic: providers in many markets pre-specify either exact prices or a binding formula that will determine them, including for post-introductory prices if applicable. Prominent examples include credit cards (fixed or go-to APR), electricity (fixed rate for contract duration), mortgages (adjustable rate as an index plus margin), and media and streaming subscriptions (stated renewal price). Theoretically, under such commitment, most existing papers do not predict high prices either on average or at the switching stage (e.g., Farrell and Klemperer, 2007, emphasize that with commitment, "switching costs confer no market power on firms"), which facilitates a clean contrast with our results. Furthermore, this contrast does not require firms to commit forever. In particular, the observation that firms can commit beyond the introductory period implies, according to existing models, that average prices should not be high (as this would induce firms to compete harder on committed prices). Our competition-failure results, however, are unchanged if firms cannot commit much beyond the introductory period. The reason is that from both the ex-ante and ex-post perspectives, the optimal post-introductory price is consumers' stay threshold.

4 Competition Failure

We now analyze our model, identifying ways in which procrastination generates competition failure.

4.1 Switching Competition

We begin by establishing, in our setting, the known result that naive present bias induces procrastination. A corollary is that procrastination weakens competition from switching opportunities.

Suppose (consistent with a symmetric equilibrium) that a consumer has selected her favorite product, which sold at price p. Not having switched yet, she comes to a switching opportunity, and ponders whether to switch now or next time. In either case, she would choose the alternative at the same location as her current provider, so the timing does not affect her mismatch disutility. Comparing the cost of switching now with the combined discounted cost of switching next time, she prefers to wait if and only if

$$\underbrace{s}_{\substack{\text{switching cost if}\\ \text{switch now}}} \quad \geq \quad \underbrace{\beta \int_0^W (p-p^s)e^{-r\tau}\,d\tau}_{\substack{\text{extra payment if}\\ \text{switch next time}}} + \underbrace{\beta e^{-rW} s}_{\substack{\text{switching cost if}\\ \text{switch next time}}}.$$

Hence, the stay threshold — the maximum price at which the consumer postpones switching — is

$$p^{\text{stay}} \equiv p^s + \frac{1-\beta e^{-rW}}{\beta\,(1-e^{-rW})} rs = p^s + \left(1 + \frac{1-\beta}{\beta} \cdot \frac{1}{1-e^{-rW}}\right) rs, \tag{4}$$

and we obtain:

Observation 1 (Switching Behavior). *Suppose the consumer has chosen her favorite product at price p. She switches at time T if and only if $p > p^{stay}$. Otherwise, she never switches.*

At the stay threshold p^{stay}, the total discounted premium a time-consistent consumer ($\beta = 1$) pays over the alternative equals her switching cost ($(p^{\text{stay}} - p^s)/r = s$). By contrast, a present-biased consumer's ($\beta < 1$) total discounted premium — including discounting by β — exceeds her switching cost ($\beta(p^{\text{stay}} - p^s)/r > s$). Hence, despite her present bias, the consumer thinks that it is worth switching immediately rather than never. But she finds switching next time even more attractive, so she procrastinates: she perpetually postpones switching, naively believing that she will act next time.

Quantitatively, procrastination can prevent switching even when the gains are enormous. For example, for a one-year window W, Laibson et al. (forthcoming) estimate $\beta = 0.53$ and $\delta = e^{-rW} = 0.99$, giving $\beta(p^{\text{stay}} - p^s)/r \approx 47.5 \cdot s$. Hence, a consumer would not pay a \$20-equivalent switching cost for a gain of \$950 *in present value*. Even with $\beta = 0.9$, around the upper end of estimates in the literature, the consumer would not pay the \$20 cost for a gain of \$218 in present value. These magnitudes reconcile our model with the research cited in Section 2 showing that consumers fail to switch for gains that exceed any plausible switching cost or provider preference. Relatedly, our model implies that existing estimates of switching costs may be severely biased upwards. An observer assuming time consistency would infer a switching cost of $(p^{\text{stay}} - p^s)/r$, which could be an arbitrarily large multiple of the true cost s.

Because the stay threshold p^{stay} fully describes consumer switching behavior, it is central for quantifying the degree of switching competition that initial firms face. To make this transparent, we consider a benchmark case with no competition at the initial stage. A monopolist sells both products at time 0, and consumers either subscribe to one of the monopolist's offers or take an outside option of gross value zero at location 0 or 1. In addition, consumers can (independently of whether they purchased initially) switch to the alternative offers as described above. For simplicity, we assume that $v > p^{\text{stay}}$. Then:

Observation 2 (Only Switching Competition)**.** *Absent initial competition, the equilibrium price is determined by v, e^{-rT}, and p^{stay}. In a non-switching equilibrium, the price is p^{stay}.*

The monopolist's optimal price depends on consumers' present bias only through the stay threshold p^{stay}, and if the monopolist wants to avoid losing consumers to the switching alternatives, it sets a price equal to p^{stay}. Combined with the observation that procrastination can greatly increase p^{stay}, we conclude that procrastination can severely undermine switching competition.

Observations 1 and 2 also imply, however, that so far procrastination is observationally equivalent to a higher switching cost s that yields the same p^{stay}. This is consistent with the literature's view that switching costs could be "psychological" without requiring separate analysis.[10] We now show that such a view is incomplete: when initial and switching competition interact, procrastination generates qualitatively different logic from large switching costs.

4.2 Initial *and* Switching Competition

In this section, we analyze the main case of our basic model. We identify a competition paradox, wherein the unused opportunity to switch raises prices.

To characterize equilibrium, we define two constants. The first is $p^{\text{plan}} \equiv p^s + rs$: the stay threshold time-consistent consumers use and naively present-biased consumers mistakenly expect to use in the future. This is given by substituting $\beta = 1$ into (4). While p^{plan} plays no role in present-biased consumers' switching behavior (Observation 1), it will be relevant for how they evaluate deviations from equilibrium prices below. If consumers expect not to switch, they place more weight on price differences between the products.

[10] See, e.g., the review by Farrell and Klemperer (2007), as well as Klemperer (1987b), Kim et al. (2003), Dubé et al. (2009), Handel (2013), or Andersen et al. (2020), who explicitly think of present bias as "augmenting" standard switching costs.

The second constant is $\overline{d} \equiv (1-e^{-rT^d})d$: the average product differentiation over time, weighting initial differentiation of d and later differentiation of 0 according to the long-run discount rate. This is the degree of differentiation that is relevant for a consumer who expects to keep her initially chosen product forever. Indeed, standard Hotelling logic implies another benchmark:

Observation 3 (Only Initial Competition)**.** *Absent switching opportunities, the equilibrium price is* $\overline{d}$*.*

Our main result in this subsection lays out possible prices when initial and switching competition are both at play, focusing on the empirically relevant situation in which consumers do not switch. To simplify our statements, we rule out knife-edge cases where p^{stay} or p^{plan} coincide with d or $\overline{d}$.

Proposition 1 (Competition Failure with Both Types of Competition)**.**

I. *Prices. In any non-switching equilibrium, (a) time-consistent consumers pay a price of* $\min\{\overline{d}, p^{stay}\}$*, while (b) present-biased consumers pay a price of* $\min\{\overline{d}, p^{stay}\}$ *or* $\min\{d, p^{stay}\}$*.*

II. *Existence. Suppose* $\min\{d, p^{stay}\} > \overline{d}$*. There is a non-switching equilibrium in which present-biased consumers pay a price of* $\min\{d, p^{stay}\}$ *— i.e., strictly more than with only initial competition — if two conditions hold: (a)* $\min\{d, p^{stay}\} \geq 2p^{plan}$ *and (b) either* $d > p^{stay}$ *with* T *sufficiently small or* $p^{stay} > d$ *(with any* T*).*

III. *Uniqueness. In both cases under Part II, the equilibrium is unique if in addition* $\overline{d} > p^{plan}$*.*

Part I identifies one sense in which procrastination is more harmful for competition than simply a high switching cost. In a non-switching equilibrium, time-consistent consumers pay $\min\{\overline{d}, p^{\text{stay}}\}$, always getting the best of initial competition (a price of $\overline{d}$, Observation 3) and switching competition (a price of p^{stay}, Observation 2). But present-biased consumers may pay $\min\{d, p^{\text{stay}}\}$, which can be higher than the price with just initial competition ($\overline{d}$). This is the case if product differentiation is temporary (so that $d > \overline{d}$) and switching competition is relatively weak (so that $p^{\text{stay}} > \overline{d}$) — features we have argued are common.

Intuitively, if prices are in the procrastination range ($p^{\text{plan}} < p \leq p^{\text{stay}}$), then the logic of procrastination weakens initial competition like a permanent extension of differentiation. First, consumers' expectation to switch leads them to focus on the short run in their initial choice, so they respond to price changes as if the differentiation parameter was d. Second, consumers' failure to switch means that firms earn profits on consumers forever. Therefore, competitive pressure is the same as if products were permanently differentiated, i.e., weaker than with just initial competition.

We refer to this as a “competition paradox” because competition from switching opportunities actually harms consumers.

Part II identifies sufficient conditions — beyond the inequalities $d, p^{\text{stay}} > \overline{d}$ just discussed — for the above competition paradox to occur. For the logic to stand, a firm should not want to deviate to a price outside the procrastination range. Condition II(a) ensures that a firm does not benefit from deviating to a price below the perceived stay threshold p^{plan}. For such a price, consumers would correctly expect not to switch, and — knowing that product differentiation disappears — be more responsive to price cuts, potentially allowing a deviator to attract many consumers. But if p^{plan} is too low, the deviation cannot be profitable. Condition II(b) in turn ensures that a firm does not benefit from deviating to a price above the stay threshold p^{stay}, where consumers switch. If $p^{\text{stay}} > d$, such a deviation would not be profitable even if consumers did not switch. If $p^{\text{stay}} < d$, then such a deviation is unprofitable if the time T until the first switching opportunity is sufficiently short, so that the deviator enjoys higher revenues for only a short time. With weak switching competition, the former condition is more likely.

An extreme form of competition failure arises if $T^d = T$ and both approach zero. This means that the period of differentiation disappears, so products become perfect substitutes, while switching competition also becomes imminent. With firms facing no adverse selection and committing to linear prices consumers can compare, previous models predict a competitive price in the limit. Our model does not: if an equilibrium satisfying the conditions of Part II exists for a particular $T = T^d$, then an equilibrium with the same price exists for all lower $T = T^d$. This is because T and T^d do not affect $\min\{d, p^{\text{stay}}\}$ or Condition II(a), while lowering T relaxes Condition II(b).

Finally, Part III of Proposition 1 identifies a sufficient condition for the competition failure in Part II to be unique: that products are sufficiently strongly differentiated on average relative to consumers' perceived stay threshold ($\overline{d} > p^{\text{plan}}$). Then, in the relevant price range, consumers expect to switch, always thinking about their initial choice from the short-run perspective. This necessarily weakens competition.

Note that quantitatively, the procrastination range ($p^{\text{plan}} < p \leq p^{\text{stay}}$) appears very large, suggesting that the conditions for both existence and uniqueness of a high-price equilibrium are often satisfied. Continuing with our previous calibration ($\beta = 0.53$ and $e^{-rW} = 0.99$) and assuming $p^s = 0$, for example, we have $p^{\text{stay}} \approx 89.7 \cdot p^{\text{plan}}$.

In other situations, however, procrastination creates a novel reason for equilibrium multiplicity:

Observation 4 (Multiple Equilibria)**.** *There are two non-switching equilibria with prices d and $\overline{d}$,* *respectively, if* $p^{stay} > d > 2p^{plan}$ *and* $(2 - e^{-rT})p^{plan} \geq 2\overline{d}$.

To illustrate, consider again the case of near-perfect substitutes and imminent switching opportunities, $T = T^d \approx 0$ and hence $\overline{d} \approx 0$. This guarantees that the second condition in the observation holds, so multiple equilibria arise if the first one does. Intuitively, if prices are high, a consumer incorrectly reasons that she will switch very soon, so she cares about her momentary preference as much as about prices. Perversely, therefore, competition does not operate exactly because prices are too high. But if prices are low, then the consumer does not plan to switch away from the offer she first takes. Since the products are then all but identical to her, she is very sensitive to price differences, creating near-perfect competition.

A good empirical example for our model is the US credit-card market of the 1980s, a period when the industry was already large, but loans were still characterized mostly by a single ongoing interest rate.[11] Banks solicited business aggressively, many of them nationwide, and although a consumer may have had short-lived preferences for an issuer — e.g., because she had a pre-approved offer in hand but had to wait for other offers — in the long run all cards provided essentially the same service. Further, there were lower-rate offers around, so most consumers could switch to a cheaper option; and all consumers had the option of repaying their loan and thus avoiding interest altogether. In our terms, product differentiation was high but short-lived (d was high, but T^d and thus $\overline{d}$ were low), and alternatives to switch to were excellent (p^s was low). While existing models predict fierce competition, ours says that the initial preferences may drive rates (yielding price d). Consistent with this prediction, interest rates were high (Ausubel, 1991).

The above insights imply that current policy approaches to fostering competition in markets with switching costs have ambiguous effects. Regulators have tried to improve consumer choices in general, but because they recognize and are worried about consumers' tendency not to switch, many interventions are centered on competition at the switching stage.[12] Most straightforwardly, a policymaker may take steps to lower the switching cost s or alternative price p^s. Either change lowers both the actual and perceived stay thresholds, p^{stay} and p^{plan}. While lowering p^{stay} weakly

[11] For descriptions of the industry at the time, see Ausubel (1991), Berlin and Mester (2004), and Stein (2004). There were no teaser offers and far fewer differentiated perks or conditions than now. Annual fees were largely standardized at $20, so the dominant aspect of a product's price was its interest rate. Stein describes this environment as an industry offering "mass-marketed, straightforward loans." The claims that follow are based on the same sources.

[12] Numerous policy reports (e.g., Competition & Markets Authority, 2016b, Canadian Radio-television and Telecommunications Commission, 2017, Financial Conduct Authority, 2017, 2018, Australian Competition & Consumer Commission, 2019) express concern about low switching rates. In response, the Office of Gas and Electricity Markets (2019) investigated in a number of trials how to best activate consumers to consider alternative contracts. Furthermore, a quick web search verifies that many countries encourage the use of accredited or government-run price comparison sites to facilitate switching. These could act through all the channels discussed above.

lowers the equilibrium price, lowering p^{plan} can increase it. For instance, combining Part III of Proposition 1 with Observation 4 implies that a decrease in s can eliminate the low-price equilibrium while leaving the high-price equilibrium unchanged. Intuitively, an increase in switching competition can make consumers falsely optimistic about switching, making them focus too much on the short run.

A policymaker may also attempt to lower the wait time W between switching opportunities, for instance by mandating frequent reminders about alternatives. In addition, a decrease in W could occur through an increase in the number of providers available to switch to, if they make offers to consumers at different times. In our model, such apparent increases in competition raise p^{stay}, (weakly) increasing prices in any non-switching equilibrium. Intuitively, if the consumer receives offers more often, she can get out of a high-price deal sooner in the future. As a result, she is more prone to procrastination, allowing initial firms to charge a higher price. These observations may help explain the puzzle that the types of interventions mentioned did not result in obvious improvements in markets.[13]

To complete our analysis, we also consider "switching equilibria," in which consumers switch:

Proposition 2 (Switching vs. Non-Switching Equilibria)**.**

I. If $\overline{d} < p^{stay}$, then any equilibrium is non-switching.

II. If $\overline{d} > p^{stay}$, then the set of equilibria is determined by d, e^{-rT}, and p^{stay}. In a switching equilibrium, initial firms charge d, and consumers switch at time T.

If switching competition is weaker than initial competition (Part I), then only the non-switching equilibria analyzed above exist. If switching competition is stronger than initial competition (Part II), then equilibria depend on consumers' present bias only through p^{stay}. As in the previous subsection, therefore, procrastination and high switching costs have identical effects on prices. In a switching equilibrium, in particular, competition from switching alternatives eliminates too much of the initial firms' profits at that stage, so they turn to earning profits before consumers can switch. This leads to an equilibrium price commensurate with initial differentiation.

Proposition 2 strengthens Proposition 1's message about how procrastination is more harmful than a high switching cost. Together, the two propositions imply that switching competition can

[13] In the UK energy market, for instance, an accredited price-comparison site was introduced in 2013. Nevertheless, the Competition & Markets Authority (2016a) found that suppliers earn high profits, estimating an overcharge of £1.4 billion paid by UK customers (see also Agency for the Cooperation of Energy Regulators, 2018). These observations led the UK's Domestic Gas and Electricity (Tariff Cap) Act of 2018 to reimpose a price cap on standard variable tariffs (Hinson, 2018).

never raise the price time-consistent consumers pay after the first switching opportunity, but it can raise the price present-biased consumers pay. Proposition 1 establishes the second part of this statement, and it shows the first part (on time-consistent consumers) for non-switching equilibria. Proposition 2 extends this first part to all equilibria. In a switching equilibrium (which is only possible if $p^{\text{stay}} < \overline{d}$), time-consistent consumers pay p^s after time T. Since $p^s < p^{\text{stay}} < \overline{d}$, they pay less than $\overline{d}$, the price they would pay without switching competition.

A switching equilibrium, however, is both counterfactual and theoretically non-robust. It is counterfactual because consumers rarely switch in reality, and it is theoretically non-robust because switching never occurs with introductory periods. Intuitively, for a firm to exploit its market power with linear prices when switching competition is strong, it has to charge a price that induces switching. But with introductory deals, it could extract the same profit during the introductory period and then charge a price that does not induce switching.

4.3 Competition with Introductory Periods

Received wisdom holds that introductory offers — common in many markets with switching costs — are pro-competitive practices, and one primary channel through which firms return ex-post profits to consumers.[14] We re-evaluate this conclusion in our model, and find that it is incorrect. While without introductory periods prices are limited by initial differentiation (in Proposition 1, they are at most d), here they can be far higher. In this sense, introductory periods exacerbate rather than mitigate the failure of switching competition.

We modify our setup by assuming that firm l's offer takes the form (B_l, p_l^1, p_l^2), where $B_l \geq 0$ and $p_l^1 \geq 0$ are the length of and price during the introductory period, and p_l^2 is the subsequent price. We call $(1 - e^{-rB_l})p_l^1 + e^{-rB_l}p_l^2$ the offer's average price; this is the constant price that has the same discounted value. A consumer can switch to an alternative at the end of the introductory period and at intervals of W thereafter, and if $T < B_l$, then also at $T, T+W, \ldots$ until time B_l. To simplify our exposition, we assume permanent differentiation ($T^d = \infty$), and restrict attention to the empirically relevant case in which $p^{\text{stay}} > d$, i.e., switching competition is relatively weak. This could be due to procrastination for present-biased consumers, or due to a high switching cost for time-consistent ones. Then, Proposition 1 implies that with linear prices both time-consistent and

[14] This idea goes back to at least Klemperer (1995), who shows that competition for future profits results in introductory offers and price wars for market share. Similarly, in the abstract of their review on switching-cost models, Farrell and Klemperer (2007) explain that "[f]irms compete ex ante for [...] ex post power, using penetration pricing, introductory offers, and price wars. Such competition for the market [...] can adequately replace [ex-post] competition, and can even be fiercer than [ex-post] competition."

present-biased consumers pay d, creating a simple benchmark case.

Two features of our model, both reconsidered in Section 5.3, are worth highlighting. First, we posit exploding bonus offers (which are available only once). These concentrate competition into a single period, so they stack the cards in favor of a competitive outcome. Second, we focus on introductory periods rather than cash sign-up bonuses. A cash bonus (or cash-equivalent perk) paired with a minimum-stay requirement that ensures no losses for the firm is equivalent to an introductory period.[15] An unconditional cash bonus exposes a firm to losses on consumers who switch quickly, so previous adverse-selection or arbitrage arguments (Ellison, 2005, Heidhues et al., 2017) also imply limited competition. The same arguments do not apply to introductory periods, so — facilitating a clean contrast with our results — previous models predict no competition failure.

Proposition 3 (Failure of Competition with Introductory Periods)**.** *Suppose* $T^d = \infty$ *and* $p^{stay} > d$*. Then, any equilibrium is non-switching* ($p^{2*} \leq p^{stay}$)*, and:*

I. If consumers are time-consistent ($\beta = 1$)*, then in any equilibrium, the average price is at most* d*, and an equilibrium with an average price of* d *exists. In any equilibrium, each firm is indifferent between its equilibrium offer and a constant price with the same average.*

II. If consumers are present-biased (with any $\beta < 1$*), then any equilibrium satisfies* $p^{1*} = 0, p^{2*} = p^{stay}$*, and* $B^* \leq \frac{1}{r} \cdot \ln\left(\frac{d + p^s + rs}{d}\right)$*. In the best equilibrium for consumers, they are strictly worse off than without introductory periods if and only if* $p^{stay} - p^{plan} > d$*.*

The proposition implies that any equilibrium is non-switching, and competition again works differently for time-consistent and procrastinating consumers. Time-consistent consumers understand that they will not switch, so they evaluate the equilibrium offer according to its average price and are as responsive to average-price cuts as with linear prices. Two implications follow. First, competition is at least as intense as without introductory periods, and as differentiation would warrant. Second, it is never in a firm's strict interest to commit to increasing prices. If anything, commitment to a strictly decreasing profile has the advantage of retaining consumers with lower switching costs. Although not typically stated in the same form, these predictions reflect the logic of existing switching-cost models when allowing for commitment.

[15] That is, the contract (B, p^1, p^2) with $p^1 \leq p^s$ is essentially equivalent to the contract in which the consumer faces the flow price p^2, obtains a cash bonus of $\int_0^B (p^2 - p^1)e^{-r\tau}d\tau$ immediately after signing up, and must stay with the firm at least until time B. Hence, the bonus equals the consumer's saving during the introductory period, and the minimum stay equals the introductory period. Even if $T \leq B$ and hence in the former case the consumer could switch before time B, it is clearly not optimal for her to do so. Although equivalent in our model, a cash payment may appeal to some consumers, such as liquidity-constrained households, or individuals who focus on, and hence overweight, a single large payment relative to periodic savings (Kőszegi and Szeidl, 2013, Dertwinkel-Kalt et al., 2019).

They are also counterfactual. The first contradicts the evidence on high average prices in markets with minimal average differentiation motivating our paper. The second contradicts the observation that many service contracts combine an attractive introductory price with a substantially higher — but initially agreed-to — post-introductory price.

In contrast to the counterfactual features above, present-biased consumers receive a free introductory period followed by a high post-introductory price, and introductory periods often harm them overall. Intuitively, because consumers expect to switch but do not, such a contract is costly ex post yet appears attractive ex ante. At the same time, the contract's structure allows firms to escape the competitive pressure of the initial contracting stage. It does so by desensitizing consumers to both the post-introductory price p^2 and the length B of the introductory period.

First, since consumers think that they will switch, they do not care about p^2 at all. As a result, firms raise p^2 to the stay threshold p^{stay}, a price that would not survive initial competition without the introductory period. Second, again because consumers think that they will switch, they underestimate the value of a higher B. If a firm extends its introductory period by ΔB, it gives value $\Delta B \cdot p^2 = \Delta B \cdot p^{\text{stay}}$ to consumers; but a consumer thinks the value is only $\Delta B \cdot p^s$ plus a delay in switching by ΔB, for a total of $\Delta B \cdot (p^s + rs) = \Delta B \cdot p^{\text{plan}}$. This weakens competition, especially if $p^{\text{stay}} - p^{\text{plan}}$, i.e., the consumer's misperception of her stay threshold, is high. In addition, the same undervaluation of a higher B explains why the introductory price p^1 is zero to start with. Namely, since consumers correctly understand the implications of p^1 for how much they will pay but they misunderstand the implications of B, they find a decrease in the former coupled with a cost-equivalent decrease in the latter attractive. It is therefore profitable to set $p^1 = 0$.[16]

We can quantify the potential competition failure due to procrastination. To start, recall that consumers fail to switch for price savings far above plausible switching costs and product differentiation; conservatively, suppose that the savings exceed twice those benchmarks. This means

[16] In Part II, there is multiplicity in the equilibrium length B^* of the introductory period. This arises because of an asymmetry in the incentive to deviate from the equilibrium offer. Suppose that firm l raises B_l while leaving the post-introductory price p_l^2 unchanged at p^{stay}. Then, it attracts some consumers whose favorite product is the other firm's. Since p^{stay} is chosen such that the consumer is indifferent to switching to the alternative at the same location, the newly attracted consumers all switch to the alternative at their favorite location. To keep these consumers, therefore, the firm must lower p_l^2. An analogous consideration does not arise if a firm shortens its introductory period, since in that case it only attracts consumers whose favorite product is its own. As a result, there is a kink in the residual profit function, supporting a range of equilibria.

Although the above is a kind of adverse-selection problem, multiple arguments make clear that this is not driving our insights. First, we have focused on the best equilibrium for consumers. At this level, a firm would not want to extend its bonus even ignoring adverse selection. Second, assuming that T_d is finite (in particular, shorter than the introductory period) eliminates adverse selection, yet leaves the logic of the model unchanged. Third, the same is true if there is a binding cap on the post-introductory price p^2.

that the equilibrium post-introductory price p^{2*} satisfies $p^{2*} - p^s > 2rs, 2d$. It follows that $p^{2*} = p^{\text{stay}} > d$, and using Equation (4), also that the condition in Part II is satisfied. Hence, Part II implies that introductory periods make consumers strictly worse off. To go further, it seems reasonable to assume that alternative options are good, which we capture as $p^s = 0$. Indeed, consistent with our endogenization of switching options in Section 5.1, consumers may expect to obtain perpetually low prices by switching between introductory deals. Then, the first-order Taylor approximation (around $d = 0$) to the average price a consumer pays in the most favorable equilibrium is

$$e^{-rB^*}p^{2*} = \frac{d}{d+rs} \cdot p^{\text{stay}} \approx \left(1 + \frac{1-\beta}{\beta} \cdot \frac{1}{1-e^{-rW}}\right) \cdot d.$$

As a baseline, we let the wait time W equal one year. This is consistent with some regulatory or organizational restrictions, such as an annual open enrollment period for medical plans. Then, taking the same estimates from Laibson et al. as previously, $\beta = 0.53$ and $e^{-rW} = 0.99$, a firm's margin is about $89.7 \cdot d$. The estimate is very sensitive to r and W; for example, letting W equal two months — the interval between our survey waves, over which consumers expect to switch many contracts — the margin rises to $533.1 \cdot d$; but leaving W at one year and letting the annual long-run discount rate be 5% yields a margin of $18.7 \cdot d$. With time-consistent consumers or without introductory periods, the margin is d. Hence, the combination of procrastination and introductory periods provides a dramatic impediment to competition, even for relatively long wait times.

Our predictions contribute to explaining limited competition in markets with switching costs that feature little differentiation and an abundance of introductory deals. One good example is again the credit-card market, where teaser offers were introduced in the 1990s, but the interest rates consumers paid remained very high (e.g., Ausubel, 1997, DellaVigna and Malmendier, 2004, Stango and Zinman, 2015). In fact, Galenianos and Gavazza (2022) note that the market is "reminiscent of monopolistic markets" despite consumers receiving many offers.[17] Similarly, competition did not lower retail electricity prices nearly as much as expected.[18]

[17] The balance-weighted credit-card interest rate for balances accruing interest, according to the Federal Reserve's latest release, is 21.52% (`https://www.federalreserve.gov/releases/g19/current/`, accessed April 16, 2026). Some other, less central changes also occurred since the 1980s: consumers are now bombarded with even more offers, applications have moved online, and there is a variety of on-going perks (such as airline miles). Due to the barrage of offers and easy applications, initial differentiation may no longer be much greater than long-run differentiation. But due to perks, there may be some long-run differentiation. A natural way to model this environment is to assume low but permanent differentiation ($T^d = \infty$ and a small d).

[18] Joskow (2003) notes that "there is a growing perception that ... [US] retail competition programs have had disappointing results," which he attributes partly to consumer behavior. See also Footnote 13 on UK energy prices.

5 Other Market Settings

To demonstrate the robustness of our insights and to make additional points, we consider natural variants of our market framework. Throughout, we modify the model in Section 4.3, and state only the new assumptions in each case. Our main interest is in the empirically most relevant situation, in which consumers are present-biased ($\beta < 1$) and switching competition is relatively weak. We have found that the equilibrium introductory price is then $p^{1*} = 0$. For simplicity, we therefore assume that initial firms choose contracts of the restricted form (B_l, p_l), where B_l is the length of the zero-price introductory period and p_l is the post-introductory price.

5.1 Endogenous Switching Options

In this subsection, we assume that the alternatives a consumer can switch to arise endogenously from the same competitive interaction as the initial offers. Two firms and a constant stream of consumers enter the marketplace at each moment t. The firms are located at the endpoints of the unit interval, and consumers' tastes are distributed uniformly on it. The entering firms make offers (B_l^t, p_l^t), which are the only contracts available at time t. Consumers who just entered observe and choose between these offers. A consumer can also switch to an available offer at the end of her existing contract's bonus period, and at intervals of W thereafter. To do so, she must pay a strictly positive cost to observe current offers, and an additional cost to switch, for a total cost of $s > 0$. We look for an essentially perfect Bayesian equilibrium in which firms make stationary symmetric pure-strategy offers (B^*, p^*), past offers are unobservable to entering firms, and when observing an out-of-equilibrium offer, consumers believe that future offers will still be (B^*, p^*) at any time t.[19]

Proposition 4 (Endogenous Switching Options)**.** *Suppose consumers are present-biased ($\beta < 1$), and for $p^s = 0$, the p^{stay} defined in (4) exceeds d (i.e., switching competition is weak). Then, any equilibrium is non-switching and has* $p^* = \left(\frac{1}{1-e^{-rB^*}} + \frac{1-\beta}{\beta} \cdot \frac{1}{1-e^{-rW}}\right) \cdot rs$*, and in the best*

[19] Essentially perfect Bayesian equilibrium (EPBE) formalizes the common practice of specifying strategies only for relevant histories that matter for the incentives on the path of play (Blume and Heidhues, 2006). For finite games, the set of PBE and EPBE outcomes coincide. For non-finite games, EPBE is more plausible because it allows for equilibria in which no player wants to deviate, yet following non-optimal deviations continuation games may be reached in which there is no optimal behavior so that PBE fails to exist.

An alternative to the assumption that past offers are unobservable is that entering firms have to incur some (arbitrarily small) cost to observe past contract offers. In a pure-strategy equilibrium, no firm incurs such cost.

With past contracts being unobservable, any equilibrium in which firms "do not signal what they do not know" — a requirement in the spirit of trembling-hand perfection that authors often impose in their definition of perfect Bayesian equilibria (see e.g. Fudenberg and Tirole, 1991) — consumers must have the type of passive beliefs we impose.

equilibrium for consumers, B^* *satisfies* $e^{-rB^*} = \frac{d}{rs} \cdot (1 - e^{-rB^*})^2$.

In equilibrium, a consumer thinks that she will switch to a new contract after each introductory period, so that she will pay a price of zero into perpetuity. This resembles the expectation to switch to an exogenous alternative with $p^s = 0$. Hence, competition failure results through the same logic as above: because consumers falsely expect to switch, there is no competition in the post-introductory price p, and little competition in the introductory period length B. In addition, the extent of competition failure is quantitatively similar to that in Proposition 3 with $p^s = 0$, with the same Taylor approximation around $d = 0$.

5.2 Non-Exclusive Contracting

In some markets, consumers may find that two subscriptions, such as different video-streaming services, provide more value than just one. We now incorporate this possibility into our model. We assume that products are undifferentiated ($d = 0$), and a consumer chooses to sign up for one or two services, with her value for the second being $\underline{v}$. A firm's marginal cost of production is c, $p^s = c$ (for simplicity), and $0 < \underline{v} < c$. In a streaming market, for example, providers may have a lot of overlapping and a bit of unique content, so that a second service yields little incremental utility. At the times at which she can switch, a consumer can cancel a contract, which also has an effort cost of $s > 0$. Extending our previous tie-breaking rule that favors the initial firms, we impose that consumers sign up for two services if they weakly prefer to, and cancel only if they strictly prefer to. We define p^{stay} as in Equation (4), but replacing p^s with $\underline{v}$.

Proposition 5. *In equilibrium, consumers do not switch or cancel, and:*

I. If consumers are time-consistent ($\beta = 1$), then they buy one service at an average price of c.

II. If $\frac{\underline{v}}{\underline{v} + rs} \cdot p^{stay} > c$ and consumers are present-biased ($\beta < 1$), then they buy both services at $p^* = p^{stay}$ and $B^* = [\ln(\underline{v} + rs) - \ln(\underline{v})]/r$.

Procrastination can turn the market from a competitive and efficient to a monopolistic and inefficient source of subscription services. Specifically, Part I says that if consumers are time-consistent, then they buy a single service at price c. These consumers recognize that only one contract is worth signing up for, so they look for the option that has the lower average price, inducing perfect competition between the initial firms. By Part II, however, procrastinating consumers may buy both services. In such an equilibrium, each firm acts as if it was a monopolist selling a service with flow value $\underline{v}$ to present-biased consumers. While this service is socially inefficient to trade, a firm induces consumers to sign up using an introductory deal chosen to just compensate for the cost of canceling after the introductory period. Thinking that they will cancel, consumers accept the deal. Procrastinating consumers are worse off than time-consistent ones both because of the non-competitive prices they pay, and because of the inefficient trade they agree to.

5.3 Unconditional Cash Bonuses and Non-Exploding Offers

Our models so far assume introductory periods with non-negative prices. As explained in Section 4.3, such a deal is equivalent to a cash bonus coupled with a minimum-stay requirement that ensures no losses for the firm. In this subsection, we consider the other extreme, cash bonuses with no minimum-stay requirement at all.

Technically, we capture this by allowing consumers to switch in the moment after signing a contract. At the beginning, there are two separate submoments, 0 and $0'$. At submoment 0, consumers choose between the two initial contracts. At submoment $0'$ and at intervals of W thereafter, a consumer can switch to an alternative provider. Crucially, at submoment 0, she thinks of submoment $0'$ as being in the future: she discounts it using β (but not r), and is naive regarding her behavior at that time. To simplify our analysis and isolate competition in bonuses, we fix the unit price at p^* satisfying $p^{\text{plan}} < p^* \leq p^{\text{stay}}$, i.e., a level that induces procrastination in switching. Hence, initial firms choose cash bonuses B_l, while p^* is the unit price effective immediately. The bonus is paid in the submoment after signing.[20] As before, we call these cash bonuses "exploding" because they are only available for initial purchases.

Observation 5 (Exploding Cash Bonuses)**.** *For any $\beta < 1$, any equilibrium has an average price of zero ($B^* = p^*/r$).*

Observation 5 is the single counterexample we have found to the general message that procrastination undermines competition. Here, present-biased consumers may induce perfect competition, even though products are differentiated and it is costly to switch to an alternative. Since $p^{\text{plan}} < p^*$, all consumers believe that they will switch immediately to their favorite alternative. Hence, they take the product with the higher bonus independently of whether it is their favorite product. This leads the firms to compete away all of their ex-post profits through the bonus; and it is straightforward to check that there is no profitable deviation if both firms set $B^* = p^*/r$. Notably, the

[20] That the consumer obtains the bonus after paying the switching cost is important for our results; how much later she obtains it is not important. This assumption is consistent with practice in most markets motivating our analysis, where the switching cost (such as the effort of finding a new provider and executing the change) must be paid before switching, but the bonus is received only after contracting has taken place.

same outcome is not an equilibrium if consumers are time-consistent (and $p^* \leq p^{\text{stay}}$, so consumers do not switch). Since a time-consistent consumer understands that taking her non-favorite firm is costly (either in mismatch disutility or switching cost), she is willing to pay a premium for her favorite firm. As a result, a firm can profitably deviate from the competitive bonus level. Hence, in this case, consumer naivete intensifies competition.[21]

Observation 5, however, relies on an unrealistic assumption we have maintained so far: that the offers firms make initially are exploding. Casual observation makes obvious that a firm's introductory deals will often also be available at future times — even if the firm claims that the deal is a one-time promotion. We capture such a situation by assuming that at submoment $0'$ and at intervals of W thereafter, the consumer can switch to the unchosen initial firm's contract. She cannot take an initial firm's contract more than once. For simplicity, we suppose that other alternatives are unavailable. Our main interest is in outcomes when W is small, so that consumers can get out of the contract not only immediately, but also frequently thereafter.

Proposition 6 (Non-Exploding Cash Bonuses)**.** *For any $\beta < 1$, if W is sufficiently small, then there is an equilibrium in which firms pay a bonus of $B^* = s$. Each consumer takes and sticks with her non-favorite firm.*

The proposition identifies an uncompetitive equilibrium that exists for any differentiation $d > 0$, and in which firms pay a sign-up bonus of s. Since the total discounted payment p^*/r could be arbitrarily large relative to s or d, bonuses again do little in the way of encouraging competition or returning profits to consumers. And as an extra problem, consumers match with the wrong firm.

For an intuition, suppose that firms' bonuses are somewhat higher than equilibrium ($B_l > s$). Then, the consumer plans to take advantage of both bonuses, and end up on her favorite firm's contract. Hence, she strictly prefers to take her *non-favorite* product first. If the wait time W is sufficiently short, however, she procrastinates on switching, and hence sticks with the wrong service forever. Furthermore, since the consumer's initial choice does not depend on which bonus is higher, firms want to deviate by lowering their bonus. They do so as long as consumers still expect to take advantage of both bonuses, i.e., until $B_l = s$.

[21] Related to Observation 5, Proposition 3 implies that if $p^{\text{stay}} - p^{\text{plan}} < d$ (while $p^{\text{stay}} > d$ still holds), then present-biased consumers may do better than time-consistent consumers (who also have $p^{\text{stay}} > d$). Since consumers are only slightly present-biased, they value an introductory period approximately correctly. But since they falsely expect to switch, they do not care so much about mismatch disutility, and are hence more responsive to introductory deals than time-consistent consumers. As a result, competition in the length B of the introductory period is intense. Unfortunately, however, plausible parameter values are far from the range in which this occurs.

Now no firm has a profitable deviation. If a firm lowers its bonus, then it is optimal for all consumers to start with the other firm. As we have just argued, a firm cannot attract a consumer initially by raising its bonus. Finally, a bonus attract switchers only if the interest they lose over a delay of W overcomes their present bias. If W is small, the required bonus is too large to be profitable.

6 Alternative Psychological Assumptions

To model consumer behavior, we have assumed naive present bias, the most widely used microfoundation for procrastination. In this section, we consider alternative foundations.

6.1 Partial Naivete

We first discuss what happens in our basic model when consumers underestimate, but are not fully naive about, their present bias. To do so, we assume (following O'Donoghue and Rabin, 2001) that a consumer has a point belief $\hat{\beta}$ about her future short-term discount factor, and $\beta < \hat{\beta} \leq 1$. In this formulation, $\hat{\beta} = 1$ corresponds to the full naivete we have assumed so far, and $\beta < \hat{\beta} < 1$ corresponds to partial naivete. We demonstrate that competition failure often results for *any* $\hat{\beta} > \beta$, i.e., it only requires lack of full sophistication, not full naivete.[22]

To start, we argue that the stay threshold p^{stay} defined in (4) for fully naive consumers is also the stay threshold for partially naive consumers. On the one hand, if a partially naive consumer takes her favorite product at price p^{stay}, she procrastinates on switching just like a fully naive consumer does. Indeed, given that her actual present bias is β, she is indifferent between switching immediately and switching next time; and given that she believes her present bias will be $\hat{\beta} > \beta$, she expects to strictly prefer switching next time rather than later. Hence, she puts off the task. On the other hand, for any price above p^{stay}, the consumer strictly prefers to switch immediately, so she does so at the first opportunity.

Building on the above, we show that any offer with a long-run price of p^{stay} that is an equilibrium with fully naive consumers (i.e., offers with $p^* = p^{\text{stay}}$ in Proposition 1 and $p^{2*} = p^{\text{stay}}$ in Propositions 3-5) continues to be an equilibrium with partially naive consumers. First, independently of their locations, both partially and fully naive consumers expect to switch away from the candidate equilibrium offers, so they evaluate these offers identically. This implies that the equilibrium offers

[22] The conclusion that an arbitrarily small amount of naivete can have large effects in a market setting is reminiscent of previous work by DellaVigna and Malmendier (2004) and Heidhues and Kőszegi (2010).

generate the same profit for the two types of consumers. Second, a deviation yields weakly lower profits from partially than from fully naive consumers, because partially naive consumers taking a non-equilibrium offer may realize and dislike that they will behave suboptimally in the future. This makes a deviation at the initial stage less attractive to them, weakly lowering the deviating firm's demand. Further, the pessimism about future behavior also induces an attracted partially naive consumer to switch weakly earlier than a naive consumer would, weakly lowering the deviation profit per attracted consumer.

6.2 Other Models of Procrastination

We argue that two microfoundations for procrastination not based on present bias also lead to similar insights, and have some additional implications.

Underestimation of Future Switching Costs We first consider the possibility that consumers underestimate future switching costs.[23] This may arise, for instance, from overconfidence in one's future willingness to undertake administrative tasks or an underestimation of future opportunity costs. Suppose that $\beta = 1$ and at any time, consumers' true switching cost is $s' > s$, while they believe with certainty that it will be s in the future. This leads to the same consumer behavior, and hence the same firm behavior, as our model with $\beta = s/s'$. Intuitively, underestimating future switching costs has the same effect on behavior as overestimating a future self's benefit from switching, which in turn is equivalent to overestimating the future self's discount factor.

Overconfidence about Future Memory or Attention Another potential hypothesis is that consumers overestimate their future ability to remember or pay attention to beneficial tasks.[24] Whenever consumers choose a provider or consider switching, they devote close attention to the task. In this situation, they may mistakenly assume that they will pay similarly high attention in the future and will be able to recall the task at any time. For a formal example, suppose that the consumer's switching cost at a moment in time is either s_L or $s_H > s_L$. During any switching opportunity, she faces times with both switching costs, but in order to act, she must also recall the task. Crucially, the consumer never remembers when her switching cost is s_L; for instance,

[23] Consistent with this hypothesis, Tasoff and Letzler (2014) find that subjects overestimate their probability of redeeming a rebate-like form by 49 percentage points. Additional evidence — e.g., that lowering transaction costs affects redemption but not beliefs — suggests that the overoptimism is due to an incomplete appreciation of future costs. Similarly, Rodemeier (2025) documents that online shoppers underestimate the hassle cost of claiming a rebate.

[24] Supporting evidence comes from Ericson (2011), who documents that subjects overvalue a payment in six months that they have to remember to claim, as well as Rogers and Milkman (2016) and Bronchetti et al. (2023), who find that people undervalue reminders.

she might be engaged in leisure activities at such times and forget about the task. But when she thinks about the future, she naively believes that she will remember the task for both switching-cost realizations. This is equivalent to the model above with $s' = s_H$ and $s = s_L$. Intuitively, overconfidence about memory and attention leads to overconfidence about remembering to switch when the cost is low, which is equivalent to underestimating the future cost of switching.[25]

Additional Implications Limitations in memory or attention may be especially conducive to procrastination, and thus competition failure, if they occur simultaneously with present bias. Consider, for example, the annual open enrollment period in a medical plan, during which a consumer was confident she will switch her insurance provider. Due to present bias, she may put off switching to late in the enrollment period, thinking that she still has time. If she was only present biased, then the deadline at the end of the period could induce her to act.[26] But if she is also forgetful in ways she did not anticipate, she may simply not remember. Then, the deadline both fails to motivate her and leaves her stuck with an expensive contract for another year.

Related logic helps account for patterns that our present-bias-based framework does not predict. One such pattern is that firms (e.g., mobile-phone providers) sometimes choose relatively long stay requirements, such as one or two years. Similarly, it was — until bans came into effect — common to renew contracts for another year or two if consumers failed to switch during the allotted window.[27] In our model, such strategies are suboptimal because they delay when a consumer expects to switch, raising the total price she expects to pay. Another pattern is that prices during the introductory period often exceed costs. In our model, this translates to $p^1 > 0$, which is again suboptimal because it raises the price a consumer expects to pay.

The above practices do make sense, however, if a firm's goal is to induce consumers to forget about switching. A long stay requirement helps because by the time a switching opportunity comes around, the intention to switch may have faded from the consumer's memory. Further, if a

[25] The conditions under which the above models lead to the *exact same* consumer behavior as our present-bias-based model are arguably special. While less extreme versions of our assumptions do not lead to the exact same behavior, the intuitions suggest that they are likely to satisfy the logic of consumer behavior underlying our results: that (i) a consumer overestimates her inclination to switch in the future, and, as a result, (ii) she is prone to not switching now.

[26] The idea that deadlines serve as effective tools to mitigate present-bias-induced procrastination is well-understood since O'Donoghue and Rabin (1999b).

[27] Responding to the widespread use of such contract clauses in different sectors, Germany made the use of them illegal in contracts for the regular provision of goods or services to households (see, e.g., `https://www.bmjv.de/SharedDocs/Meldungen/DE/2022/0228_faire_Verbrauchervertraege.html`, accessed April 16, 2026). Ofgem — the UK regulator for gas and electricity — rules out the use of early termination fees for contracts that are automatically rolled over (`https://www.ofgem.gov.uk/sites/default/files/docs/2017/10/decision_letter_-_default_tariffs_for_domestic_customers_at_the_end_of_fixed-term_tariffs.pdf`, accessed April 16, 2026).

consumer is not paying attention, the firm might as well lock her in for another lengthy period. And a higher introductory price helps because it makes the subsequent price change smaller and thus less salient. The relevance of such salience considerations is suggested by pricing patterns that appear explicitly designed to avoid triggering consumers' attention to switching. Under "price walking," sellers increase margins a bit at each renewal until a target margin is reached (Financial Conduct Authority, 2019, page 44). Under "legacy pricing," sellers in a market with a general downward pricing trend keep contracts unaltered for existing customers, while offering better deals to new ones (Office of Communications, 2019). Finally, a common type of contract starts with an attractive price but reverts to the "regular" price after the introductory period, and then automatically renews at the latter price for passive consumers.

7 Discussion of Policy Implications

Given the main message of our paper — that markets with switching costs do not work well — it is natural to ask whether there are interventions that increase consumer welfare. We conclude by discussing some first-pass ideas, recognizing that more research is necessary, especially for evaluating the practical implementability of our proposals.

Based on our arguments, it appears daunting to design a soft-touch intervention that operates at the switching stage and reliably lowers procrastination. As we have shown in Section 4.2, policies inspired by classical research, such as lowering the switching cost s or shortening the wait time W, can backfire with present-biased consumers. And our arguments in Section 6.2 imply that even policies designed for naive present-biased consumers, such as limited time windows or deadlines for switching, can backfire if procrastination is partly due to imperfect memory or attention, which seems likely. If both mechanisms are operational, then one must combine deadlines with effective reminders (Ericson, 2017), but it is likely difficult to time reminders just right and guarantee that the consumer pays attention.

It is worth noting that just like policymakers, firms may also try to motivate switchers by offering limited-time or exploding deals. Such offers may fail for the same reasons as the above policy interventions, and because of two further, strategic problems. First, as we have emphasized, commitment to not offering the deal again may be impossible. Second, Section 5.1 shows that even if a single firm's deal is exploding, consumers may procrastinate because they expect other firms to offer similar deals in the future.

A completely different regulatory approach is to target initial competition. We contrast two cases. First, for relatively undifferentiated products, one effective policy that only minimally changes the economic environment is a type of managed competition: the consumer is initially assigned to the cheapest provider, and if she wishes, she can immediately switch to another initial provider. Then, firms compete intensely to be assigned (and hence keep) consumers, circumventing procrastination and resulting in marginal-cost pricing.[28] A noteworthy example is Ohio's residential electricity market as described by Joskow (2003). By default, some municipalities purchased power on behalf of consumers and assigned them to the cheapest supplier. Consumers who wanted to make their own choices could opt out, but few did. Of course, many more consumers were on low-price contracts than in other parts of the US. Similarly, some low-income enrollees in Medicare Part D receive free coverage if their premium is below a threshold, and they are automatically reassigned to a cheaper plan if their existing premium rises above the threshold.[29] Evidence based on the effects of consumer attention suggests that an expansion of such a program could significantly reduce prices (Ho et al., 2017).

Second, for more differentiated products, efficiency dictates that consumers choose their providers themselves.[30] One potential policy direction, then, is to require consumers to designate a switching strategy when signing up with a provider. For example, in our model, each consumer could pre-specify her preferred supplier (the initial firm or an alternative) from time T. The consumer can later opt out of her choice, but if she does not, then her strategy is automatically implemented. This again circumvents procrastination, leading consumers to make their initial contract choice as if they had a short-run discount factor $\beta = 1$. As a result, firms compete more strongly. With introductory periods, for example, firms would charge an average price of at most the degree of differentiation d — and potentially much less — while without the policy they may charge large multiples of d. For time-consistent consumers, in contrast, the policy has no effect. A variant of this policy suited to markets with non-exclusive contracting (e.g., streaming services, as discussed in Section 5.2) allows consumers, at sign-up, to pre-specify whether the contract should be canceled

[28] Formally, we can evaluate this policy in our basic model of Section 3. Suppose that $d < rs$, consumers are assigned to the cheaper initial firm (or randomly in case of a tie), and at cost s they can switch to the other initial provider at time 0. It is easy to verify that in the unique symmetric pure-strategy equilibrium, $p^* = 0$ and consumers do not switch. Although consumers are not matched to firms efficiently, this matters little due to the low degree of differentiation.

[29] `https://www.cms.gov/medicare/enrollment-renewal/part-d-plans/low-income-subsidy/reassignment`, accessed April 16, 2026.

[30] Of course, product differentiation can arise not only from utility-relevant features, but also from consumers' misperceptions about which attributes matter. In such cases, our model strengthens the case for product standardization. Restricting differentiation to dimensions that ultimately matter for consumer welfare intensifies competition through standard logic, but also limits the amplifying effect of procrastination-induced competition failures.

at the end of the introductory period.

An alternative to pre-specification is an active-choice rule that forces a deliberate decision between staying and switching and, importantly, equalizes the convenience costs of the two. From an individual-choice perspective, it is well-understood that active choice can benefit consumers by eliminating the possibility of procrastination. This is attractive if no single default option fits all consumers, i.e., consumers are sufficiently heterogeneous (Carroll et al., 2009, Beshears et al., 2021). Our model adds a novel market perspective: even without much heterogeneity, active choice can be beneficial because it intensifies competition and improves the options available to consumers in the first place. As an example, suppose that whenever the price is about to rise, the consumer's existing contract is provisionally canceled, and she must re-select her provider on a standardized site that does not favor the current seller.[31] As a result, the consumer chooses as if she had a switching cost of zero (although she does have to pay the relatively small convenience cost of active choice). In our model, firms react by not offering introductory deals, and reducing their average price to d. This means that they do not trigger the active-choice rule. If there are reasons for introductory deals or price hikes outside our model, the rule may be triggered at a low cost (and potentially other benefits) for consumers.

In our theory, market outcomes and optimal policy responses derive from consumers' false belief that they will switch away from a bad deal in the future. We suspect that incorrect expectations about one's future "choice-revision" efforts may have far broader implications for markets. Closely related to our setting is the case where individuals are initially uncertain about the quality of a product — or employer or partner — and overestimate their likelihood of abandoning a poor match. In such cases, they may overprioritize money or other salient payoffs over non-obvious good matches that require effort to find, leading to an initial market that is overly competitive in the salient dimensions (e.g., looks in the dating market) and generates mismatch disutility on other dimensions that consumers do not correct later. Similarly to our competition-failure results, however, naivete can also reduce competition to offer better initial matches, so the total effect requires careful modeling and estimation to evaluate. More generally, whenever choices are, in principle, revisable — as is common in consumption, saving, and labor-market decisions — agents who expect to act more rationally in the future may exhibit an excessive tolerance to give in to their biases today. This forward-looking naivete can, in turn, distort firms' incentives and modify

[31] An issue with active-choice rules is what to do if (despite the requirement) a consumer does not make a selection. In our setting, the planner can assign her to the cheapest provider.

competitive pressures.

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Online Appendix for

Procrastination and Competition Failure

Peter Andre, Paul Heidhues, Botond Kőszegi, Takeshi Murooka

A Proofs

Proof of Observation 1. In the main text.

Proof of Observation 2. By Observation 1, $p_0, p_1 \leq p^{\text{stay}}$ in any non-switching equilibrium. Because $v > p^{\text{stay}}$, conversely, all consumers purchase from the monopolist whenever $p_0, p_1 \leq p^{\text{stay}}$ and hence $p_0 = p_1 = p^{\text{stay}}$ dominates any other price vector that does not induce some consumers to switch. For any consumer who switches, the monopolist can charge at most v, earning $\frac{1-e^{-rT}}{r}v$ from this consumer; and if the monopolist charges $p_0 = p_1 = v$, then all consumers are willing to buy. Therefore, if $(1-e^{-rT})v > p^{\text{stay}}$, it is uniquely optimal to charge v and induce all consumers to switch; if the inequality is reversed, then it is uniquely optimal to charge p^{stay} and induce non-switching. □

Proof of Observation 3. A consumer located at x is indifferent between buying from firm 0 and firm 1 if

$$\int_0^\infty ve^{-r\tau}d\tau - \int_0^{T^d} xde^{-r\tau}d\tau - \int_0^\infty p_0e^{-r\tau}d\tau = \int_0^\infty ve^{-r\tau}d\tau - \int_0^{T^d}(1-x)de^{-r\tau}d\tau - \int_0^\infty p_1e^{-r\tau}d\tau,$$

which is equivalent to $x^{ns}(p_0,p_1) = {}^{\bar{d}+p_1-p_0}/_{2\bar{d}}$. Suppose firm 1 sets the symmetric equilibrium price p^*. Then, firm 0's demand is $D_0(p_0,p^*) = \max\{0, \min\{x^{ns}(p_0,p^*), 1\}\}$. For p^* to be a symmetric equilibrium, we must have $p^* = \arg\max_{p_0} p_0D_0(p_0,p^*)$, which requires that $p_0 = p^*$ satisfies the first order condition

$$\frac{1}{2\bar{d}}[\bar{d} + p^* - 2p_0] = 0. \tag{5}$$

Hence, a necessary condition is $p^* = \bar{d}$. Because the above profit function is concave over the range in which demand is interior, the first-order condition is also sufficient. □

Proof of Proposition 1.

Part I. In a symmetric equilibrium, each consumer buys her favorite product initially. It then follows from Observation 1 that for the consumer not to switch, $p^* \leq p^{\text{stay}}$ must hold. By Equation 4, $p^{\text{plan}} = p^s + rs$ is the price at which a time-consistent consumer — for whom $\beta = 1$ — refrains from switching if she bought her favorite product, and a naive time-inconsistent consumer expects to switch (with positive probability) at time T only for prices (weakly) above p^{plan}. Time-consistent consumers for whom $p^{\text{plan}} = p^{\text{stay}}$, thus, expect not to switch when buying their favorite product at $p^* < p^{\text{stay}}$.

First, consider time-consistent consumers. Suppose firm 1 charges the symmetric equilibrium price $p^* < p^{\text{stay}}$ and consider deviations by firm 0. Because time-consistent consumers strictly prefer not to switch when buying their favorite product for the symmetric equilibrium price p^*, there exists an open interval of prices $o(p)$ around p^* and an open interval of consumer locations $o(l)$ around $1/2$ such that for any price p_0 in the open pricing interval no time-consistent consumer in the open location interval wants to switch at time T (or any later switching opportunity) independently of whether she bought her favorite or non-favorite product. Consider an open subinterval $o'(p) \subset o(p)$ such that for any $p_0 \in o'(p)$, $x^{ns}(p_0, p^*) = \bar{d}+p^*-p_0/2\bar{d} \in o(l)$; for any such local price deviation by firm 0, the consumer who is indifferent between firms 0 and 1 does not want to switch at time T. For local deviations to be unprofitable, Equation 5 must hold. Hence, $p^* = \bar{d}$ if $p^* < p^{\text{stay}}$, which establishes Part I(a).

Second, consider time-inconsistent consumers. Analogously, if $p^* < p^{\text{plan}}$, a naive time-inconsistent consumer expects to strictly prefer not to switch. For local deviations to be unprofitable, it must be that $p^* = \bar{d}$. In case $p^* \in (p^{\text{plan}}, p^{\text{stay}})$, the time-inconsistent consumers expect to prefer to switch at time T when buying her favorite product by Equation 4; since the benefit of switching is even greater when buying her non-favorite product, consumers hence expect to switch when both firms price above p^{plan}. In that case, the consumer is indifferent between buying from firm 0 and firm 1 if and only if

$$\int_0^T ve^{-r\tau}d\tau - \int_0^T xde^{-r\tau}d\tau - \int_0^T p_0e^{-r\tau}d\tau = \int_0^T ve^{-r\tau}d\tau - \int_0^T (1-x)de^{-r\tau}d\tau - \int_0^T p_1e^{-r\tau}d\tau,$$

where we use the fact that $T \leq T^d$. This is equivalent to $x(p_0, p_1) = d+p_1-p_0/2d$. Supposing firm 1 sets the symmetric equilibrium price p^*, firm 0's demand when deviating to a price $p_0 \in (p^{\text{plan}}, p^{\text{stay}})$ is $D_0(p_0, p^*) = \max\{0, \min\{x(p_0, p^*), 1\}\}$. A necessary condition for a symmetric equilibrium is thus that $p_0 = p^*$ maximizes $p_0D_0(p_0, p^*)$. It follows from the first-order condition that $p^* = d$ in such an equilibrium.

We are left to rule out that the firm charges a price $p^* = p^{\text{plan}} \neq d, \bar{d}$. Suppose otherwise, and consider first a deviation by firm 0 to a price $p_0 < p^{\text{plan}}$. To specify the profits of such a deviation, we now establish that a consumer who buys from firm 0 does not plan to switch at T (or thereafter). Since $p_0 < p^{\text{plan}}$, a consumer y can only be willing to switch if $y > 1/2$. Switching changes future payments by $(p_0 - p^s)/r$, induces a gain in product satisfaction of $(1/r)(2y-1)d(1-e^{-r(T^d - T)})$, and costs s. A necessary condition for planing to switch is thus that

$$p_0 - (p^s + rs) + (2y-1)d = p_0 - p^{\text{plan}} + (2y-1)d > 0. \tag{6}$$

Consumer y strictly prefers to buy from firm 1 and not switch rather than to buy from firm 0 and switch to product 1 at time T if

$$\begin{gathered} v - \int_0^\infty p_1 e^{-r\tau} d\tau - \int_0^{T^d} (1-y) d e^{-r\tau} d\tau > \\ v - \int_0^T p_0 e^{-r\tau} d\tau - \int_0^T y d e^{-r\tau} d\tau - \int_T^\infty p^s e^{-r\tau} d\tau - \int_T^{T^d} (1-y) d e^{-r\tau} d\tau - s e^{-rT}, \end{gathered}$$

which is equivalent to

$$0 > p_1 - p^{\text{plan}} - (1 - e^{-rT}) \left[p_0 - p^{\text{plan}} + (2y-1)d \right].$$

Because $p_1 = p^* = p^{\text{plan}}$ by presumption, the right-hand side of this inequality is negative by (6), and hence if consumer y wants to switch to product 1 at time T, she prefers to buy from firm 1 initially. Therefore, firm 0's demand is at most $\min\{x^{ns}(p_0, p^{\text{plan}}), 1\}$. Hence, the left-handed limit of firm 0's marginal profits evaluated at p^{plan} are

$$\lim_{p_0 \nearrow p^{\text{plan}}} \frac{1}{2\bar{d}} (\bar{d} + p^{\text{plan}} - 2p_0) = \frac{1}{2\bar{d}} (\bar{d} - p^{\text{plan}}),$$

which is non-negative if and only if

$$p^{\text{plan}} \leq \bar{d}. \tag{7}$$

Hence, a necessary condition for an equilibrium in which $p^* = p^{\text{plan}}$ to exist is that (7) holds.

If firm 0 raises its price above p^{plan}, then any consumer attracted by firm 0 plans to switch at time T; and since the consumer located at $1/2$ is indifferent between switching and not switching when buying from firm 1, any consumer located at $y < 1/2$ plans to switch at time T when having bought from firm 1. Hence, firm 0's initial demand is given by $x(p_0, p^{\text{plan}}) = {}^{d+p^{\text{plan}}-p_0}/_{2d}$. Because consumers are naively time-inconsistent, and hence $p^{\text{plan}} < p^{\text{stay}}$, they refrain from switching for local deviations. Thus, local deviations upwards are unprofitable if

$$\lim_{p_0 \searrow p^{\text{plan}}} \frac{1}{2d}\left[d + p^{\text{plan}} - 2p_0\right] = \frac{1}{2d}[d - p^{\text{plan}}] \leq 0.$$

Hence, a necessary condition for an equilibrium with $p^* = p^{\text{plan}}$ to exist is that $p^{\text{plan}} \geq d$. Together with $d \geq \bar{d}$ and (7), this implies that an equilibrium in which $p^* = p^{\text{plan}}$ can only exist if $d = \bar{d} = p^{\text{plan}}$, a knife edge case we have ruled out.

We conclude that any $p^* < p^{\text{stay}}$ must satisfy either $p^* = \bar{d}$ or $p^* = d$, which together with $p^* \leq p^{\text{stay}}$ establishes Part I(b). □

Part II. Suppose first that $p^{\text{stay}} > d$ and firm 0 sets the candidate equilibrium price $p^* = d$. We begin by ruling out a profitable deviation to $p_0' \in (p^{\text{plan}}, p^{\text{stay}}]$. As argued in Part I, any consumer who buys from firm 0 plans to switch for $p_0' > p^{\text{plan}}$. A necessary condition for the consumer to choose firm 0 is hence that she prefers to buy from firm 0 and switch rather than to buy from firm 1 and switch. Thus, profits of firm 0 in the case are bounded from above by

$$p_0' \max\{0, \min\{x(p_0', d), 1\}\} = p_0' \max\left\{0, \min\left\{\frac{2d - p_0'}{2d}, 1\right\}\right\}.$$

A necessary condition for a profitable deviation p_0' to exist is hence that $p_0' x(p_0', d) > {}^d/_2$. Because $p_0 = d$ satisfies the first-order condition and $p_0' x(p_0', d)$ is concave over the interval $(p^{\text{plan}}, p^{\text{stay}}]$, such a deviation does not exist. Similarly, since consumers who buy from firm 0 switch at time T for prices $p_0 > p^{\text{stay}}$, profits following such a deviation are bounded from above by

$$(1 - e^{-rT}) p_0' \max\{0, \min\{x(p_0', d), 1\}\} < p_0' \max\{0, x(p_0', d)\},$$

and hence such a deviation is also unprofitable by concavity of $p_0' x(p_0', d)$. Finally, when deviating to a price $p_0' < p^{\text{plan}}$, a trivial bound on firm 0's profits is p^{plan}, which is less than the candidate equilibrium profits ${}^d/_2$ by Condition (a).

Suppose next that $p^{\text{stay}} < d$ and firm 0 sets the candidate equilibrium price $p^* = p^{\text{stay}}$. By a similar argument to above, a deviation from the candidate equilibrium price to $p_0' < p^{\text{stay}}$ is unprofitable. Furthermore, a deviation to $p_0' > p^{\text{stay}}$ is unprofitable if

$$(1 - e^{-rT})p_0' x(p_0', p^{\text{stay}}) < \frac{p^{\text{stay}}}{2}.$$

Because $p_0' x(p_0', p^{\text{stay}})$ is bounded, as $T \to 0$ the left hand side of the above inequality goes to zero, and hence any deviation is unprofitable for sufficiently small T. □

Part III. Suppose first that $d < p^{\text{stay}}$. Since $\overline{d} > p^{\text{plan}}$, it follows from the proof of Part I that there exists no equilibrium in which $p^* = \overline{d}$, and by Part I thus $p^* = d$ if $p^* < p^{\text{stay}}$. We are hence left to rule out a non-switching equilibrium in which $p^* = p^{\text{stay}}$ and a switching equilibrium in which $p^* > p^{\text{stay}}$. In the former case, since $p^* = p^{\text{stay}} > p^{\text{plan}}$, all consumers expect to switch when both firms prices are sufficiently close to p^*. Furthermore,

$$\lim_{p_0 \nearrow p^{\text{stay}}} \frac{\partial}{\partial p_0} p_0 x(p_0, p^*) = \lim_{p_0 \nearrow p^{\text{stay}}} \frac{1}{2d}[d + p^* - 2p_0] = \frac{1}{2d}[d - p^{\text{stay}}] < 0,$$

and hence it is proiftable to lower p_0, contradicting the existence of such an equilibrium. In the latter case ($p^* > p^{\text{stay}}$), consumers plan to and actually switch at time T. Thus, firm 0's profits when setting $p_0 > p^{\text{stay}}$ taken as given that firm 1 sets the candidate equilibrium price $p^* > p^{\text{stay}}$ are $(1/r)(1 - e^{-rT})p_0' x(p_0', p^{\text{stay}})$. It follows from the first-order condition that a necessary condition for such an equilibrium is $p^* = d > p^{\text{stay}}$, contradicting $d < p^{\text{stay}}$.

Suppose second that $d > p^{\text{stay}}$. Because $d > p^{\text{stay}}$ and $\overline{d} > p^{\text{plan}}$, the proof of Part I rules out a non-switching equilibrium in which $p^* < p^{\text{stay}}$. We are thus left to rule out a switching equilibrium in which $p^* > p^{\text{stay}}$. By the a similar calculation to above, a necessary condition for such an equilibrium is that $p^* = d > p^{\text{stay}}$. Thus, candidate equilibrium profits are $(1 - e^{-rT})d/2r$, and for sufficiently small T,

$$(1 - e^{-rT})\frac{d}{2r} < \frac{p^{\text{stay}}}{2r} < \frac{p^{\text{stay}}}{r} \min\{x(p^{\text{stay}}, d), 1\}.$$

Hence, a profitable deviation exists, contradicting the existence of an equilibrium with $p^* > p^{\text{stay}}$.

□

Proof of Observation 4. Proposition 1 Part II (a) shows that a non-switching equilibrium with $p^* = d$ exists if $p^{\text{stay}} > d > 2p^{\text{plan}}$. In what follows, we show that a non-switching equilibrium with $p^* = \overline{d}$ exists if $(2 - e^{-rT})p^{\text{plan}} \geq 2\overline{d}$.

We first characterize a candidate equilibrium with $p^* < p^{\text{plan}}$. When deviating from $p^* < p^{\text{plan}}$

to $p_0 \in [0, p^{\text{plan}}]$, firm 0 earns profits of

$$\frac{1}{r} p_0 \min\left\{ \max\left\{ 0, \frac{1}{2} + \frac{p^* - p_0}{2\bar{d}} \right\}, 1 \right\}.$$

Using the first-order condition, a necessary condition for the candidate equilibrium is that $p^* = \overline{d}$, and hence that $\overline{d} < p^{\text{plan}}$.

We next check deviations from the above candidate equilibrium. Consider a deviation by firm 0 in which it sets a price $p_0 \in [0, p^{\text{plan}}]$. We first rule out that a consumer y who bought from firm 1 plans to switch at T. Because $p^* < p^{\text{plan}}$, the consumer can only be planing to switch if $y < 1/2$. From now on, consider this case. Then, switching at T changes discounted payments from T by $1/r(p_1 - p^s)$ and leads to a discounted gain in product satisfaction of $\beta \int_T^{T^d} (1-2y) d e^{-r\tau} d\tau \leq 1/r(1-2y)d$, and induces switching costs s. Hence, a necessary condition for planing to switch to product 0 is that

$$[p_1 - (p^s + rs)] + (1-2y)d = (p_1 - p^{\text{plan}}) + (1-2y)d \geq 0. \tag{8}$$

Consumer y prefers buying from firm 0 and not switching to buying from firm 1 and switching to product 0 if

$$-\int_0^{\infty} p_0 e^{-r\tau} d\tau - \int_0^T dy e^{-r\tau} d\tau \geq -\int_0^T p_1 e^{-r\tau} d\tau - \int_T^{\infty} -p^s e^{-r\tau} d\tau - \int_0^T d(1-y) e^{-r\tau} d\tau - e^{-rT} s,$$

where we use the fact that both strategies yield the same product satisfaction after T. This is equivalent to

$$p_1(1 - e^{-rT}) + (p^s + rs)e^{-rT} - p_0 + (1-2y)d(1 - e^{-rT}) \geq 0,$$

which holds for any consumer who would want to switch at T since

$$p_1(1 - e^{-rT}) + p^{\text{plan}} e^{-rT} - p_0 + (1-2y)d(1 - e^{-rT}) \geq (1 - e^{-rT}) \{p_1 - (p^s + rs) + (1-2y)d\} \geq 0,$$

where the first inequality follows from $p_0 \leq p^{\text{plan}}$ and the second from Equation (8). We conclude that no consumer plans to switch from product 1 to product 0. By symmetry, no consumer plans to switch from product 0 to product 1 if both firms price below p^{plan}. Finally, consumers do not plan to switch to the same product when firms charge below p^{plan}. Hence, consumers do not plan to switch when $p_0, p_1 \leq p^{\text{plan}}$; this also implies that consumers do not switch at T.

We finally rule out a profitable deviation to $p_0 > p^{\text{plan}}$. By the definition of p^{plan}, a consumer buying from firm 0 plans to switch at T. A necessary condition for consumer y to buy from firm 0 is thus that she prefers buying from firm 0 and switching at T to buying from firm 1 and not switching; i.e. $y \leq x'$ where x' satisfies

$$\bar{d}x' + \left[(1 - e^{-rT})p_0 + e^{-rT}p^{\text{plan}}\right] = \bar{d}(1 - x') + p^*,$$

which using that $p^* = \overline{d}$ is equivalent to

$$x'(p_0, \overline{d}) = \frac{1}{2} + \frac{\bar{d} - [(1 - e^{-rT})p_0 + e^{-rT}p^{\text{plan}}]}{2\bar{d}}.$$

Thus, when deviating to a price $p_0 \in (p^{\text{plan}}, p^{\text{stay}}]$, firm 0's profits are less than

$$\frac{1}{r}p_0 \max\left\{\frac{1}{2} + \frac{\bar{d} - [(1 - e^{-rT})p_0 + e^{-rT}p^{\text{plan}}]}{2\bar{d}}, 0\right\}$$

Moreover, this profit function is an upper bound on the actual profits for all prices $p_0 > p^{\text{stay}}$ (which take into account that consumers do switch at T if $p_0 > p^{\text{stay}}$). Note that our bound on profits is strictly concave over the interior demand range. Taking the derivative with respect to p_0 gives,

$$\frac{1}{2rd}[2\overline{d} - e^{-rT}p^{\text{plan}} - 2(1 - e^{-rT})p_0],$$

and hence a sufficient condition for an equilibrium with $p^* = \overline{d} < p^{\text{plan}}$ to exist is that $(2 - e^{-rT})p^{\text{plan}} \geq 2\overline{d}$. □

To prove Proposition 2, we use the following Lemma.

Lemma 1. *I. If there exists a symmetric equilibrium with $p^* > p^{stay}$, then in any such equilibrium $p^* = d$ and consumers switch at time T.*

II. There exists a symmetric equilibrium with $p^* = d$ if both of the following conditions are satisfied:

Condition (a) $d > p^{stay}$ and $dp^{stay}e^{-rT} \leq (1 - e^{-rT})\left(d - p^{stay}\right)^2$;

Condition (b): $\overline{d} \geq p^{plan} - (1 - e^{-rT})(d - p^{plan})$.

III. Conversely, if Condition (a) is violated, no equilibrium with $p^* > p^{stay}$ exists.

Part I. Consider a candidate symmetric equilibrium with $p^* > p^{\text{stay}}$. By (4), a consumer who bought her favorite product will switch. Because the benefit of a consumer who bought her non-favorite product from switching is weakly greater, all consumers switch at a price above p^{stay} at

T. Furthermore, because consumers think they are time-consistent ($\hat{\beta} = 1$), by (4) they expect to switch for any price $p > p^{\text{plan}}$. Hence, for any pair of prices $p_0, p_1 \in [p^{\text{plan}}, \infty)$, the consumer located at x is indifferent between the two firms if

$$\int_0^T (v - dx - p_0)e^{-r\tau} d\tau = \int_0^T (v - d(1-x) - p_1)e^{-r\tau} d\tau,$$

which is equivalent to

$$x(p_0, p_1) = \frac{1}{2} + \frac{p_1 - p_0}{2d}. \tag{9}$$

Thus, the demand of firm 0 is

$$D_0(p_0, p_1) = \min\{\max\{0, x(p_0, p_1)\}, 1\} \qquad \text{if } p_0, p_1 \in [p^{\text{plan}}, \infty). \tag{10}$$

Because consumers switch at T, if firm 1 sets the candidate equilibrium price $p^* > p^{\text{stay}}$ and firm 0 sets a price $p_0 > p^{\text{stay}}$, firm 0's profits are

$$\frac{1}{r} D_0(p_0, p_1) p_0 (1 - e^{-rT}). \tag{11}$$

Focusing on the interior demand case and using the first-order condition with respect to p_0, yields

$$d + p^* - 2p_0 = 0.$$

Hence, a necessary condition for a candidate equilibrium with $p^* > p^{\text{stay}}$ is $p^* = d$. This, together with the fact that consumers switch for prices above p^{stay}, proves Part I. □

Part II. We consider whether a profitable deviation from a candidate equilibrium $p^* = d$ exists for firm 0. First, because the profit function in (11) is concave for all prices $p_0 > p^{\text{stay}}$ that induce positive demand, there exist no profitable deviation to a price strictly above p^{stay}.

Second, consider a deviation by firm 0 to p^{stay}. By (4), consumers located at (or below) $1/2$ are indifferent between switching and staying ex post, so all consumers located at $y > 1/2$ strictly prefer switching ex post. Hence, firm 0's profits upon the derivation are

$$\frac{1}{r}\frac{1}{2} p^{\text{stay}} + \frac{1}{r}\frac{d - p^{\text{stay}}}{2d} p^{\text{stay}} (1 - e^{-rT}).$$

Thus, such a deviation is unprofitable if and only if

$$\frac{1}{2r}\left\{p^{\text{stay}} + \frac{d - p^{\text{stay}}}{d}p^{\text{stay}}(1 - e^{-rT})\right\} \leq \frac{1}{2r}d(1 - e^{-rT}), \tag{12}$$

which is equivalent to Condition (a) stated in the lemma.

Third, we show that Condition (a) rules out that any deviation to a price $p_0 \in [p^{\text{plan}}, p^{\text{stay}})$ is profitable. Because the marginal consumer expects to switch for any such price at T, by (10),

$$D_0(p_0, d) = \frac{1}{2} + \frac{d - p_0}{2d}.$$

An upper bound to the profits from deviating to such a p_0 are the profits if no consumer decides to switch ex post. In that case, marginal profits in p_0 is proportional to $1/2 + (d-2p_0)/2d = 1 - p_0/d$, which is increasing in $p_0 \leq p^{\text{stay}} < d$. Hence the bound reaches its maximum at p^{stay}, and therefore such a deviation is unprofitable whenever deviating to a price of p^{stay} is.

Finally, we show that a deviation to a price $p^0 \in [0, p^{\text{plan}})$ is unprofitable if Condition (b) holds. Since both alternative products cost p^s at any switching opportunity, a consumer located at x strictly prefers a product located at 1 to 0 if and only if $x > 1/2$. A consumer located at $x' > 1/2$ is indifferent between buying from firm 0 and not switching and buying from firm 1 and switching to p^s at time T if

$$\frac{1}{r}\bar{d}x' + \frac{1}{r}p_0 = \frac{1}{r}\bar{d}(1 - x') + \frac{1}{r}(1 - e^{-rT})p^* + \frac{1}{r}e^{-rT}p^s + e^{-rT}s.$$

Rewriting the above gives

$$x'(p_0, p^*) = \frac{1}{2} + \frac{[(1 - e^{-rT})p^* + e^{-rT}(p^s + rs)] - p_0}{2\bar{d}} = \frac{1}{2} + \frac{[(1 - e^{-rT})p^* + e^{-rT}p^{\text{plan}}] - p_0}{2\bar{d}}. \tag{13}$$

Using that $p^* = d$, we note that

$$x'(p^{\text{plan}}, d) = \frac{1}{2} + \frac{(d - p^{\text{plan}})}{2d}\frac{(1 - e^{-rT})}{(1 - e^{-rT^d})} \leq \frac{1}{2} + \frac{d - p^{\text{plan}}}{2d} = x(p^{\text{plan}}, d), \tag{14}$$

where the consumer located at $x(p^{\text{plan}}, d)$ is, as specified in (9), indifferent between buying from firm 0 (and switching at time T) and buying from firm 1 (and switching at time T). Finally, let $x^s(p_0) \geq 1/2$ be the consumer who is indifferent between staying with firm 0 and switching at time

T, given that she bought from firm 0 at time 0. The optimal deviation $p_0 \in [0, p^{\text{plan}})$ solves

$$\max_{p_0 < p^{\text{plan}}} \frac{(1-e^{-rT})}{r} p_0 \min\{\max\{x(p_0,d), x'(p_0,d)\}, 1\} + \frac{e^{-rT}}{r} p_0 \min\{\max\{x(p_0,d), x'(p_0,d)\}, x^S(p_0), 1\}.$$

For any price p_0 in which $x'(p_0,d) \leq x(p_0,d)$, the deviation is unprofitable because in this case an upper bound on the deviation profits is that all consumers located in $[0, x(p_0,d)]$ buy from firm 0 and do not switch. Since $p_0 < p^{\text{plan}} < p^{\text{stay}} < d$, marginal profits of this upper bound are positive over the relevant range, and hence such a deviation is unprofitable whenever a deviation to p^{plan} is also unprofitable.

Thus at any profitable deviation $x'(p_0,d) > x(p_0,d)$. In the rest of the proof of Part II, we consider a relaxed problem that ignores the constraint that demand after T is less than $x^S(p_0)$. Then, firm 0's profits of any potentially profitable deviation are at most

$$\max_{p_0 < p^{\text{plan}}} \frac{1}{r} p_0 \min\{x'(p_0,d), 1\}.$$

A deviation to a price in which the consumer located at 1 strictly prefers buying is suboptimal, and for the range in which demand is interior marginal profits are

$$\frac{1}{r}\left\{\frac{1}{2} + \frac{[(1-e^{-rT})p^* + e^{-rT}p^{\text{plan}}] - 2p_0}{2\overline{d}}\right\} \geq \frac{1}{r\overline{d}}(p^{\text{plan}} - p_0) > 0,$$

where the first inequality follows from Condition (b) and $p^* = d$, and the second from $p_0 < p^{\text{plan}}$. As a result, we can bound the deviation profits by

$$\frac{1}{r} p^{\text{plan}} x'(p^{\text{plan}}, d) \leq \frac{1}{r} p^{\text{plan}} \min\{x(p^{\text{plan}}, d), 1\},$$

where the inequality follows from Inequality (14). Above, however, we established that the right-hand-side of this inequality is less than the equilibrium profits, which rules out the existence of a profitable deviation. □

Part III. Note that Inequality (12) establishes that Condition (a) is a necessary condition for an equilibrium with $p^* = d > p^{\text{stay}}$ to exist. Therefore, together with Part I, we have shown that there is no equilibrium with $p^* > p^{\text{stay}}$ if Condition (a) is violated. □

Proof of Proposition 2.

Part I. Suppose otherwise, i.e., that there exists a switching equilibrium. By Observation 1, it must be that $p^* > p^{\text{stay}}$. By Lemma 1 Part I, $p^* = d$ and consumers switch at time T. Hence, candidate-switching-equilibrium profits are $(1 - e^{-rT})d/2$. Furthermore, $(1 - e^{-rT})d/2 \leq \overline{d}/2$, where the inequality follows from $(1 - e^{-rT}) \leq (1 - e^{-rT^d})$. Note that the demand of firm 0 when setting $p_0 < d$ is strictly greater than 1/2. Because $\overline{d} < p^{\text{stay}} < d = p^*$, firm 0's deviation profits by setting $p_0' = \overline{d}$ are strictly greater than $\overline{d}/2$, a contradiction. □

Part II. Since $d \geq \overline{d} > p^{\text{stay}} \geq p^{\text{plan}}$, by Proposition 1 Part I, $p^* = p^{\text{stay}}$ in any non-switching equilibrium. Also, by Lemma 1 Part I, in any switching equilibrium $p^* = d$ and consumers switch at T. Since $\overline{d} > p^{\text{stay}}$ implies that $d > p^{\text{stay}}$ and that Condition II.(b) of Lemma 1 holds, a switching equilibrium exists by Lemma 1 if and only if $dp^{\text{stay}}e^{-rT} \leq (1 - e^{-rT})(d - p^{\text{stay}})^2$. Thus, whether a switching equilibrium exists depends only on d, e^{-rT}, and p^{stay} in this case. □

Proof of Proposition 3.

Part I. Because all consumers need to purchase an initially offered product, in a symmetric equilibrium consumers buy their favorite product initially. We first argue that consumers do not switch prior to B^* in any symmetric equilibrium. Suppose otherwise. A necessary condition for a consumer who bought her favorite product to switch at a switching opportunity $T' < B^*$ is that she does not prefer to switch at the next switching opportunity, i.e. that

$$s < \int_0^{\min\{W, B^*-T'\}} (p^{1*} - p^s)e^{-r\tau}d\tau + e^{-r\min\{W, B^*-T'\}}s,$$

which is equivalent to $p^{1*} > p^s + rs = p^{\text{plan}} = p^{\text{stay}}$. Furthermore, if a consumer wants to switch prior to B^*, $p^{1*} > p^{\text{stay}}$ implies that she strictly prefers to switch at the first switching opportunity T. In that case, firm 0 when setting (B^*, p_0^1, p^{2*}) with $p_0^1 > p^{\text{stay}}$ earns

$$e^{-rB^*}p_0^1 x(p_0^1, p^{1*}) = e^{-rB^*}p_0^1 \frac{d + p^{1*} - p_0^1}{2d}.$$

Since $p^{1*} > p^{\text{stay}} > d$, the marginal profits are strictly negative at $p_0 = p^{1*}$. Hence, firm 0 can profitably deviate by setting a price slightly below p^{1*}, contradicting the existence of a symmetric equilibrium in which $p^{1*} > p^{\text{stay}}$. We conclude that no consumer switches before B^* in any symmetric equilibrium.

We next rule out that consumers switch after B^*. Since all consumers buy their favorite product initially in a symmetric equilibrium, they all switch at the end of the bonus period by (the obvious analog of) Observation 1 if and only if $p^{2*} > p^{\text{stay}}$. If $p^{2*} > p^{\text{stay}}$, however, firm 0 can increase its profits by reducing p^{2*} to p^{stay}; this does not affect the utility the consumer receives from choosing firm 0 initially, and hence does not impact firm 0's demand. Since the consumers firm 0 attracts refrain from switching at B^* following this deviation, it increases profits by $e^{-rB^*}(1/2)p^{\text{stay}}$. We conclude that $p^{2*} \leq p^{\text{stay}}$ and that consumers do not switch in any symmetric equilibrium.

Denote the average price of firm $l \in \{0,1\}$ by $p^a_l = (1-e^{-rB_l})p^1_l + e^{-rB_l}p^2_l$. We now show that $p^{a*} \leq d$ in any symmetric equilibrium. Suppose otherwise; there exists a symmetric equilibrium with $p^{a*} > d$. Consider a deviation by a firm 0 that changes its average price in such a way that all consumers it initially attracts strictly prefer not to switch; e.g. suppose firm 0 deviates by setting $B_0 = \frac{T}{2}$, $p^1_0 = {p^{a*}-\epsilon}/{(1-e^{-rB_0})}$ and $p^2_0 = 0$ for some small $\epsilon > 0$ specified below. Since $p^2_0 < p^{\text{stay}}$, all consumers who bought their favorite product strictly prefer not to switch at B_0, and by continuity there exists some ϵ_y such that any consumer y located in $(1/2, 1/2+\epsilon_y)$ strictly prefers not to switch at B_0 or thereafter. From now on, we consider only deviations in which the indifferent consumer lies below $1/2+\epsilon_y$. Then, consumers expect not to switch when buying from either firm. As a result, firm 0's deviation leads to profits

$$p^a_0 \frac{d + p^{a*} - p^a_0}{2d}.$$

For $p^{a*} > d$, the left hand side limits of marginal profits evaluated at $p^a_0 = p^{a*}$ is negative, contradicting the existence of an equilibrium in which $p^{a*} > d$.

From now on, we show that an equilibrium with $p^{a*} = d$ exists. Consider a candidate equilibrium in which $B^* = T$, $p^{1*} = p^{2*} = d$. Suppose firm 1 offers the candidate equilibrium contract, and consider a deviation by firm 0.

We first rule out deviations (B_0, p^1_0, p^2_0) by firm 0 that induce less than half of the consumers to buy from firm 0 initially. For any such deviation, setting a price $p^2_0 > p^{\text{stay}}$ is dominated by setting a price of $p^2_0 = p^{\text{stay}}$; consumers in former case anticipate and do switch at B_0, and their continuation utility from B_0 onward is the same when facing the price p^{stay} and not switching. Hence, it does not change the consumers' initial decision and gives firm 0 strictly greater profits from any consumer it initially attracts. For such any deviation with (B_0, p^1_0, p^2_0) with $p^2_0 \leq p^{\text{stay}}$, the consumer anticipates not switching when buying from firm 0, and a necessary condition for the consumer to do so is that she prefers buying from firm 0 and not switching to buying from firm 1 and not switching, i.e., that

$$v - dy - p^a_0 \geq v - d(1-y) - p^{a*}$$

Hence, demand is bounded by $(d+p^{a*}-p_0^a)/(2d)$ and an optimal deviation using this bound solves

$$\max_{p_0^a} p_0^a \frac{d + p^{a*} - p_0^a}{2d}.$$

Since $p^{a*} = d$, it follows from the first order condition that no profitable deviation exists that induces less than half the consumers to buy initially.

In what follows, we consider deviations (B_0, p_0^1, p_0^2) by firm 0 that induce more than half of the consumers to buy from firm 0 initially. We divide these into three cases: (1) $B_0 \leq T$; (2) $B_0 > T$ and $p_0^1 \geq p_0^2$; and (3) $B_0 > T$ and $p_0^1 \geq p_0^2$.

Consider Case (1). Then the consumer prefers switching to not switching at B_0 if

$$\int_{B_0}^{\infty} (v - yd - p_0^2) e^{-rt} dt \leq \int_{B_0}^{\infty} (v - (1-y)d - p^s) e^{-rt} dt - e^{-rB_0} s,$$

which is equivalent to $y \geq \frac{d+p^{\text{stay}}-p_0^2}{2d} \equiv x^{SB}(p_0^2)$.

Let $x^I(B_0, p_0^1, p_0^2)$ be the marginal consumer who is indifferent between buying from firm 0 and 1 initially. We consider two subcases: Subcase (1-i) in which the deviation induces $x^I(B_0, p_0^1, p_0^2) \leq x^{SB}(p_0^2)$ and Subcase (1-ii) in which $x^I(B_0, p_0^1, p_0^2) > x^{SB}(p_0^2)$.

In Subcase (1-i), no consumer who bought from firm 0 switches. In this case, a consumer prefers to buy from firm 0 if and only if

$$v - p_0^a - yd \geq v - p^{a*} - (1-y)d,$$

where $p_0^a = (1 - e^{-rB_0}) p_0^1 + e^{-rB_0} p_0^2$. Thus, $x^I(B_0, p_0^1, p_0^2) = \frac{d+p^{a*}-p_0^a}{2d} = \frac{2d-p_0^a}{2d}$. Maximizing the profits for this case implies that $p_0^a = d = p^{a*}$ is the unique best response, i.e. that no profitable deviation exists in this subcase.

In Subcase (1-ii), a consumer located at $y > x^{SB}(p_0^2)$ prefers buying from firm 0 to buying from firm 1 if

$$\int_0^{B_0} (v - dy - p_0^1) e^{-rt} dt - \int_{B_0}^{\infty} p^s e^{-rt} dt - e^{-rB_0} s \geq \int_0^{B_0} (v - d(1-y)) e^{-rt} dt - p^{a*},$$

which using that $p^{a*} = d$ is equivalent to

$$y \leq \frac{d(1 - e^{-rB_0}) + d - [(1 - e^{-rB_0}) p_0^1 + e^{-rB_0} p^{\text{stay}}]}{2d(1 - e^{-rB_0})} \equiv x^I(B_0, p_0^1).$$

Let $(B_0', p_0^{1'}, p_0^{2'})$ be a strictly profitable deviation. In case $B_0' = 0$, by continuity of the profit function below, there also exists a profitable deviation in which $B_0' > 0$. Hence, without loss of generality we consider $B_0' > 0$. Ignoring the constraint that $x^I(B_0, p_0^1, p_0^2) > x^{SB}(p_0^2)$, the optimal deviation by firm 0 with regards to p_0^1, p_0^2 solves

$$\max_{(B_0', p_0^1, p_0^2)} (1 - e^{-rB_0'}) p_0^1 x^I(B_0', p_0^1) + e^{-rB_0'} p_0^2 x^{SB}(p_0^2),$$

which is a strictly concave function in prices. Rewriting the first-order conditions with respect to p_0^2 and p_0^1 yields

$$p_0^2 = \frac{d + p^{\text{stay}}}{2} \quad \text{and} \quad p_0^1 = \frac{d(1 - e^{-rB_0'}) + d - e^{-rB_0'} p^{\text{stay}}}{2(1 - e^{-rB_0'})},$$

respectively. These, in turn, imply that the optimal deviation when ignoring the constraint $x^I(B_0, p_0^1, p_0^2) > x^{SB}(p_0^2)$ induces

$$x^{SB}(p_0^2) = \frac{d + p^{\text{stay}}}{4d} > \frac{1}{2} \quad \text{and} \quad x^I(B_0', p_0^{1'}) = \frac{d(1 - e^{-rB_0'}) + d - e^{-rB_0'} p^{\text{stay}}}{4d(1 - e^{-rB_0'})} < \frac{1}{2},$$

contradicting $x^I(B_0', p_0^1) > x^{SB}(p_0^2)$. By strict concavity of the profit function in prices, however, any convex combination of $(p_0^{1'}, p_0^{2'})$ and the optimal price vector yields larger profits. And by continuity of the functions $x^I(B_0', p_0^1)$ and $x^{SB}(p_0^2)$ in prices, we can find a convex combination such that $x^I(B_0', p_0^1) = x^{SB}(p_0^2)$. At this price vector, the marginal consumer is indifferent between switching and not switching, and hence $x^I(B_0', p_0^1)$ is equal to $x^I(B_0', p_0^1, p_0^2)$ as specified in Subcase (1-i). Thus, the profits of this deviation (which is more profitable than the strictly profitable deviation we started with) are equal to those of a deviation we considered in Subcase (1-i). Because no profitable deviation exists in Subcase (1-i), hence, we have a contradiction. We conclude that there is also no profitable deviation in Subcase (1-ii).

Consider next Case (2). Since $p_0^1 \geq p_0^2$, if it is beneficial to switch at some switching opportunity $\tau > T$, then the benefit of switching at T is even greater. A consumer located at $y > 1/2$ prefers switching at T to staying with her non-favorite product 1 in case

$$\int_T^\infty (v - yd) e^{-rt} dt - \int_T^{B_0} p_0^1 e^{-rt} dt - \int_{B_0}^\infty p_0^2 e^{-rt} dt \leq \int_T^\infty (v - (1-y)d - p^s) e^{-rt} dt - e^{-rT} s,$$

which is equivalent to

$$y \geq \frac{d + p^{\text{stay}} - \left[p_0^1(1 - \frac{e^{-rB_0}}{e^{-rT}}) + p_0^2 \frac{e^{-rB_0}}{e^{-rT}}\right]}{2d} \equiv x^{ST}(B_0, p_0^1, p_0^2).$$

Let $x^I(B_0, p_0^1, p_0^2)$ be the consumer who is indifferent between buying from firm 0 and firm 1 initially. In case $x^I(B_0, p_0^1, p_0^2) \leq x^{ST}(B_0, p_0^1, p_0^2)$, by the same argument as in Subcase (1-i), a profitable deviation does not exist. Thus, suppose $x^I(B_0, p_0^1, p_0^2) > x^{ST}(B_0, p_0^1, p_0^2)$. Then, a consumer located at $y > x^{ST}(B_0, p_0^1, p_0^2)$ buys from firm 0 initially if

$$\int_0^T (v - dy)e^{-rt}dt - \int_0^T p_0^1 e^{-rt}dt - \int_T^\infty p^s e^{-rt}dt - e^{-rT}s \geq \int_0^T (v - d(1-y))e^{-rt}dt - p^{a*},$$

which is equivalent to

$$y \leq \frac{d(1 - e^{-rT}) + d - [(1 - e^{-rT})p_0^1 + e^{-rT}p^{\text{stay}}]}{2d(1 - e^{-rT})} \equiv x^I(B_0, p_0^1).$$

The optimal deviation, hence, solves

$$\max_{(B_0, p_0^1, p_0^2)} (1 - e^{-rT})p_0^1 x^I(B_0, p_0^1) + (e^{-rT} - e^{-rB_0})p_0^1 x^{ST}(B_0, p_0^1, p_0^2) + e^{-rB_0}p_0^2 x^{ST}(B_0, p_0^1, p_0^2).$$

which is a strictly concave function in prices. Ignoring the constraint that $x^I(B_0, p_0^1, p_0^2) > x^{ST}(B_0, p_0^1, p_0^2)$ and fixing $B_0 > T$, the optimal deviation by firm 0 with regards to p_0^1, p_0^2 is derived by the first-order conditions. By solving them, we obtain

$$p_0^2 = \frac{e^{-rB_0}d(1 - e^{-rT}) - d(e^{-rT} - e^{-rB_0}) + e^{-rT}p^{\text{stay}}(1 - e^{-rB_0})}{2(1 - e^{-rT})e^{-rB_0}} \quad \text{and} \quad p_0^1 = \frac{d(1 - e^{-rT}) + d - e^{-rT}p^{\text{stay}}}{2(1 - e^{-rT})},$$

respectively. These, in turn, imply that the optimal deviation induces

$$x^{ST}(B_0, p_0^1, p_0^2) = \frac{d + p^{\text{stay}}}{4d} > \frac{1}{2} \quad \text{and} \quad x^I(B_0, p_0^1) = \frac{d(1 - e^{-rT}) + d - e^{-rT}p^{\text{stay}}}{4d(1 - e^{-rT})} < \frac{1}{2},$$

contradicting $x^I(B_0, p_0^1) > x^{ST}(B_0, p_0^1, p_0^2)$. The rest of the proof in Case (2) follows the same argument as in Subcase (1-ii).

Finally, consider Case (3). Conditional on reaching a switching opportunity $B_0 > T$, a consumer located at $y > 1/2$ who bought her non-favorite product 0 prefers switching at B_0 if and only if $y \geq x^{SB}(p_0^2) = \frac{d + p^{\text{stay}} - p_0^2}{2d}$. Because the consumer located at $x^{SB}(p_0^2)$ is indifferent between switching and staying at time B_0 when she faces the strictly greater price p_0^2 immediately, she — as well as any consumer located at $y < x^{SB}(p_0^2)$ — strictly prefers not switching at time T. A consumer located at $y > x^{SB}(p_0^2)$ prefers switching at time T to switching at time B_0 if

$$\int_T^{B_0} (v - yd - p_0^1)e^{-rt}dt - e^{-rB_0}s \leq \int_T^{B_0} (v - (1-y)d - p^s)e^{-rt}dt - e^{-rT}s,$$

which is equivalent to $y \geq {}^{(d+p^{\text{stay}}-p_0^1)}/_{2d}$. Similarly, at any switching opportunity $\tau \in (T, B_0)$, the consumer prefers switching if the same condition holds. Hence, she switches either at T or B_0. As a result, a consumer located at $y > 1/2$ who bought product 0 switches at T if $y \geq \frac{d+p^{\text{stay}}-p_0^1}{2d} \equiv x^{ST}(p_0^1)$, and any consumer located in $y \in [x^{SB}(p_0^2), x^{ST}(p_0^1))$ switches at B_0, where $x^{SB}(p_0^2) = {}^{(d+p^{\text{stay}}-p_0^2)}/_{d}$. Let $x^I(B_0, p_0^1, p_0^2)$ be the consumer who is initially indifferent between buying from firm 0 and firm 1. If $x^I(B_0, p_0^1, p_0^2) \leq x^{ST}(p_0^1)$, the marginal consumer does not switch or switches at the end of the bonus period B_0. By the same argument as in Case (1) above, in this case a profitable deviation in which $x^I(B_0, p_0^1, p_0^2) \leq x^{ST}(p_0^1)$ does not exist. We are left to consider the case in which $x^I(B_0, p_0^1, p_0^2) > x^{ST}(p_0^1) > x^{SB}(p_0^2)$. Because in this case the consumer located at $x^I(B_0, p_0^1, p_0^2)$ anticipates switching at T, it follows from the same argument as in Subcase (1-ii) that

$$x^I(B_0, p_0^1, p_0^2) = \frac{d(1-e^{-rT}) + d - [(1-e^{-rT})p_0^1 + e^{-rT}p^{\text{stay}}]}{2d(1-e^{-rT})} = x^I(B_0, p_0^1).$$

Then, however, $x^I(B_0, p_0^1, p_0^2) > x^{ST}(p_0^1)$ is equivalent to

$$d(1-e^{-rT}) + d - (1-e^{-rT})p_0^1 - e^{-rT}p^{\text{stay}} > (1-e^{-rT})(d + p^{\text{stay}} - p_0^1)$$

or $d - e^{-rT}p^{\text{stay}} > (1-e^{-rT})p^{\text{stay}}$, contradicting $p^{\text{stay}} > d$. We conclude that a profitable deviation does not exist in Case (3), and hence that there is no profitable deviation that induces more than half of the consumers to buy from firm 0 initially, which completes the proof of Part I.

Part II. We begin by arguing that any equilibrium has $p^{1*} = 0$ and $p^{2*} = p^{\text{stay}}$. Observe that for any candidate equilibrium contract in which $p^{2*} > p^{\text{stay}}$, a firm can profitably deviate to $p^2 = p^{\text{stay}}$ keeping the bonus and introductory price fixed; since all consumers expect to switch for prices above p^{plan}, this does not affect initial demand but increase the profits from any consumer the deviating firm attracts. Thus, $p^{2*} \leq p^{\text{stay}}$.

To rule out $p^{2*} < p^{\text{stay}}$, we first rule out equilibria in which consumers expect to stay with their initial provider. Let $p^{a*} > 0$ be the candidate equilibrium average price. Consider a deviation in which firm l sets $p_l^1 = 0$ and $p_l^2 = p^{\text{stay}}$, and chooses B_l to satisfy $e^{-rB_l} p^{\text{stay}} = p^{a*}$. This means that on any of the consumers for whom it offers the favorite product (and hence who buy from it in the candidate equilibrium), it earns the same profit. We show that these consumers strictly prefer this offer to paying p^{a*} on average. With this offer, the consumer expects to switch at time B_l, and pay p^s afterwards. Plugging $e^{-rB_l} = p^{a*}/p^{\text{stay}}$ into $p^{\text{stay}} > p^s + rs$, yields that $e^{-rB_l} s + e^{-rB_l} p^s/r < p^{a*}/r$ for any $\beta < 1$, which implies that the consumers for whom the firm offers their favorite product strictly prefer the deviating offer. Hence, firm l can profitably deviate by marginally lowering B_l.

The above paragraph implies that consumers expect to switch either at the end of the bonus period B^* or at $T < B^*$. Consider the former case first. The consumer anticipates facing costs of $(p_0^1/r)(1 - e^{-rB^*}) + e^{-rB^*}(p^s+rs)/r$. Minimizing these subject to $p_0^1(1 - e^{-rB^*}) + e^{-rB^*} p_0^2 = p^{a*}$ and $p_0^2 \leq p^{\text{stay}}$ shows that the optimal way of doing so is to set $p_0^1 = 0$ and $p_0^2 = p^{\text{stay}}$. We next rule out the case in which the consumer anticipates switching at $T \neq B_0$. In this case, firm 0 can increase its profits by adjusting the bonus period to $B_0 = T$ and the post-introductory price to $p_0^2 = p^{\text{stay}}$; by doing so, firm 0's consumers expect to face the same costs, and because $T < B^*$ and $p^{2*} \leq p^{\text{stay}}$, firm 0 earns greater profits. Hence, the consumer must expect to switch at B^*, and $p^{1*} = 0$ and $p^{2*} = p^{\text{stay}}$.

We now derive necessary conditions for a symmetric equilibrium $(0, p^{\text{stay}}, B^*)$. We first derive the condition under which firms do not want to offer a marginally lower bonus. If firm 0 deviates to $B_0 < B^*$, consumer $y < 1/2$ is indifferent between buying from firm 1 and firm 0 if

$$\begin{aligned} & v - \int_0^{B_0} dy e^{-rt} dt - e^{-rB_0} s - \int_{B_0}^{\infty} p^s e^{-rt} dt - \int_{B_0}^{\infty} dy e^{-rt} dt \\ = \; & v - \int_0^{B^*} d(1-y) e^{-rt} dt - e^{-rB^*} s - \int_{B^*}^{\infty} p^s e^{-rt} dt - \int_{B^*}^{\infty} dy e^{-rt} dt, \end{aligned}$$

which is equivalent to

$$y = \frac{(e^{-rB^*} - e^{-rB_0}) p^{\text{plan}} + (1 - e^{-rB^*}) d}{2(1 - e^{-rB^*}) d}. \tag{15}$$

Such a deviation earns profits

$$e^{-rB_0} y \frac{p^{\text{stay}}}{r}.$$

Let $\chi = e^{-rB_0}$, and note that lowering the bonus B_0 is equivalent to increasing χ. The marginal profits from increasing χ are non-positive if

$$y - \chi \frac{p^{\text{plan}}}{2(1 - e^{-rB^*}) d} \leq 0.$$

Using that $y = {}^1\!/\!_2$ when $B_0 = B^*$, lowering the bonus marginally is unprofitable if and only if $e^{-rB^*} \geq d/(d+p^{\text{plan}})$ or $B^* \leq (1/r)[\ln(d + p^{\text{plan}}) - \ln d]$.

We next derive a necessary condition under which firms do not want to offer a marginally higher bonus. Raising the bonus without adjusting p_0^2 is unprofitable because in this case all consumers located above $1/2$ will switch away at the end of the bonus period, leading to lower profits. Consider, instead, a deviation in which the firm adjusts p_0^2 so that the marginal consumer it attracts does not switch at the end of the bonus period. A consumer $y > 1/2$ prefers not switching if

$$s \geq \beta \int_0^W (p_0^2 - p^s)e^{-r\tau}d\tau + \beta e^{-rW}s + \beta \int_0^W d(2y-1)e^{-r\tau}d\tau. \tag{16}$$

Supposing that the condition holds with equality for the marginal consumer y the firm initially attracts implies that $p_0^2(y) = p^{\text{stay}} - (2y-1)d$. At this price, the marginal consumer y firm 0 attracts expects to switch at the end of the bonus period to product 1. Hence, the initially indifferent consumer is given by Equation (15). Again, let $\chi = e^{-rB_0}$. The deviating firm 0 earns $1/r$ times

$$\chi \; y(\chi) \; p_0^2(y(\chi))$$

Since increasing the bonus is equivalent to lowering χ, a necessary condition for a symmetric equilibrium is that the marginal profits with respect to χ

$$y \; p_0^2(y(\chi)) + \chi \frac{\partial y}{\partial \chi}\left[p_0^2(y(\chi)) + y(\chi)\frac{\partial p_0^2(y)}{\partial y}\right] \geq 0$$

are non-negative when evaluated at B^*. Using that $\partial y/\partial \chi = -p^{\text{plan}}/2(1-e^{-rB^*})d$, $\partial p_0^2(y)/\partial y = -2d$ and that evaluated at the symmetric equilibrium $y = 1/2$ and $p_0^2(y) = p^{\text{stay}}$, we thus require

$$\frac{p^{\text{stay}}}{2} + e^{-rB^*}\frac{-p^{\text{plan}}}{2(1-e^{-rB^*})d}(p^{\text{stay}} - d) \geq 0,$$

which is equivalent to $e^{-rB^*} \leq dp^{\text{stay}}/(dp^{\text{stay}} + p^{\text{plan}}(p^{\text{stay}} - d))$. Together with the previous paragraph, we conclude that a necessary condition for a symmetric equilibrium is that firms offer contracts $(0, p^{\text{stay}}, B^*)$, where B^* is chosen such that

$$\frac{1}{1 + \frac{p^{\text{plan}}}{d}} \leq e^{-rB^*} \leq \frac{1}{1 + \frac{p^{\text{plan}}}{d}\frac{p^{\text{stay}} - d}{p^{\text{stay}}}}.$$

Also, in the equilibrium with the longest possible bonus period $B^* = (1/r)[\ln(d + p^{\text{plan}}) - \ln d]$, consumers are strictly worse off than the equilibrium in the model without introductory periods if and only if $p^{\text{stay}} - p^{\text{plan}} > d$.

In the rest of the proof, we show that the above necessary conditions are also sufficient. We begin by arguing that there is no profitable deviation that induces (weakly) less than half of the consumers to buy from firm 0. First, note that setting $p_0^2 = p^{\text{stay}}$ dominates any higher price. Second, by the exact same argument as in the first paragraph of this proof, the optimal way of attracting consumers in this case is to set $p_0^1 = 0$ and $p_0^2 = p^{\text{stay}}$. Third, the resulting profits when setting a lower than the equilibrium bonus (or equivalently raising $\chi = e^{-rB_0}$) are

$$\chi \frac{p^{\text{stay}}}{r} \frac{(e^{-rB^*} - \chi)p^{\text{plan}} + (1 - e^{-rB^*})d}{2(1 - e^{-rB^*})d},$$

which is a strictly concave function. Since a local deviation is unprofitable, hence, a global one is also unprofitable. We conclude that there is no profitable deviation in which firm 0 attracts weakly less than half of the consumers.

We next consider deviations in which firm 0 attracts strictly more than half of the consumers. We distinguish between deviations in which the marginal consumer firm 0 attracts switches away and those in which it stays with firm 0. Consider the latter case first, and let p_0^a be the average price firm 0 charges to all of its consumers. We now argue that the optimal way of charging p_0^a while keeping all consumers up to $y > 1/2$ the firm initially attracts entails setting $p_0^1 = 0$ and $p_0^2(y) \equiv p^{\text{stay}} - (2y - 1)d$. At any higher price p_0^2, firm 0 loses the marginal consumers it attracts. For any price $p_0^2 \in (p^s + rs - (2y - 1)d, p_0^2(y))$, the consumer expects to switch away weakly before B_0; hence the firm can raise the price p_0^2 without affecting its initial demand while increasing the profits of any consumer it attracts, and therefore any such deviation is dominated by one setting $p_0^2(y)$. Finally, consider the case $p_0^2 \leq p^s + rs - (2y - 1)d$. the firm can in a first step increase p_0^2 to $p^s + rs - (2y - 1)d$ while at the same time lowering p_0^1 (or increase the length of the bonus periods B_0 in case $p_0^1 = 0$) in such a way as to keep p_0^a constant. This attracts the same number of consumers (independently of whether the consumer expect to switch or not) and earns the same profit per consumer. Then, the firm can in a second step increase its profits by raising p_0^2 to $p_0^2(y)$. We hence conclude that any optimal deviation that keeps all consumers the firm initially attracts takes the form $(0, p^{\text{stay}}, B_0)$ inducing profits

$$\frac{1}{r}\chi \; y(\chi) \; p_0^2(y(\chi))$$

using the above notation. Because we showed that local deviations are unprofitable and the above function is concave, any non-local deviations are unprofitable.

We are left to consider deviations in which the marginal consumer $y > 1/2$ the firm initially attracts switches away. First, note that any deviation in which all consumers switch away, i.e. in which $p_0^2 > p^{\text{stay}}$ is dominated by one in which p_0^2 is set at p^{stay}; lowering p_0^2 does not reduce initial demand and all consumers less than $1/2$ firm 0 initially attracts remain after p_0^2 is lowered to p^{stay}, raising profits. Hence, there exists some consumer $y' < y$ such that all consumers below y' stay and all other consumers firm 0 initially attracts switch away — either at B_0 or $T < B_0$.

We first consider the case $B_0 \leq T$ and $y' < y$. Note that if a consumer switches, a time-consistent consumer at the same location would also switch; furthermore, a time-consistent consumer must switch at B_0. Hence, the naive consumer anticipates to switch at B_0. Hence, y solves

$$\begin{aligned} & -\int_0^{B_0} yde^{-rt}dt - \int_0^{B_0} p_0^1 e^{-rt}dt - e^{-rB_0}s - \int_{B_0}^{\infty}(1-y)de^{-rt}dt - \int_{B_0}^{\infty} p^s e^{-rt}dt \\ = & -\int_0^{\infty}(1-y)de^{-rt}dt - e^{-rB^*}s - \int_{B^*}^{\infty} p^s e^{-rt}dt. \end{aligned}$$

Thus

$$y = \frac{(e^{-rB^*} - e^{-rB_0})p^{\text{plan}} + d(1-e^{-rB_0}) - (1-e^{-rB_0})p_0^1}{2d(1-e^{-rB_0})} < \frac{p^{\text{plan}} + d - p_0^1}{2d}. \tag{17}$$

Hence, firm 0's deviation profits are

$$\frac{1}{r}\left[(1-e^{-rB_0})p_0^1 y + e^{-rB_0}p_0^2 y'\right],$$

where we used Equation (16) to determine the marginal consumer $y' = (p^{\text{stay}}+d-p_0^2)/(2d)$ who just switches at B_0. Because y' is not a function of p_0^1 and y not a function of p_0^2, it follows from the first order condition that $p_0^2 = (p^{\text{stay}}+d))/2$ and hence that $y' = (p^{\text{stay}}+d))/4d$. Marginal profits with respect to p_0^1 are

$$\frac{1}{r}(1-e^{-rB_0})\left[y + \frac{\partial y}{\partial p_0^1}p_0^1\right].$$

We will evaluate these profits at the price p_0^1 that induces $y = (p^{\text{stay}}+d))/4d = y'$. Setting them equal and rewriting using $e^{-rB^*} < 1$ gives $2p_0^1 < 2p^{\text{plan}} + d - p^{\text{stay}}$ and hence $2p_0^1 < p^{\text{plan}} + d$. Using this fact and that $\partial y/\partial p_0^1 = -1/2d$, the marginal profits evaluated at the p_0^1 that induces y', satisfy

$$\frac{1}{r}(1-e^{-rB_0})\left[y + \frac{\partial y}{\partial p_0^1}p_0^1\right] \geq \frac{1}{r}(1-e^{-rB_0})\left[\frac{(p^{\text{stay}}+d))}{4d} - \frac{(p^{\text{plan}}+d))}{4d}\right] > 0,$$

contradicting the fact that firm 0 wants to set a low enough p_0^1 to induce switching of the marginal consumer it attracts (i.e. $y > y'$).

We next consider the case $B_0 > T$ and $p_0^1 \geq p_0^2$. In this case, the benefit of switching at T is greater than at B_0. Hence, since the marginal consumer firm 0 attracts switches, she switches at T. Furthermore, if the naive consumer switches ex post, she anticipates doing so ex ante. Hence, the marginal consumer y the firm initially attracts is given by a variant of Equation (17) where B_0 is replaced by T, and we have $y \leq {}^{(p^{\text{plan}}+d-p_0^1)}/_{2d}$. The marginal consumer $y' < y$ who switches at T must prefer doing so to waiting $M \equiv \min\{W, B_0 - T\}$ to the next switching opportunity, which implies that

$$y' \geq \frac{d + p^s + rs\frac{(1=\beta e^{-rM})}{\beta(1-e^{-rM})} - p_0^1}{2d} > \frac{p^{\text{plan}} + d - p_0^1}{2d},$$

contradicting $y' < y$.

We are left to consider the case $B_0 > T$ and $p_0^1 < p_0^2$. A necessary condition for the consumer y the firm initially attracts not to switch is that she does not want to switch at T, which by the argument of the last paragraph implies

$$y > \frac{d + p^{\text{plan}} - p_0^1}{2d},$$

contradicting Equation (17) at B_0 or its analog with T replacing B_0 if she anticipates switching at T. □

Proof of Proposition 4. We begin by (partially) specifying consumer behavior. Consider a time-consistent consumer who bought her favorite product and anticipates to be offered the equilibrium contracts when looking now or in the future and faces a regular price of p. If she prefers switching, she prefers doing so immediately. Switching once dominates sticking with the original contract if

$$s \leq \int_0^{B^*} pe^{-rt}dt,$$

or $p \geq {}^{rs}/_{(1-e^{-rB^*})} \equiv p^{\text{plan}}$. If the consumer is currently consuming her non-favorite product, the benefit of switching is even greater so that all consumers expect to switch whenever $p \geq {}^{rs}/_{(1-e^{-rB^*})}$. By stationarity of the consumers' problem, the (naive) consumer hence must expect to switch every time a bonus period ends.

Thus, a naive consumer who bought her favorite product is willing to delay switching if

$$s+\beta\{e^{-rB^*}+e^{-r2B^*}+\cdots\}s = s+\frac{\beta e^{-rB^*}}{1-e^{-rB^*}}s \geq \beta\int_0^W pe^{-rt}dt+\frac{\beta e^{-rW}}{1-e^{-rB^*}}s,$$

which is equivalent to

$$p \leq rs\left(\frac{1-[(1-\beta)e^{-rB^*}+\beta e^{-rW}]}{\beta(1-e^{-rB^*})(1-e^{-rW})}\right) = \left(\frac{1}{1-e^{-rB^*}}+\frac{1-\beta}{\beta}\cdot\frac{1}{1-e^{-rT_w}}\right)\cdot rs \equiv p^{\text{stay}}.$$

Denote the firm that enters at time t at location l as t^l. For firm t^l, we define histories on the path of play, i.e., in which the firm entered and all other firms active at $\tau \neq t$ make the equilibrium contract offer as relevant. In other words, each firm believes that all firms in the past made equilibrium offers, and expects all firms in the future (who cannot observe whether firm t^l deviated) to make equilibrium offers. Furthermore, each firm correctly anticipates how consumers' demand responds in case it makes a non-equilibrium offer.[32]

For consumers, we define histories as relevant in which they just entered, and those in which they entered at t and observed a single deviation by one firm t^l. We furthermore define histories as relevant in which they have accepted either an initial contract equilibrium offer or an offer from a single firm t^l that has deviated and all future offers are equilibrium offers to specify the perceived future behavior of naive consumers as well as the actual switching behavior following a single deviation by some firm. We simply presume consumers make optimal and perceived-optimal choices, which amount to analogous choices to the ones we specify in proof of Proposition 3 using the above definitions of p^{stay} and p^{plan}, and defining $p^s = p^{\text{plan}} - rs$; following relevant histories a consumer believes to face the same problem as in Proposition 3 given our definition of p^s (which now, however, does depend on the equilibrium bonus) and hence these choices are optimal.

Similarly, a firm t^l's problem is identical to the one it faces in Proposition 3, and hence offering the contract (B^*, p^*) is a best response as long as

$$\frac{1}{1+\frac{p^{\text{plan}}}{d}} \leq e^{-rB^*} \leq \frac{1}{1+\frac{p^{\text{plan}}}{d}\frac{p^{\text{stay}}-d}{p^{\text{stay}}}}.$$

Note that p^{stay} is a decreasing function of the equilibrium bonus. We next argue that the maximal

[32] Precisely, each firm believes that all consumers who entered at $t' < t$ have seen equilibrium offers so far and do not become active at t, all consumers who enter at $t'' > t$ will see equilibrium offers and not become active at any switching opportunity, and the consumers who entered at t see a rival equilibrium offer and anticipate seeing equilibrium offers at any future switching opportunity.

equilibrium bonus must satisfy $e^{-rB^*} = {}^{d}/_{d+p^{\text{plan}}}$. Suppose not, i.e. that $e^{-rB^*} > {}^{d}/_{d+p^{\text{plan}}}$. Then it is feasible to increase the bonus while still satisfying the above condition. To find the maximal bonus, hence, we can substitute the definition of p^{plan} into this condition and obtain $e^{-rB^*} = \frac{d}{rs} \cdot (1 - e^{-rB^*})^2$. Finally, differentiating the consumers' discounted payments $e^{-rB^*}\left(\frac{1}{1-e^{-rB^*}} + \frac{1-\beta}{\beta} \cdot \frac{1}{1-e^{-rT_w}}\right) \cdot rs$ with respect to B^* shows that these are decreasing in the length of the bonus period, and hence consumers benefit most in the equilibrium in which the bonus period is chosen as long as possible. □

Proof of Proposition 5.

To prove this proposition, we first make some preliminary observations that apply to both Parts I and II.

(i) In equilibrium, all consumers respond in the same way to any pair of offers, i.e., they make the same choices regarding how many offers to sign up for, and whether to switch or cancel each one. To see this, notice that canceling strictly dominates switching for the second service, and if switching is strictly optimal for the first service, then canceling is strictly optimal for the second service. The claim then follows from our tie-breaking rules.

(ii) In equilibrium, consumers do not switch to an alternative. Suppose, toward a contradiction, that consumers switch in equilibrium. Given (i), consumers either sign up for one service and then stay or switch at the first opportunity, or they sign up for two services and then stay with both, switch one and cancel the other at the first opportunity, or cancel one at the first opportunity. In all of these cases, if consumers switched, then an initial firm with positive demand would lose all consumers to an alternative at time B^*, and hence make strictly negative profits, a contradiction.

Part I. We argue by contradiction that in equilibrium, consumers sign up for one initial offer. Suppose otherwise. Consider first the case in which consumers do not cancel their second contract. Because they are time consistent and took the second contract, the average price of the equilibrium offer must be at most $\underline{v}$. Hence, a firm with positive demand makes strictly negative profits, a contradiction. Consider second the case in which consumers do cancel their second contract. Then, a firm loses money on these consumers. This implies that the firm makes strictly positive profits on those who do not cancel its contract. Consequently, the firm has a profitable deviation: it can offer $B_l = 0$ and a price slightly below the current average price, attracting all profitable consumers and strictly increasing profits on previously money-losing consumers.

Given that all consumers sign up for one offer, the average price consumers pay while consuming the service must be at least c. Thus, consumer must not switch at the end of the bonus period in equilibrium. If the average equilibrium price was strictly above c, a firm could profitably undercut and serve all consumers. Furthermore, both firms setting a bonus period of zero and an average price of c is an equilibrium by standard arguments.

Part II. We first show that there is no equilibrium in which consumers take one offer. Suppose, toward a contradiction, that this is the case, and take any candidate equilibrium (B, p). If the average price $e^{-rB}p$ equals c, then offering $(B^* + \epsilon, p^*)$ with the (B^*, p^*) stated in the proposition is a profitable deviation. Indeed, in that case, a consumer prefers to take the deviating firm's offer whether or not she takes the other firm's offer, and she does not switch or cancel it. If the average price is strictly greater than c, then offering $(B+\epsilon, p)$ is a profitable deviation for a firm not getting all consumers. Whether or not a consumer expects to switch, she strictly prefers the deviating offer. Therefore, consumers take both offers in equilibrium.

Note that if consumers expected to stick with their second contract, then the average price would be at most $\underline{v} < c$. As a result, firms would lose money, a contradiction. Hence, consumers must expect to cancel it in equilibrium.

Next, we argue that in equilibrium, consumers do not actually cancel their second contract. If they did, a firm would lose money on all second-contract consumers. Hence, it could deviate by offering $B_l = 0$ and a price slightly below the candidate equilibrium's average price. Then, all consumers would sign up for this offer, and take (and cancel) the other firm's offer as their second service. This strictly increases the deviating firm's profits.

Since consumers do not cancel, we must have $p^* \leq p^{\text{stay}}$. Since they expect to cancel, if $p^* < p^{\text{stay}}$ the consumer is indifferent between the candidate-equilibrium contract (B^*, p^*) and (B^*, p^{stay}), so a firm can increase its profits by slightly increasing the bonus period and charging p^{stay}. Thus, $p^* = p^{\text{stay}}$. This implies that any equilibrium $e^{-rB^*} \leq \underline{v}/(\underline{v} + rs)$; otherwise, consumers would not sign up for a second service. Further, we cannot have $e^{-rB^*} < \underline{v}/(\underline{v} + rs)$. If this was the case, a firm could deviate by shortening B_l; consumers would still sign up for both offers, and cancel neither. We conclude that $e^{-rB^*} = \underline{v}/(\underline{v} + rs)$, which implies the B^* stated in the proposition.

Finally, we confirm that $p^* = p^{\text{stay}}, e^{-rB^*} = \underline{v}/(\underline{v} + rs)$ is an equilibrium. Since consumers sign up for and keep both offers, there is no profitable deviation with a weakly lower average price. Consider, therefore, any deviation to an offer with a strictly higher average price. If this induces consumers to sign up for just one offer, then it must be the other firm's, so it cannot be profitable. If it induces consumers to sign up for both offers, then it can only be profitable if it does not induce cancellation, i.e., $p_l \leq p^{\text{stay}}$. Hence, the deviation must have a shorter introductory period. But such a deviation induces consumers to sign up for just one offer, a contradiction. □

Proof of Observation 5. In the main text. □

Proof of Proposition 6. We argued in the main text that a firm cannot attract more consumers initially by raising its bonus, and that it loses all demand by lowering it. For a deviation to be profitable, thus, it must attract consumers at a switching opportunity. In what follows, we confirm that if W is sufficiently small, then a firm cannot benefit by raising its bonus to a point where consumers do not procrastinate.

With the candidate equilibrium offer, a firm's demand is 1/2. By preventing procrastination for all consumers, therefore, it doubles its demand at most. Hence, the deviation is unprofitable if the profit per consumer is less than half of the equilibrium one. This is clearly the case if B is large enough. Hence, it is sufficient to prove that as W approaches zero, the bonus necessary to prevent procrastination approaches infinity. We argue that this is the case even for a consumer located at the same point as the firm. To see why, consider such a consumer. If she switches, she obtains a continuation payoff of $-s + \beta B$ net of the given payment for the service. If she plans to switch at the next switching opportunity, she expects that she would obtain $\beta[-(1-e^{-rW})d + e^{-rW}(-s+B)]$ instead. Comparing the continuation payoffs, the consumer switches only if $(1 - e^{-rW})\beta(B + d) \geq (1 - \beta e^{-rW})s$. As W approaches zero, B must approach infinity for the inequality to hold. □

B Additional Material for the Empirical Study

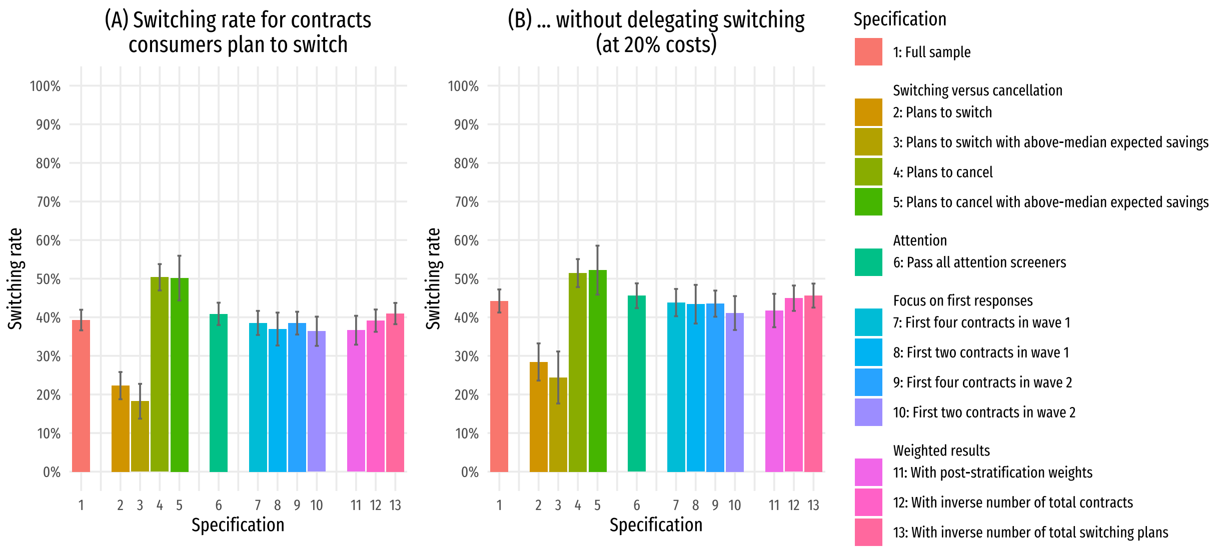
B.1 Additional Tables and Figures

Table B.1: Comparison of the Sample to the American Community Survey (ACS)

Variable	**ACS (2022)**	**Sample**
Gender		
Female	50%	55%
Age		
18-34	29%	27%
35-54	32%	49%
55+	38%	25%
Household net income		
Below 50k	34%	38%
50k-100k	29%	34%
Above 100k	37%	28%
Education		
Bachelor's degree or more	33%	56%
Region		
Northeast	17%	17%
Midwest	21%	20%
South	39%	42%
West	24%	21%
Race and ethnicity		
White	73%	76%
Black or African American	13%	12%
Hispanic/Latino	17%	8%
Asian	7%	8%
Political affiliation*		
Democrat	31%	45%
Republican	29%	26%
Independent	39%	29%
Sample size	1,980,550	3,449

*Data on political affiliation is taken from Chinoy et al. (2026) and based on Gallup surveys from the year 2022 (https://news.gallup.com/poll/15370/party-affiliation.aspx).
Notes: This table presents summary statistics from our sample and compares them to the American Community Survey (ACS) 2022. Respondents can identify with multiple races or ethnicities. We report statistics for the adult US population (18 years and above).

Figure B.4: Actual Switching Rates: Robustness

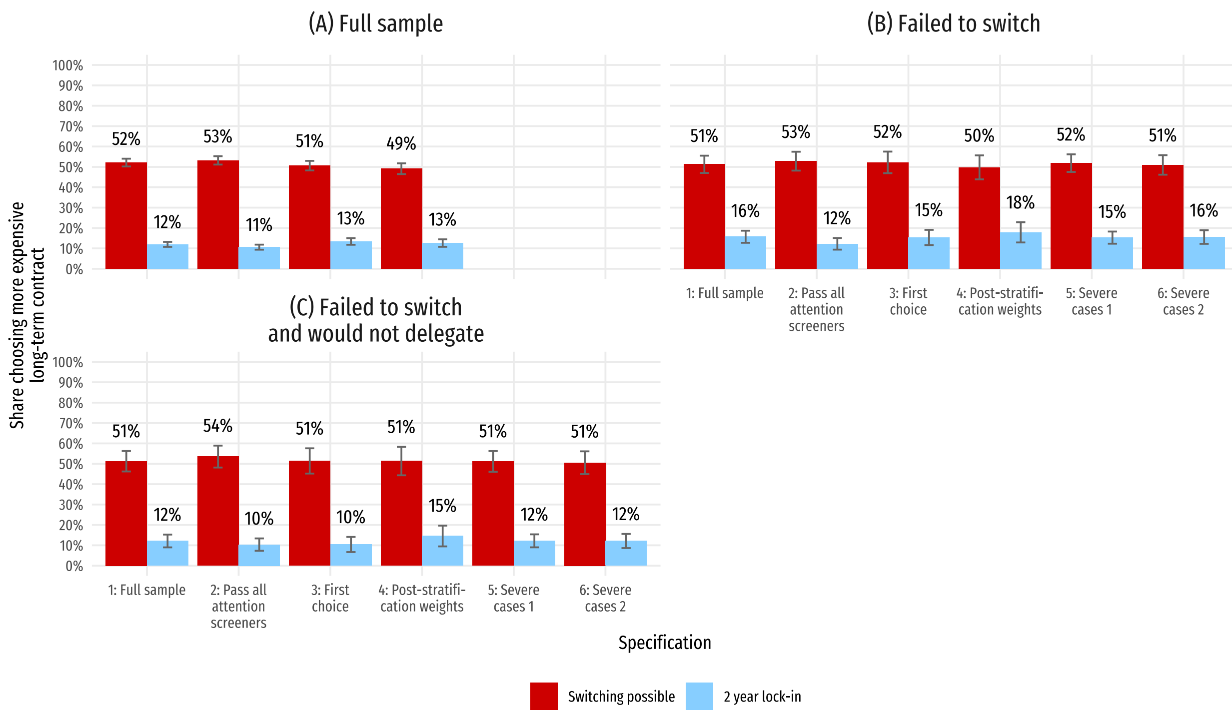


Notes: This figure shows the switching rate pooled across contract types, across various specifications. Panel A shows the switching rate for contracts which consumers planned to switch (as in Figure 1). Panel B shows the switching rate for contracts which consumers planned to switch without being willing to delegate the switching process at an additional costs of 20% of the savings made from switching (as in Figure 2a). The gray lines indicate 95% confidence intervals with standard errors clustered at the consumer level.

Specifications:

1. Full sample, replicating the results of Figure 1 and Figure 2a.
2. Restrict sample to contracts consumers want to switch (not cancel).
3. Restrict sample to contracts consumers want to switch (not cancel) with above-median expected savings from switching.
4. Restrict sample to contracts consumers want to cancel (not switch).
5. Restrict sample to contracts consumers want to cancel (not switch) with above-median expected savings from cancellation.
6. Restrict sample to respondents who pass all attention screeners. See discussion in Section B.4.3.
7. Restrict sample to first four contracts elicited in wave 1.
8. Restrict sample to first two contracts elicited in wave 1.
9. Restrict sample to first four contracts elicited in wave 2.
10. Retrict sample to first two contracts elicited in wave 2.
11. With post-stratification weights.
12. With weights equal to respondents' inverse number of total contracts. See discussion in Section B.4.6.
13. With weights equal to respondents' inverse number of planned switches (or cancellations). See discussion in Section B.4.6.

Figure B.5: Contract Choice: Robustness



Notes: This figure shows the results of Figure 2b across various specifications. The figure shows the share of consumers choosing the more expensive contract with initial discount. Results are shown for two treatment conditions: consumers can switch anytime (red bars), or they can switch only after a two-year lock-in period (blue bars). Panel A displays results for the full sample. Panel B displays results for consumers who failed to switch at least one contract they had planned to switch, and Panel C further restricts the sample to consumers who failed to switch at least one contract without being willing to delegate the switching process (at an additional costs of 20% of the savings made from switching). The gray lines indicate 95% confidence intervals with standard errors clustered at the consumer level.

Specifications:

1. Full sample, replicating the results of Figure 2b.
2. Restrict sample to respondents who pass all attention screeners. See discussion in Section B.4.3.
3. Restrict sample to choices from the first scenario.
4. With post-stratification weights.
5. Restrict sample to more severe cases. Panel B: Consumers fail to switch for at least 50% of contracts they plan to switch. Panel C: Consumers fail to switch and do not delegate the switching process for at least 50% of contracts they plan to switch. See discussion in Section B.4.4.
6. Restrict sample to even more severe cases. Panel B: Consumers fail to switch for 100% of contracts they plan to switch. Panel C: Consumers fail to switch and do not delegate the switching process for 100% of contracts they plan to switch. See discussion in Section B.4.4.

B.2 More Information on the Sample

Sampling We recruited respondents in collaboration with the online survey company Prolific. Wave 1 took place in September 2025 and included 5,073 respondents. Of these, 3,449 (68%) also participated in Wave 2, launched in November 2025, two months after completing the first wave. We did not announce Wave 2 nor did we reveal the content of our Wave 2 survey before participants start the survey. Hence, the recontact rate of 68% — which is high for follow-up surveys over this timeframe — reflects that, conditional on participating in one survey, respondents do not always participate in another survey two months later for reasons unrelated to our survey.[33] As preregistered, our final sample consists of respondents who complete both survey waves.

Aside from ensuring a balanced gender ratio, we did not impose demographic quotas. Nonetheless, the demographics of our final sample resemble those of the general U.S. adult population in most respects. An exception is education. Our sample overrepresents college-educated consumers, as is common in online surveys. When we reweight the sample to correct for any imbalances in the summary statistics, we find the same results (see Figure B.4, specification 11, and Figure B.5, specification 4).

Exclusion Criteria As preregistered, the sample excludes respondents who did not complete both waves, duplicate respondents (very rare), and those who list the same provider twice within any of the four domains (also very rare). We also apply an exclusion criterion that we planned but forgot to preregister: in wave 2, respondents could indicate that a contract they had listed in wave 1 was incorrect. For these contracts, switching histories are uninformative due to possible mistakes in wave 1. This applies to 243 out of 16,835 contracts. We exclude these contracts from the analysis. Given their small number, their exclusion does not materially affect our results.

Attention and Bot Screener Only participants who pass a CAPTCHA and two attention screener at the beginning of the survey can proceed to the main part of the survey. The first screener asks participants about their current state of mind (focused, tired, happy, relaxed, ...), but the instructions clarify that they must select exactly three specific response options (out of eight) to pass. The second screener asks for their opinion on the annual switch to daylight saving time. Participants respond in an open-text box and are instructed to write approximately 15–30 words. We register keystroke events and screen out respondents with too few keystrokes, which indicates overly brief answers or copying and pasting. Open-text screener are effective at detecting

[33] The response rate was actually higher than the expected response rate of roughly 50% that we reported in the preregistration.

bots (Celebi et al., 2025), although the Prolific respondent pool is known for high data quality and the prevalence of bots is estimated to be very low (Stagnaro et al., 2024, Celebi et al., 2025) (as of fall 2025, close to when we collected the data).

Wave 1 of the survey contains a series of additional attention tests and indicators. This allow us to test whether our results are sensitive to excluding respondents who are most likely to be inattentive or submit automated responses. They are not, see Section B.4.

Final Sample Characteristics Table B.1 presents demographic summary statistics for our final sample and compares them to the demographic characteristics of the US adult population.

Survey Duration and Remuneration In Wave 1, the median response duration is 13 minutes and most respondents complete the survey within 9 and 20 min (20%-80% quantile range). The standard reward for survey completion is approximately $4.30. In Wave 2, the median response duration is 4 minutes and most respondents complete the survey within 3 and 7 min (20%-80% quantile range). The standard reward for survey completion is approximately $1.4.

Preregistration We preregistered the survey via OSF (Open Sciece Framework). The preregistration includes details on the survey design, survey instructions, sampling process, planned sample size, exclusion criteria, and research questions. The preregistration is available online at `https://osf.io/n8ktv/`.

B.3 Survey Instructions

This section provides an overview of the most important survey instructions. The complete instructions are available online at `https://osf.io/6phqy/files/u3xfz`.

B.3.1 Switching Plans (Wave 1)

The main part of the survey starts as follows:

> **About this survey**
>
> We are conducting research on consumer behavior related to recurring payments—including contracts and services such as internet or entertainment. Recurring payments may be billed monthly, semi-annually, annually, or at other regular intervals. Your responses will help us better understand how consumers manage these expenses.
>
> **Important!** You will also encounter a few open questions in which we will ask you to explain your responses to us. From previous experience, we know that it can take 1-2 minutes to respond

to each of these questions. Your responses are very valuable for this research project. Thus, please take the time and respond carefully.

Respondents respond to four blocks of questions, each on one of four different services: home internet, mobile service, video streaming, and audio streaming (music and audiobooks). The blocks are presented in random order. Below, we show the instructions for the home internet service block.

Your home internet service provider(s)

Do you currently pay for the following service on a recurring basis? Recurring payments may be billed monthly, semi-annually, annually, or at other regular intervals.

Home internet service, e.g., Comcast Xfinity; AT&T; Verizon Fios; Spectrum

[ ] Yes

[ ] No

[If yes ...] **Please list all providers you currently pay for this service below.**

Only list providers you currently pay for the service. You must list one provider, you can list up to five providers, contracts, or services.

For each provider the respondent lists, the survey proceeds as follows.

Your assessment

Within the next two months, do you think it would be possible to:

- **switch to a cheaper provider of similar quality**
- **or cancel the contract and be better off without it**

This requires that (i) it is possible to terminate the contract within the next two months, and (ii) the termination would take effect within the next two months, so that (iii) you would already save money over the next two months.

For my home internet service provider: [provider name] ...

[ ] It's possible to switch to a cheaper provider of similar quality within the next two months.

[ ] It's possible to cancel the contract within the next two months and be better off without it.

[ ] Neither is possible within the next two months.

If a respondent says it is possible to switch or cancel, the next questions measures the respondent's switching expectation:

Future Plans

Thinking ahead, what do you plan to do within the next two months? Will you cancel or switch to a different provider/plan? If you are not sure what you will do, please select "Not sure".

In the case of my home internet service provider: [provider name]

[ ] I will switch to a different provider/plan within the next two months.

[ ] I will cancel the contract within the next two months.

[ ] I will neither cancel nor switch within the next two months.

[ ] Not sure.

B.3.2 Delegation Decision (Wave 1)

If respondents plan to switch (or cancel) a contract, the next question introduces the delegation choice.

Would you pay for a switching service?

You said that you plan to switch the following service within the next two months.

Home internet service: [provider name]

Now, imagine there is a company that can handle the entire switching process on your behalf. You wouldn't need to invest any time or effort. The company handles everything quickly and conveniently: no paperwork, no communication with customer service, no research, no hassle on your part.

Completion in two months

Assume you will execute your plan to switch exactly two months from today.

What is the maximum amount you would agree to pay to have the entire process completed for you at that time?

You specify the maximum amount you would agree to pay now, but switching would be completed *in two months*, and you would pay for the service *in two months*.

Please specify the highest amount you would be willing to pay in two months. You would not pay more than this, but you would pay this or any lower amount. Type in 0 if you would not be willing to pay any amount.

Pay at most $____

Once we know how consumers value the reduction in switching costs, we can ask consumers whether they would prefer to delegate switching with immediate effect at an additional cost. Put differently, consumers can ensure that switching "gets done" already today by paying an additional cost. We first ask for an additional cost of 50% of savings. Consumers who decline are asked again for a lower cost of 20% of savings. We focus on the results for a cost of 20% of savings because this is the even more conservative specification.

Immediate completion

Now, consider the company can handle the entire switching process on your behalf **already today**. You would still pay in two months.

However, the **cost of this service** would be:

- A one-time fee of [valuation of service in two months], plus
- 50% of the savings you make from switching over the next two months.

Note: Switching would be completed today, but you would pay for the service *in two months.*

Given these terms, which option would you choose?

[ ] Delegate switching and pay [valuation of service in two months] plus 50% of your savings over the next two months.

[ ] Handle the switching myself.

[If respondent does not delegate ...] **Now, instead imagine the cost of the service would be lower**, namely:

- A one-time fee of [valuation of service in two months], plus
- **20% (instead of 50%) of the savings** you make from switching over the next two months.

Given these terms, which option would you choose?

For their first delegation decision, we ask respondents to explain their choice at 50% costs.

Please explain why you would make this choice.

From previous experience, we know that it can take 1-2 minutes to respond to this question. Your response is very valuable for this research project. Thus, please take the time and respond carefully.

____

____

[...]

B.3.3 Contract Choice (Wave 1)

Respondents are asked to imagine that they will soon move to a new home and have to select a new provider for either their home internet, mobile service, video streaming, or audio streaming. Respondents face two randomly selected cases, and we randomly vary on the case-level whether contracts can be cancelled and switched anytime or only after a two-year lock-in period. Below, we show instructions for the home internet case.

Choosing a home internet provider

The situation

Imagine you will soon move to a new home and need to select a new home internet provider. Currently, you have two options to consider:

Two providers

- Provider A costs $80 per month, but offers the first three months free.
- Provider B costs $60 per month, making it $20 cheaper each month, but does not offer any initial discount.
- Both providers offer the same service quality.
- You can cancel and switch providers **anytime** without fees or penalties. / You can cancel and switch providers only after a **two-year lock-in period**. [Depending on treatment]

[A comprehension quiz follows]

Summary

- Provider A: $80 per month, first three months free.
- Provider B: $60 per month, no initial discount.
- Both contracts can be canceled at **any time**. / You can cancel and switch providers only after a **two-year lock-in period**. [Depending on treatment]

Which provider would you choose to start service with?

[ ] Provider A

[ ] Provider B

Please explain your choice.

From previous experience, we know that it can take 1-2 minutes to respond to this question. Your response is very valuable for this research project. Thus, please take the time and respond carefully.

____

____

[...]

B.3.4 Contract Status Two Months Later (Wave 2)

The main part of the survey starts as follows:

About this survey

Thank you for participating in this follow-up survey. Approximately two months ago, you provided us with information about your recurring payments for contracts and services such as internet, mobile service, or entertainment. In today's survey, we would like to understand how your situation may have changed since then.

We go through all contracts the respondent listed two months ago — in random order. Below, we show the key questions for the example of a home internet contract.

Your home internet provider: [provider name]

About two months ago, you told us that you pay for the home internet provider:

[provider name]

Was this information correct?

[ ] Yes

[ ] No

Do you still have the same home internet contract ([provider name]) as two months ago?

[ ] Yes

[ ] No

[Respondents have to confirm their response in a separate question.]

B.4 Additional Analyses

B.4.1 Delegation Decision: Open-Text Responses

We ask respondents to explain their first delegation decision in their own words. Example explanations for choosing not to delegate include:

"The process of cancelling a subscription isn't very difficult. I would rather just save all the money and do it myself."

"The purpose of switching would be to save money. I would not want to give up 50% of my savings from the next 2 months."

Example explanations for delegating are:

"I will definitely de[l]egate the cancellation and pay the $20. I am always a busy man who always values high levels of efficiency and cost saving in the long-term. I think delegating the task would save me a lot of time and allow me to simply handle the most important things[.]"

"Delegating switching would save me time and allow me to do other things while[ ]the switching process is completed seamlessly."

To enable a quantitative analysis, we assign topic codes to each free-text response using few-shot prompting with OpenAI's GPT-4o model (temperature: 0), accessed via the API in September 2025. Each response can receive multiple codes. Table B.2 summarizes our codebook, which we developed based on pilot data before the main data collection.

To validate the model-based classification, we manually coded a random subset of 200 responses. In this subset, 89% of the assigned codes overlap, and the overall distribution of codes closely aligns with the model's output. To assess the stability of the model-based classification, we repeated the coding procedure 10 times on a random sample of 200 responses. On average, 99% of the assigned codes are consistent across two independent runs, indicating very low variability of the model's output.

Table B.2 also displays the frequency of each code. Consumers who delegate generally report doing so either because they perceive the delegation cost as low or believe switching independently is difficult. Consumers who choose not to delegate usually argue the opposite: they consider the delegation cost high or feel that switching is easy enough to manage themselves.[34] What is perhaps more surprising is what people do *not* say. Respondents who delegate rarely mention ensuring that switching actually "gets done" as a reason for delegating.

[34] As in the main text, we use "switching" to cover both switching providers and canceling services.

Table B.2: Overview of the Coding Scheme for Delegation Decision Explanations

Theme	**Description**
Delegation chosen at 50% costs (16%)	
High switching costs (9%)	Delegation is chosen because it saves time, effort, nerves, or energy.
Delegation service is cheap (5%)	Delegation is perceived as affordable or worth the price.
High quality (2%)	Delegation is preferred because the company is believed to do a good job (e.g., smooth process, expert handling, fewer errors).
Ensure switching "gets done" (1%)	Delegation chosen out of fear of procrastination, forgetting, or not following through.
Delegation not chosen at 50% costs (84%)	
Low switching costs (55%)	Respondents see little personal effort in canceling/switching themselves.
Delegation service is expensive (36%)	Delegation is rejected due to its perceived high cost or because respondents want to avoid additional expenses.
Low quality (11%)	Skepticism about the company's ability to execute the switch well. Preference to avoid miscommunication or errors.
Contract still in use (2%)	Respondents want to keep the service for a while longer (e.g., to finish a show), hence reject immediate cancellation.
Other	
Other (3%)	None of the above apply or explanation is too vague or unclear for coding.

B.4.2 Contract Choice: Open-Text Responses

We ask respondents to explain their contract choice in their own words. Example explanations for choosing the initially discounted, ultimately costlier contract include:

> "This one I feel is a no-brainer, considering I can switch and cancel at any time. I would go with Provider A offering the free service for the first three months to test the quality, and then switch to Provider B to receive the overall savings." (*condition: switching possible*)

> "I would rather take the first three months for free and pay more later than pay more upfront." (*condition: switching possible*)

Example explanations for choosing the contract with the lower regular price are:

> "Getting an initial savings is nice, but it would be eaten up over time. I'd rather keep long-term savings." (*condition: switching possible*)

Table B.3: Overview of the Coding Scheme for Contract Choice Explanations

Theme	Description
Choose Provider A	
Anticipate switching	Provider A is chosen for its short-term advantage in anticipation of the opportunity to cancel or switch after the discount period.
Discount attractive	Provider A is chosen due to the free initial months, without any mention or hint of switching or canceling later.
Choose Provider B	
Cheaper regular price	Provider B is preferred because it results in lower costs in the long run.
Avoid future switching	Provider B is selected to avoid the future hassle or risk of switching providers.
Other	
Other	None of the above apply or explanation is too vague or unclear for coding.

> "B is going to be cheaper in the long run and if the quality is the same, then it's an easy choice." (*condition: 2 year lock-in*)

To enable a quantitative analysis, we assign each free-text response to one topic code using few-shot prompting with OpenAI's GPT-4o model (temperature: 0), accessed via the API in September 2025. Table B.3 summarizes our codebook, which we developed based on pilot data before the main data collection.

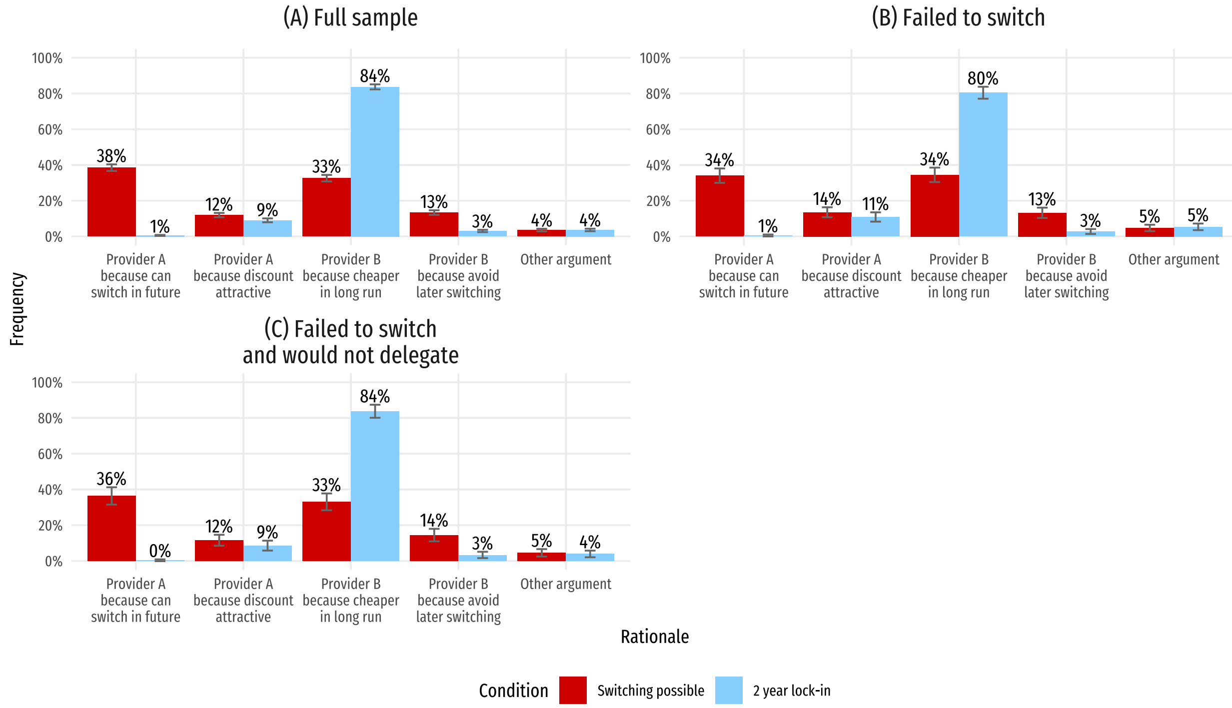
To validate the automated classification, we manually coded a random subset of 200 responses from our data. We found 95% agreement between manual and model-based classifications, and the overall code distributions closely matched. We repeated the model-based classification 10 times on another random sample of 200 responses. We observed an average consistency rate of 99%, indicating minimal variability in the model's assignments.

Figure B.6 presents the results for both treatment conditions (cancellation is possible at any time versus after a two-year lock-in period) and three different samples, as in Figure 2b in the main text. The key takeaway is that, if cancellation is possible at any time, many consumers argue they choose the discounted contract because they anticipate being able to switch in the future.

B.4.3 Excluding Potentially Inattentive Respondents

One potential threat for the interpretation of our results is that some respondents may not report their switching plans carefully. To address this, we implement multiple safeguards beyond the bot

Figure B.6: Consumers' Explanations for Their Contract Choice



Notes: This figure shows consumers' explanations for the contract choice. Results are shown for two treatment conditions: consumers can switch anytime (red bars), or they can switch only after a two-year lock-in period (blue bars). Panel A displays results for the full sample. Panel B displays results for consumers who failed to switch at least one contract they had planned to switch, and Panel C further restricts the sample to consumers who failed to switch at least one contract without being willing to delegate the switching process (at an additional costs of 20% of the savings made from switching). The gray lines indicate 95% confidence intervals with standard errors clustered at the consumer level.

and attention screeners at the start of the survey (see Section B.2). Throughout the survey, we collect several further indicators of respondent attentiveness. While we recognize these indicators can also yield false positives — respondents incorrectly flagged as inattentive — they allow us to identify respondents most likely to provide careless answers:

- We manually review all submitted provider names and flag respondents who report at least one unreasonable name (2%).
- We flag respondents reporting more than two home internet or two mobile service contracts, which could indicate careless form-filling (2%).
- We flag respondents who fail a second attention-check question inserted midway through the survey (2%).
- We flag respondents who make more than one mistake on the comprehension quiz for either of their two contract choice scenarios (4%).
- We flag respondents who answer a "honeypot" question — a hidden open-text question visible

only to bots (1 respondent).

- We flag respondents identified by reCAPTCHA as likely automated responses (4 respondents).
- We flag respondents identified by Qualtrics' built-in duplicate detection, which analyzes device and browser metadata, excluding IP addresses, which we disabled for privacy reasons (4%).
- In the contract choice scenarios, respondents are asked to explain their choices in open-text boxes. We record keystroke counts for these explanations and flag respondents whose submitted text contains more characters than keystrokes (2% of cases).

Overall, 13% of respondents are flagged by at least one indicator as potentially inattentive. While we acknowledge that these indicators likely yield false positives — that is, flag attentive respondents incorrectly — they help us identify those most likely to provide careless responses. To ensure robustness, we test whether our findings change if we exclude these respondents. As Figures B.4 (specification 6) and B.5 (specification 2) demonstrate, our results remain unaffected.

B.4.4 Contract Choice with History of Naive Switching Plans

Our findings from the contract-choice scenario remain robust even when restricting the analysis to "consumers who have an even more conspicuous history of naive switching plans (see Appendix Figure B.5)." Specifically, we strengthen our criteria for identifying consumers with a history of naive switching plans, thereby creating subsamples that include only respondents exhibiting particularly severe patterns of naive switching in our data. Appendix Figure B.5 reports results from two such additional specifications.

"Severe cases 1" (specification 5):

- Panel B: Consumers fail to switch for at least 50% of contracts they plan to switch.
- Panel C: Consumers fail to switch and do not delegate the switching process for at least 50% of contracts they plan to switch.

"Severe cases 2" (specification 6):

- Panel B: Consumers fail to switch for 100% of contracts they plan to switch.
- Panel C: Consumers fail to switch and do not delegate the switching process for 100% of contracts they plan to switch.

B.4.5 How Do People Who Plan to Switch Explain that They Do Not Switch?

In Wave 2, we ask participants who did not switch a contract why they did not switch. Here, we discuss the responses for contracts consumers planned to switch two months before. To classify the responses, we follow an analogous procedure as before and employ few-shot prompting with GPT-4o. Consumers' explanations broadly align with the behavioral mechanisms outlined in Section 2. Some respondents say switching requires too much effort, indicating an initial underestimation of switching costs. Others report handling more pressing matters over recent weeks, consistent with underestimating opportunity costs. A further group explains that they continue using the service or, common in the case of video streaming, started watching new content, consistent with procrastination. Interestingly, roughly 40% of the respondents mention they are satisfied with their current service. Such responses are consistent with rationalization similar to Heidhues et al. (2022), whereby consumers justify their failure to switch by adjusting their perceived valuation of the current product. Even when we exclude these cases, the switching rate among those who initially planned to switch is only slightly above 50% — specifically, 52%.

B.4.6 Contract-Level versus Individual-Level Results

We report our results for expected and actual switching rates at the contract level. For example, consumers plan to switch 9% of their listed contracts but followed through on only 39% of these planned switches. Because calculating averages at the contract level inherently gives more weight to respondents with many contracts, we also compute results using alternative weighting methods. Specifically, we weight each contract by the inverse of either the total number of contracts reported by each consumer or the total number of contracts each consumer planned to switch. Both methods yield virtually identical results, as shown in Figure B.4 (specifications 12 and 13).

B.5 Formal Discussion of Delegation Decision

For a formal discussion of the delegation decision, we use our model of consumers with a short-run discount factor $\beta \in (0, 1]$. We consider a consumer who has not switched a contract but plans to do so over the next two months with incurring a switching cost $s > 0$.[35] For notational simplicity, we denote the continuation value of having switched by V_{switch}, the continuation value of having not switched by $V_{\text{no-switch}}$, and set the long-run discount factor to zero over the next two months. The consumer plans to switch in some moment within the next two months, from which we infer that she believes that switching is better than not switching. In particular, they prefer having switched

[35] In an extended model, we show that even when a switching cost s is an i.i.d. random variable, the following result goes through by merely replacing s with the expected value of s conditional on switching. The analysis is available upon request.

in two months with the switching cost s rather than not having switched:

$$\beta V_{\text{no-switch}} \leq \beta(V_{\text{switch}} - s) \quad \Longleftrightarrow \quad V_{\text{no-switch}} \leq V_{\text{switch}} - s. \tag{18}$$

The consumer considers delegating the switching process to an external agency. Delegation effectively avoids any switching costs. For consumers who plan to switch, we quantify their valuations for avoiding any switching costs by asking them for the highest fixed fee f they would be willing to pay for the switching service in two months. Because all payments come in the future, it leads to $\beta f = \beta s$ and hence $f = s$.

Then, we ask whether they would prefer delegating switching *now* at an additional cost equal to 20% of the savings over the next two months from switching, denoted by Δp. The value of delegating now is

$$\beta \left[\underbrace{\Delta p + V_{\text{switch}}}_{\text{Benefit of immediate switching}} - \underbrace{(f + 0.2\Delta p)}_{\text{Costs of delegation}} \right] = \beta \left[0.8\Delta p + V_{\text{switch}} - f \right].$$

The value of **not** delegating depends on (i) when consumers think they will switch themselves and (ii) the probability with which they expect to switch at all. We denote the perceived switching probability by q and allow for $q < 1$. We bound the benefit of switching by assuming that consumers realize the full savings Δp, irrespective of when they switch in the next two months. Hence, we can bound the value of not delegating now as follows:

$$\begin{aligned} \text{value of } \textbf{not} \text{ delegating now} \leq & \beta \left[q(\underbrace{\Delta p + V_{\text{switch}}}_{\text{Upper bound of benefit}} - \underbrace{s}_{\text{Costs of switching}}) + (1-q)V_{\text{no-switch}} \right] \\ \leq & \beta \left[q\Delta p + qV_{\text{switch}} - qs + (1-q)(V_{\text{switch}} - s) \right] \\ = & \beta \left[q\Delta p + V_{\text{switch}} - s \right], \end{aligned}$$

where the second inequality holds by Condition (18).

Hence, with using $f = s$ derived above, delegating now is better than not delegating now if

$$\beta \left[0.8\Delta p + V_{\text{switch}} - f \right] \geq \beta \left[q\Delta p + V_{\text{switch}} - s \right] \quad \Longleftrightarrow \quad q \leq 0.8.$$

That is, the group of consumers who planned to switch but did not choose to delegate should exhibit an actual switching rate of at least 80%. As we only observe an actual switching rate of 44% (Figure 2a), the group would have been better off had they delegated.