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Paying Not to Go to the Gym

By STEFANO DELLAVIGNA AND ULRIKE MALMENDIER*

How do consumers choose from a menu of contracts? We analyze a novel dataset from three U.S. health clubs with information on both the contractual choice and the day-to-day attendance decisions of 7,752 members over three years. The observed consumer behavior is difficult to reconcile with standard preferences and beliefs. First, members who choose a contract with a flat monthly fee of over $70 attend on average 4.3 times per month. They pay a price per expected visit of more than $17, even though they could pay $10 per visit using a 10-visit pass. On average, these users forgo savings of $600 during their membership. Second, consumers who choose a monthly contract are 17 percent more likely to stay enrolled beyond one year than users committing for a year. This is surprising because monthly members pay higher fees for the option to cancel each month. We also document cancellation delays and attendance expectations, among other findings. Leading explanations for our findings are overconfidence about future self-control or about future efficiency. Overconfident agents overestimate attendance as well as the cancellation probability of automatically renewed contracts. Our results suggest that making inferences from observed contract choice under the rational expectation hypothesis can lead to biases in the estimation of consumer preferences. (*JEL* D00, D12, D91)

"Saturday 31 December. New Year's Resolutions. I WILL [...] go to the gym three times a week not merely to buy sandwich."
Bridget Jones's Diary: A Novel

"Monday 28 April. [...] Gym visits 0, no. of gym visits so far this year 1, cost of gym membership per year £370; cost of single gym visit £123 (v. bad economy)."
Bridget Jones: The Edge of Reason

Many firms offer consumers a menu of contracts. Cellular phone users choose combinations of monthly airtime minutes and prices. Credit card users choose between teaser rate offers and contracts with a constant interest rate. A large literature in industrial organization analyzes the profit-maximizing contract design (Jean Tirole, 1988). A standard assumption in this literature is that consumers have rational expectations about their future consumption frequency and choose the utility-maximizing contract.

In this paper, we provide evidence that this may not always be the case. We present a novel dataset from three U.S. health clubs that allows us to analyze the contractual choices of consumers in light of their actual consumption behav-

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TABLE 1—EMPIRICAL FEATURES AND POSSIBLE EXPLANATIONS

	Standard model	Trans. costs of payment per usage	Membership benefits per usage	Limited memory	Time inconsist. with sophistication	Time inconsist. with naiveté	Overestimation of future efficiency	Persuasion
Finding 1								
Price per average attendance = $17.27		Distaste of pay per usage	Membership benefits		Commitment	Commitment, overestimation of attendance	Overestimation of attendance	Pressure of salesman
Finding 2								
Average attendance in months 2–4 higher in annual than monthly contract	Sorting at enrollment	Sorting at enrollment	Sorting at enrollment	Sorting at enrollment	Sorting at enrollment	Sorting at enrollment	Sorting at enrollment	Sorting at enrollment
Finding 3								
Users predict 9.50 monthly visits; actual monthly visits are 4.17						Overestimation of attendance	Overestimation of attendance	
Finding 4								
Interval between last attendance and termination 2.31 full months		Distaste of pay per usage	Membership benefits	Forget to cancel		Overestimation of cancellation	Overestimation of cancellation	Pressure of salesman
Finding 5								
Survival probability after 14 months 17 percent higher for monthly than for annual contract				Forget to cancel		Overestimation of cancellation	Overestimation of cancellation	Pressure of salesman
Finding 6								
Average attendance 27 percent higher in second year for annual contract	Learning, sorting out	Learning, sorting out	Learning, sorting out	Learning, sorting out	Learning, sorting out	Learning, sorting out	Learning, sorting out	Learning, sorting out
Finding 7								
Decreasing average attendance over time in monthly contract				Forget to cancel		Overestimation of cancellation	Overestimation of cancellation	Pressure of salesman
Finding 8								
Positive correlation of price per average attendance and interval between last attendance and termination						Heterogeneity in naiveté	Heterogeneity in overconf.	

ior. The dataset contains information both on the type of membership and the day-to-day attendance decisions of 7,752 health club members over three years. We find that consumers choose a contract that appears suboptimal given their attendance frequency. In addition, low-attendance consumers delay cancelling this contract despite small transaction costs.

Our empirical analysis exploits the presence of a contractual menu. Consumers can choose between two flat-rate contracts—a monthly contract and an annual contract—and a pay-per-visit option. The monthly contract is automatically renewed from month to month until the consumer cancels. The annual contract, instead, expires after 12 months unless the consumer explicitly renews it. The variation in the per-usage pricing and in the renewal procedures allows us to identify several puzzling features of consumer behavior.

First, consumers who choose a monthly membership of over $70 per month pay on average 70 percent more than they would under the pay-as-you-go contract for the same number of visits. Eighty percent of the monthly members would have been better off had they paid per visit for the same number of visits.

Second, consumers who choose the monthly contract are 17 percent more likely to stay enrolled beyond one year than users choosing the annual contract. This is surprising because monthly members pay higher fees for the option to cancel each month. This result occurs even though high-attendance users sort into the annual contract at enrollment.

These and additional empirical findings (summarized in Table 1) are hard to reconcile with standard preferences and beliefs. We explore potential explanations, including high transaction costs of payment per usage, risk aversion, underestimation of costs of attendance and of cancellation, time inconsistency, naiveté about the time inconsistency, and persuasion by health club employees.

In our view, the most parsimonious explanations are those allowing for overconfidence (naiveté). Consumers overestimate, for example, their future self-control or their future efficiency

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in pursuing costly activities. This leads to overestimation of attendance and of cancellation in automatically renewed contracts. As an alternative explanation, persuasion by health club employees can explain most findings.

In a simple yet economically significant decision—enrollment and attendance in a health club—consumers deviate systematically from the optimal contractual choice. In the health clubs of our sample, the average nonsubsidized user chooses the monthly contract and, by doing so, forgoes savings of about $600 per membership, out of a total amount of about $1,400 paid to the health club. The results of this study are likely to generalize to the 32.8 million Americans who exercise in one of the 16,983 U.S. health clubs. Therefore, both in terms of monetary magnitude and in terms of population involved, the nonstandard behavior has a significant economic impact. Our findings are also consistent with findings on consumer behavior in the credit card industry (Haiyan Shui and Lawrence M. Ausubel, 2004) and employee choice of 401(k) plans (Brigitte C. Madrian and Dennis F. Shea, 2001).

The analysis of consumer behavior is just the first step toward a better understanding of industries where consumers display nonstandard preferences or beliefs. Profit-maximizing firms should respond to the nonstandard features of consumer behavior in their contract design. This is the central theme of the growing literature on behavioral industrial organization (DellaVigna and Malmendier, 2004; Kfir Eliaz and Ran Spiegler, forthcoming; Xavier Gabaix and David Laibson, forthcoming; Paul Heidhues and Botond Koszegi, 2005), surveyed in Glenn Ellison (forthcoming). The large effect of small cancellation costs on renewal rates may explain the high frequency of contracts with automatic renewal in the newspaper, credit card, and mail-order industry. The findings have implications also for the design of flat-rate pricing (Eugenio J. Miravete, 2003). In DellaVigna and Malmendier (2004), we explore the implications for firm pricing of a leading explanation of our results: overconfidence about self-control.

Our findings suggest caution in making inferences about consumer preferences from observed choices of products (Igal Hendel and Aviv Nevo, 2004) or contracts (Miravete and Lars-Hendrik Röller, 2003), when actual consumption is unobserved. Inferences made under the assumption of rational expectations can lead to significant bias. For example, we would have concluded that monthly members attend on average at least twice a week. This erroneous conclusion would have overstated the impact of health club enrollment on health outcomes.

Finally, our findings have implications for the policy debate on obesity (David M. Cutler et al., 2003). Subsidizing enrollment in health clubs is likely to have only small effects on obesity rates, given the low average attendance of members.

The remainder of the paper is organized as follows. In Section I, we introduce the main features of the health club dataset. In Section II, we develop predictions about the contractual choice at enrollment and test the predictions empirically. In Section III, we present a similar analysis of the contractual choice and consumption behavior over time. Section IV discusses possible explanations for the empirical findings. Section V concludes.

I. Health Club Dataset

A. *Health Club Industry*

As of January 2001, 16,983 clubs were operating in the United States. The industry revenues for the year 2000 totalled $11.6 billion. The memberships in the same period was 32.8 million, up from 17.4 million in 1987. Fifty-one percent of the users were members in commercial health clubs, while 34 percent were members in nonprofit facilities. Only the market leader Bally Total Fitness, with $1,007 million in revenues and 4 million members, is publicly traded. Few companies operate in more than ten states. Ownership concentration is in the tenth percentile of U.S. industries.

B. *Dataset*

We collected a new panel dataset from three health clubs located in New England, which we label clubs 1, 2, and 3. The dataset contains information on the contractual choices and the day-to-day attendance of users who enrolled after April 1, 1997. The sample period is April 1997 through July 2000 for club 1 and April 1997 through February 2001 for clubs 2 and 3. The day-to-day record of usage is made available by the technology regulating the access to

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these health clubs, described below. The panel of contractual choices comes from the billing records. Each entry in the accounting data specifies the price paid for the transaction and a four-letter code. This code allows us to track the membership type—standard, student, family, corporate—as well as details like the subsidizing company (if any).

Several companies located near the clubs subsidize their employees' attendance. For these corporate members, the health club receives part of the membership payments directly from the firms, with the remainder being paid by the members. The health club informs the companies periodically about the number of employees enrolled and their attendance. This creates incentives for the health club to record attendances accurately or, possibly, to overrecord them.

C. *Contractual Menu*

We conducted a survey of the 97 health clubs in the Boston metropolitan area to document the contract design in the industry.[1] Health clubs offer up to three options: 87 clubs offer a monthly contract and a monthly fee is automatically debited each month to a credit card or bank account until the user cancels; 90 clubs offer an annual contract. Both monthly and annual contracts have an initiation fee but no fee per visit. Finally, 82 clubs offer a pay-per-visit option, often in the form of a ten-visit pass. Health clubs 1 and 2 in our sample offer the three types of contract with the following additional features:[2]

- The monthly contract has a monthly fee ranging between \$70 (discounted level) and \$85 (standard level). Noncorporate users also pay an initiation fee ranging from \$0 (in promotional periods) to \$150. Corporate users generally pay an out-of-pocket monthly fee between \$19 and \$65, depending on the subsidy paid by their company, and no initiation fee. Cancellation can be done in person at the club or by sending a written note.[3] If cancellation takes place before the 10th of the month, no further fees are due, and the users can attend until the end of the month. Members who cancel after the 10th have to pay the fee for the next month and can attend until the end of the following month.
- The annual contract charges up front ten times the applicable monthly fee, e.g., \$850 for a standard membership.[4] Users thus get a discount of 2 months out of 12 in exchange for a yearly commitment. The initiation fee is the same as under the corresponding monthly contract. At the end of the year, the contract expires and members who wish to stay enrolled have to sign up again, either for an annual or for a monthly contract. In order to encourage renewal, the club sends out a reminder card one month before the contract expires.
- The pay-per-visit system offers two options, either to pay \$12 per visit or to purchase a ten-visit pass for \$100. Transaction costs for the ten-visit pass are small. Users provide basic demographic information and receive a card for ten visits. Unfortunately, attendance is not tracked for the pay-per-visit users.

Users of club 3 face the same menu of contracts with lower prices and slightly different services. The monthly fee ranges from \$13 to \$52, and the initiation fee is at most \$50. The annual fee in the annual contract equals ten times the corresponding monthly fee. The pay-per-visit options are a \$10 fee per visit, and a \$80 pass for ten visits.

Under all types of membership, users receive cards they have to deposit in a basket at the front desk when they enter. While they are exercising, a health club employee swipes them (marks the visit for the ten-visit passes), and users pick them up when they exit. This method guarantees a high recording precision even during peak hours. The three contracts give right to the same services, i.e., a temporary locker, tow-

[1] For details on the survey, see DellaVigna and Malmendier (2004).

[2] Contracts for one to six months with automatic expiration are also available. We do not include them in our analysis, since they are typically targeted toward occasional summer users. We also remove from the sample free, limited-time memberships that are occasionally given to employees of the subsidizing companies.

[3] Some users cancel by discontinuing the payments to the health club.

[4] The annual fee can be paid in three installments due in the first six months.

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els,[5] and access to the equipment. Also, both the monthly and the annual contract allow members to "freeze" (suspend) their membership for three months per year.[6] Users with a monthly contract do not have to pay their monthly fee during the freezing period. Annual members get additional usage time after the original 12 months.

D. *Sample Construction*

We match the information on attendance and on contract choice in the three clubs to form a longitudinal dataset with monthly observations, covering the period from April 1997 to July 2000 (club 1) and to February 2001 (clubs 2 and 3). Our analysis focuses on *enrollment spells.* A spell starts whenever an individual enrolls (or reenrolls) in a club and ends whenever the individual quits. We define spells to be censored if either the enrollment is ongoing at the end of the sample period, or the individual switches to a short-term contract or receives a promotional membership. Accordingly, spells are completed if the individual cancels the membership (under a monthly contract) or if the membership expires (under an annual contract) within the sample period. Individuals have multiple spells if they quit the club and reenroll at some later date.

The initial sample includes 10,175 individuals. We drop individuals who were never enrolled in either a monthly or an annual contract (1,867 individuals). We eliminate individuals with data inconsistencies (49 individuals). We also exclude users with a family membership to avoid issues regarding the joint consumption of the services (247 individuals). Finally, in order to limit the sample to first-time users of these clubs, we drop users who had a free or a seasonal membership before they chose a monthly or an annual contract (260 individuals). (Additional information on the dataset construction is available in the Data Appendix.)

This leaves us with a sample of 7,752 individuals and 8,273 enrollment spells. In the paper, we consider only the first enrollment spell for each individual. As row 1 of Table 2 shows, club 1 has 22 percent more members than club 2, and more than twice as many members as club 3. The percentage of completed spells is similar across the clubs, above 60 percent. Of the 7,752 individuals enrolled in any club, 89 percent choose a monthly membership as their first contract. Health club members rarely change the type of contract they initially enroll in. In addition to the whole sample, we also use the sample "no subsidy," which includes only unsubsidized memberships. We consider a membership to be unsubsidized if, over the whole spell, the average out-of-pocket fee exceeds $70 per month for enrollment in a monthly membership and $700 per year ($58 per month) for enrollment in an annual membership. This smaller sample includes 1,070 individuals (14 percent of the full sample).

E. *Descriptive Statistics*

In clubs 1 and 2 (columns 1 and 2), the average amount spent per spell is about $550, and the average fee per month ranges between $44 and $52. For corporate users, these are out-of-pocket payments and do not include subsidies paid by the sponsoring firms. The amounts are substantially lower in club 3 (column 3), since the contracts are cheaper, and substantially higher in the sample "no subsidy" (columns 7 and 8). Across all clubs (column 4), the initiation fee averages $4 and is paid by only 14 percent of users. Individuals with a monthly contract attend on average four times per month, and individuals with an annual contract attend on average 4.4 times per month. Attendance in club 1 (column 1) is somewhat higher than in the other clubs. Freezing of a contract is rare in all the clubs. The bottom part of Table 2 displays the available demographic controls. Users are somewhat more likely to be male than female and are on average in their early thirties. Corporate memberships account for 50 percent of the sample, while student memberships account for only 2 percent.

II. Contract Choice at Enrollment

A. *Predictions of the Standard Model*

We set up a model of contract choice and health club attendance. We assume that health

[5] Towels are not included in memberships in club 3.

[6] Monthly users can also quit for up to three additional months without repaying the initiation fee.

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TABLE 2—DESCRIPTIVE STATISTICS

	Sample: All				Sample: All		Sample: No subsidy	
					All clubs		All clubs	
	Club 1	Club 2	Club 3	All clubs				
	All contr. (1)	All contr. (2)	All contr. (3)	All contr. (4)	First contract monthly (5)	First contract annual (6)	First contract monthly (7)	First contract annual (8)
Number of spells								
Total	3,495	2,866	1,391	7,752	6,875	877	866	204
Completed spells	2431	1825	990	5246	5246	509	581	112
Total amount in $	558.30	551.50	314.08	511.96	498.40	618.25	918.02	1,022.56
	(500.52)	(551.50)	(304.18)	(500.52)	(504.94)	(450.71)	(699.58)	(536.89)
	$N = 3,495$	$N = 2,866$	$N = 1,391$	$N = 7,752$	$N = 6,875$	$N = 877$	$N = 866$	$N = 204$
Initiation fee	6.35	1.91	2.89	4.09	3.88	5.74	14.68	17.65
	(26.64)	(11.91)	(13.03)	(20.23)	(19.51)	(25.10)	(41.88)	(45.57)
	$N = 3,495$	$N = 2,866$	$N = 1,391$	$N = 7,752$	$N = 6,875$	$N = 877$	$N = 866$	$N = 204$
Average fee per month								
Monthly contract	52.14	49.04	31.27	42.22	47.12	55.98	78.56	73.60
	(18.57)	(19.09)	(10.97)	(19.22)	(19.19)	(20.58)	(5.03)	(15.78)
	$N = 3,185$	$N = 2,551$	$N = 1,262$	$N = 6,951$	$N = 6,875$	$N = 76$	$N = 866$	$N = 20$
Annual contract	48.19	44.33	24.13	43.01	46.99	42.57	70.12	66.27
	(15.64)	(17.08)	(8.75)	(17.45)	(15.10)	(17.64)	(4.54)	(4.03)
	$N = 436$	$N = 391$	$N = 147$	$N = 974$	$N = 97$	$N = 877$	$N = 6$	$N = 204$
Average attendance per month								
Monthly contract	4.13	3.98	3.76	4.01	4.00	4.49	3.93	5.20
	(3.92)	(3.76)	(3.69)	(3.82)	(3.82)	(3.77)	(3.76)	(4.29)
	$N = 3,138$	$N = 2,551$	$N = 1,262$	$N = 6,951$	$N = 6,875$	$N = 76$	$N = 866$	$N = 20$
Annual contract	4.57	4.22	4.20	4.37	5.71	4.22	7.26	4.35
	(3.98)	(4.08)	(3.95)	(4.01)	(4.27)	(3.96)	(3.50)	(3.95)
	$N = 436$	$N = 391$	$N = 147$	$N = 974$	$N = 97$	$N = 877$	$N = 6$	$N = 204$
Contract choice per spell								
Months with monthly contract	9.03	6.95	8.94	8.98	10.08	0.42	11.67	0.50
	(8.27)	(9.03)	(8.84)	(8.66)	(8.57)	(2.08)	(8.87)	(2.26)
	$N = 3,495$	$N = 2,866$	$N = 1,391$	$N = 7,752$	$N = 6,875$	$N = 877$	$N = 866$	$N = 204$
Months with annual contract	1.55	1.97	1.42	1.68	0.15	13.68	0.07	14.92
	(4.67)	(5.78)	(4.83)	(5.14)	(1.50)	(7.32)	(1.05)	(7.86)
	$N = 3,495$	$N = 2,866$	$N = 1,391$	$N = 7,752$	$N = 6,875$	$N = 877$	$N = 866$	$N = 204$
Freezing	0.26	0.31	0.18	0.26	0.29	0.05	0.35	0.04
	(0.94)	(1.14)	(0.72)	(0.99)	(1.04)	(0.38)	(1.20)	(0.32)
	$N = 3,495$	$N = 2,866$	$N = 1,391$	$N = 7,752$	$N = 6,875$	$N = 877$	$N = 866$	$N = 204$
Female	0.44	0.48	0.47	0.46	0.48	0.34	0.38	0.35
	(0.50)	(0.50)	(0.50)	(0.50)	(0.50)	(0.47)	(0.49)	(0.48)
	$N = 3,487$	$N = 2,866$	$N = 1,391$	$N = 7,744$	$N = 6,875$	$N = 876$	$N = 866$	$N = 204$
Age at sign-up	30.71	31.51	35.08	31.79	31.50	34.06	33.12	34.42
	(8.44)	(8.91)	(9.30)	(8.91)	(8.78)	(9.63)	(9.75)	(10.86)
	$N = 3,293$	$N = 2,745$	$N = 1,316$	$N = 7,354$	$N = 6,523$	$N = 831$	$N = 812$	$N = 193$
Corporate member	0.43	0.61	0.43	0.50	0.50	0.52	0.17	0.16
	(0.50)	(0.49)	(0.50)	(0.50)	(0.50)	(0.50)	(0.37)	(0.37)
	$N = 3,495$	$N = 2,866$	$N = 1,391$	$N = 7,752$	$N = 7,079$	$N = 877$	$N = 866$	$N = 204$
Student	0.05	0.00	0.00	0.02	0.02	0.01	0.00	0.00
	(0.21)	(0.05)	(0.05)	(0.15)	(0.15)	(0.12)	(0.05)	(0.07)
	$N = 3,495$	$N = 2,866$	$N = 1,391$	$N = 7,752$	$N = 6,875$	$N = 877$	$N = 866$	$N = 204$

Notes: Standard deviation in parentheses. An enrollment spell starts whenever an individual enrolls in the club and ends whenever the individual quits or is censored. The sample "no subsidy" consists of the spells in which the average adjusted monthly fee is at least $70 if the spell starts with a monthly contract and at least $58 if the spell starts with an annual contract. The spells in column "first contract monthly" start with a monthly contract. The spells in column "first contract annual" start with an annual contract. "Average price per month" refers to the out-of-pocket fee in the case of corporate users.

club attendance involves immediate effort costs and delayed health benefits, and that the effort costs are uncertain ex ante. In particular, costs can be high ($c = \bar{c}$) or low ($c = \underline{c}$), and individuals differ in the ex ante probability that costs will be high. A contract (L', p', T') gives

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customers the right to exercise for a fee p' and for T' periods (days), once the flat fee L' is paid. We assume that consumers can choose between flat-fee contracts (like the monthly and annual contract) with $p' = 0$ and pay-per-visit contracts with $L' = 0$. We summarize here the results on contract choice for the case of standard preferences and rational beliefs. The derivation is in the working-paper version (DellaVigna and Malmendier, 2002).

Flat Rate versus Pay per Usage.—We consider first the choice at enrollment between a flat-rate contract $(L, 0, T)$ and a pay-per-visit contract $(0, p, T)$. Denote by δ the daily discount factor and by $E_F[v]$ the expected number of visits (over T days) under the flat-rate contract.

Prediction 1 (price per expected attendance at enrollment): *For agents who choose a flat-rate contract,*

$$\frac{L}{E_F[v]}\, a(T) \leq p. \tag{1}$$

The factor $a(T) \equiv (1 - \delta)T/(1 - \delta^T)$ is a time-adjustment coefficient due to the fact that the flat fee L is paid up front and the per-visit fee p is paid every period between 1 and T. For small T, such as $T = 30$ under the monthly contract, $a(T)$ is approximately 1. Equation (1) says that payment per expected visit under the flat-rate contract should be smaller than the per-visit-fee p. Intuitively, only consumers who attend frequently should choose the flat-rate contract. Suppose, instead, that a consumer under the flat-rate contract attends infrequently enough that the price per expected visit $L/E_F[v]$ is greater than the per-visit-fee p. If this consumer switched to the pay-per-visit contract without changing state-contingent attendance, she would have higher utility. Reoptimizing the attendance choices, she must be even better off.

Annual versus Monthly Contract.—The annual contract A requires a yearly commitment. The monthly contract M offers the option to cancel in any period but charges a higher fee per month. Consumers who anticipate a high enough probability of being high-cost types $(c = \bar{c})$ prefer the monthly contract for its flexibility. Users who believe that they will be low-cost types prefer the annual contract. The users who select the annual contract, therefore, are more likely to be frequent users. In Prediction 2, we use attendance in the initial months $E[v]$ (before the selective exit) as a measure of the likelihood to be a frequent user.

Prediction 2 (attendance of monthly and annual members): *The average initial attendance of annual members is higher than the average initial attendance of monthly members:*

$$E_A[v] > E_M[v].$$

A third test for the standard model is whether consumers have rational expectations about their attendance.

Prediction 3 (forecast of attendance): *The average forecast of attendance equals the average actual attendance.*

B. *Empirical Analysis*

We test Prediction 1 using the sample of users enrolled in an unsubsidized flat-rate membership in clubs 1 and 2. We analyze separately users in club 3, given the lower fee per visit. As the benchmark measure of price per visit, we use the price per visit under the ten-visit pass, \$10, rather than the \$12 visit-by-visit fee: the ten-visit pass is cheaper for users with a monthly or annual contract, given their attendance frequency.[7]

Monthly Contract.—For users initially enrolled in a monthly contract, we compute the price per expected attendance for each month. We limit the analysis to the first six months of tenure to target inexperienced users. We use the sample "no subsidy" (866 individuals) to ensure comparability to standard health clubs with no corporate subsidy.

The first column in Table 3 reports the average monthly fees in months one through six,

[7] The (hypothetical) average price per average attendance from using the ten-visit pass, given the distribution of attendance for users enrolled with the monthly and the annual contract, is \$10.91. The benefits of a lower price relative to the \$12-per-visit fee outweigh the losses from unused coupons for these users. The single-visit fee of \$12 is targeted toward one-time users such as travelling businessmen.

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TABLE 3—PRICE PER AVERAGE ATTENDANCE AT ENROLLMENT

	Sample: No subsidy, all clubs		
	Average price per month (1)	Average attendance per month (2)	Average price per average attendance (3)
	Users initially enrolled with a monthly contract		
Month 1	55.23	3.45	16.01
	(0.80)	(0.13)	(0.66)
	$N = 829$	$N = 829$	$N = 829$
Month 2	80.65	5.46	14.76
	(0.45)	(0.19)	(0.52)
	$N = 758$	$N = 758$	$N = 758$
Month 3	70.18	4.89	14.34
	(1.05)	(0.18)	(0.58)
	$N = 753$	$N = 753$	$N = 753$
Month 4	81.79	4.57	17.89
	(0.26)	(0.19)	(0.75)
	$N = 728$	$N = 728$	$N = 728$
Month 5	81.93	4.42	18.53
	(0.25)	(0.19)	(0.80)
	$N = 701$	$N = 701$	$N = 701$
Month 6	81.94	4.32	18.95
	(0.29)	(0.19)	(0.84)
	$N = 607$	$N = 607$	$N = 607$
Months 1 to 6	75.26	4.36	17.27
	(0.27)	(0.14)	(0.54)
	$N = 866$	$N = 866$	$N = 866$
	Users initially enrolled with an annual contract, who joined at least 14 months before the end of sample period		
Year 1	66.32	4.36	15.22
	(0.37)	(0.36)	(1.25)
	$N = 145$	$N = 145$	$N = 145$

Notes: Standard errors in parentheses. Standard errors for "average price per average attendance" measure computed using the bivariate Delta method. The number of observations is denoted by *N*. An enrollment spell starts whenever an individual enrolls in the club and ends whenever the individual quits or is censored. The sample "no subsidy" consists of the spells in which the average adjusted monthly fee is at least \$70 if the spell starts with a monthly contract and at least \$58 if the spell starts with an annual contract. The sample for the *t*-th month includes spells that are ongoing, not frozen, and not miscoded at month *t*. For the six-month period, the sample includes spells that are ongoing, not frozen, and not miscoded in at least one month in the period. For the one-year period in the annual contract, the sample includes only spells that started at least 14 months before the end of the sample period, and that were not prematurely terminated because of medical reasons or relocation. The "average price" in period *t* is the average fee across people enrolled in period *t*. The "average attendance" in period *t* is the average number of visits across people enrolled in period *t*. The measure in column 3 is the ratio of the measure in column 1 and the measure in column 2.

with standards errors in parentheses. The sample for month *t* consists of users who initially enrolled in a monthly contract and have had a continuous history of membership up to month *t* under either a monthly or an annual contract. Consumers drop out of the sample when they cancel or are censored. For users who switch to an annual contract, the monthly fee is the monthly share of the annual fee. The average monthly fee exceeds \$80 in all months, except in the joining month which is typically prorated, and in month 3, a promotional free month for 18.6 percent of the sample. The average number of visits for users in the t^{th} month of tenure (column 2) declines from 5.46 in month 2 to 4.32 in month 6. (Month 1 covers only part of a month.)

The third column in Table 3 presents the ratio of the average fee in month *t* (column 1) and the

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TABLE 4—DISTRIBUTION OF ATTENDANCE AND PRICE PER ATTENDANCE AT ENROLLMENT

	Sample: No subsidy, all clubs			
	First contract monthly, months 1–6 (monthly fee ≥ $70)		First contract annual, year 1 (annual fee ≥ $700)	
	Average attendance per month (1)	Price per attendance (2)	Average attendance per month (3)	Price per attendance (4)
Distribution of measures				
10th percentile	0.24	7.73	0.20	5.98
20th percentile	0.80	10.18	0.80	8.81
25th percentile	1.19	11.48	1.08	11.27
Median	3.50	21.89	3.46	19.63
75th percentile	6.50	63.75	6.08	63.06
90th percentile	9.72	121.73	10.86	113.85
95th percentile	11.78	201.10	13.16	294.51
	$N = 866$	$N = 866$	$N = 145$	$N = 145$

Notes: The number of observations is denoted by N. An enrollment spell starts whenever an individual enrolls in the club and ends whenever the individual quits or is censored. The sample "no subsidy" consists of the spells in which the average adjusted monthly fee is at least $70 if the spell starts with a monthly contract and at least $58 if the spell starts with an annual contract. The spells in column "first contract monthly, months 1–6" start with a monthly contract. The spells in column "first contract annual, year 1" start with an annual contract. The variable "price per attendance" is defined as the ratio of the average price over the average attendance over the first period (six months for the monthly contract, one year for the annual contract).

average attendance in month t (column 2). This ratio is the estimated price per expected attendance for month t, $(L/E_F[v])a(T)$ in Prediction 1. In each of the six months, we reject the hypothesis that the price per expected attendance is smaller than $10 (or than $12). The estimate ranges between $14 and $16 in the first three months and is higher than $17 in the subsequent three months. As a summary measure, we compute the ratio of average monthly payment (column 1) and average monthly attendance (column 2) in the first six months across all individuals.[8] The resulting price per average attendance in the first six months of enrollment equals $17.27, well above $10 (or $12).

In addition to averages, we consider also the distribution of these measures in the first six months (Table 4). We measure the price per attendance as the ratio of total attendance over total payment in the first six months of membership in a monthly contract (column 2). Only 20 percent of the individuals pays less than $10 per visit. The remaining 80 percent would have saved money choosing the pay-per-visit contract, holding constant the number of visits.

Annual Contract.—We also test Prediction 1 on the users who chose an annual contract at enrollment. We use the sample "no subsidy" further restricted to users who joined the club at least 14 months before the end of the sample period (145 individuals). This ensures that we observe the annual contract in its entirety.[9]

The bottom row of Table 3 presents the estimation results. The average monthly share of the annual fee for the first year (column 1), adjusted for discounting, is $66.32.[10] The average number of monthly visits in the first year

[8] For each individual, we compute the average over all available months until the sixth, with the exception of miscoded months and months with freezing. When averaging across individuals, we weigh all individuals equally, independent of tenure.

[9] We exclude three annual contracts that are terminated before the twelfth month. Health clubs are required to accept cancellations for medical reasons or for relocation more than 25 miles from the clubs.

[10] We use a daily discount factor of 0.9998, implying an adjustment factor $T(1 - \delta)/(1 - \delta^T)$ equal to 1.037.

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(column 2) is 4.36. The resulting price per average attendance (column 3) of $15.22 is substantially higher than $10 (or than $12). The estimate is somewhat lower than for the monthly contract, consistent with selection of users with higher expected attendance into the annual contract (Prediction 2). Table 4 shows the distribution across users of attendance (column 3) and of the price per attendance (column 4) in the first year of an annual membership. Only 24 percent pay less than $10 per visit.

Finding 1 (price per expected attendance at enrollment): *Users who choose an unsubsidized flat-rate contract pay a price per average attendance of over $17 in the monthly contract and over $15 in the annual contract. The share of users who pay ex post less than $10 per visit is 20 percent in the monthly contract and 24 percent in the annual contract.*

Size of the Effect.—As a monetary measure of the deviation from the standard model, for monthly and annual memberships we compute the difference between actual expenses over the whole enrollment spell and imputed expenses for the same number of attendances with ten-visit passes.[11] This measure understates the savings from paying per visit since the agents could reoptimize their attendance. The "average loss" measure is positive if the user would have saved money purchasing ten-visit passes, and negative otherwise. We use the sample "no subsidy" for spells that start before October 1997.

The average loss per spell is $614 for agents initially enrolled in a monthly contract. This amount is 43 percent of the overall $1,423 spent on the health club membership. For agents initially enrolled in an annual contract, there is a small, insignificant gain of $1.

The observed deviation from the standard model has large monetary consequences for users in the monthly contract. For users in the annual contract, the automatic expiration moderates the possible losses.

Robustness.—We now check the robustness of Finding 1.

1. *Sample.* Thus far, we have restricted attention to the unsubsidized sample and pooled the results across clubs. We now include all users who initially chose a monthly contract and disaggregate the results by club. Separately for each club, we regress health club attendance on the monthly fee using an Epanechnikov kernel. The measure of attendance is the average attendance per month in the first six months. We cross-validate club by club with a grid search to compute the optimal bandwidth for the price.[12] In club 1 (Figure 1A), the average monthly attendance from the kernel regression lies between three and five and is increasing in price, although the estimates are not very smooth given the small bandwidth suggested by the cross-validation. We use the average attendance from the kernel regression to compute the ratio of price and average attendance for each level of price (Figure 1B). The price per average attendance is significantly higher than $10 for users paying a monthly fee in excess of $53. The estimates for club 2 are comparable (Figures 1C and 1D) and somewhat smoother given the larger optimal bandwidth. In club 3 the price per average attendance is higher than the per-visit fee of $8 for users paying a fee in excess of $46 (Figure 1F).

2. *Underrecording of attendance.* The high price per attendance could result from underrecording of attendance due to a faulty computer system or moral hazard problems with the staff. Health club employees may also seek to avoid queues of users waiting to swipe. The three health clubs in our sample had incentives to address these problems, since they provide reports of attendance to the corporations subsidizing employee memberships. They therefore put in place one of the most advanced and reliable systems to track attendance in the industry. Unlike in most clubs, a front-desk employee collects the cards from the members and swipes them while the member is exercising. Therefore, card swiping does not generate queues. We also witnessed the procedure if a member has forgotten the card: the employee looks the name up in the computer and records the attendance. Thus, while errors may occur in both directions—failure to swipe and double swiping—the health club data used in our analysis are unusually accurate.

[11] This measure takes into account the potential loss associated with not using fully a ten-visit pass.

[12] Adrian Pagan and Aman Ullah (1999), pp. 110–20.

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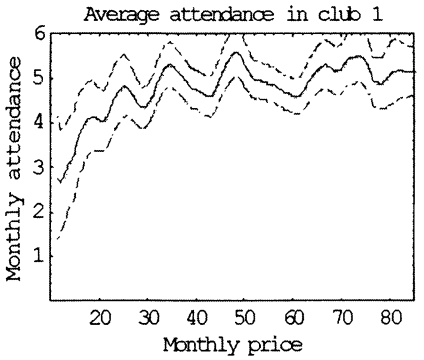
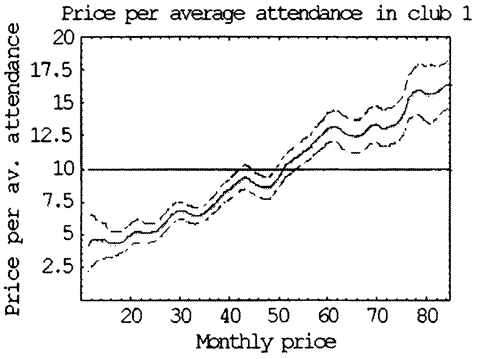
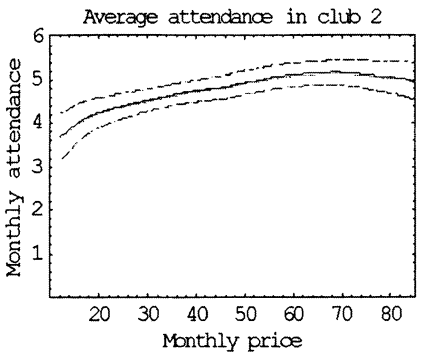


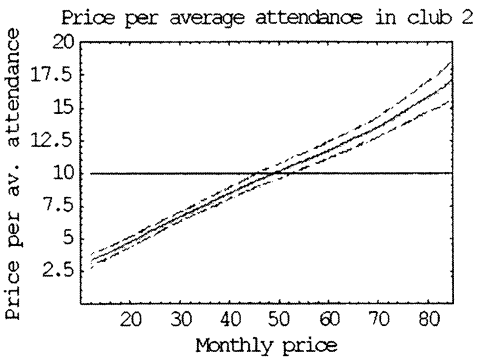
A. Kernel regression of attendance on price (club 1, bandwith 4)



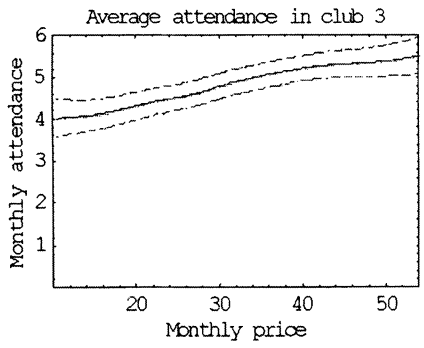
B. Price per average attendance as a function of the monthly price (club 1, bandwith 4)



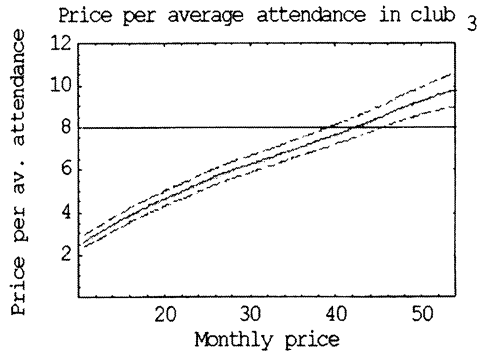
C. Kernel regression of attendance on monthly price (club 2, bandwith 16)



D. Price per average attendance as a function of the monthly price (club 2, bandwith 16)



E. Kernel regression of attendance on price (club 3, bandwith 16)



F. Price per average attendance as a function of the monthly price (club 3, bandwith 16)

FIGURE 1. AVERAGE ATTENDANCE AND PRICE PER AVERAGE ATTENDANCE (KERNEL REGRESSIONS)

Notes: Point estimates and 95-percent confidence intervals plotted. The sample is all individuals initially enrolled with a monthly contract. The individual price variable is the average price over the first six months. The individual attendance variable is the average attendance over the first six months. Figures 1A, 1C, and 1E show a kernel regression of attendance on price using an Epanechnikov kernel. The bandwidth is determined by cross-validation with a grid search separately for each club. Figures 1B, 1D, and 1F show the ratio of the price and the expected attendance predicted for that price using the kernel regression. Confidence intervals are derived using the Delta method.

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As supporting evidence, we can test whether random events such as computer crashes or idiosyncratic laziness of employees affect substantially the accuracy of the attendance record. We calculate the fraction of members attending on each day in the sample and regress it on a set of controls: 6 day-of-the-week dummies, 11 month dummies, 3 year dummies, and 15 holiday dummies. If recording precision is highly variable, the R^2 of this regression should be low. The R^2 of the regression for club 1, instead, is as high as 0.8785, with the day-of-the-week dummies explaining most of the variance. The regression for clubs 2 and 3 yield an even higher R^2 of 0.8915.[13] The high explanatory power of these regressions suggests that daily variation in recording precision is limited.

3. *Ex post subsidies.* Some HMOs reimburse members partially for health club expenses. To the extent that these reimbursements make the annual and the monthly contract cheaper relative to the pay-per-visit contract, they induce users to choose flat-rate contracts. However, the HMOs in the state where the three clubs operate offer discounts either on the initiation fee only, or to both flat-rate and pay-per-usage contracts.[14]

4. *Membership benefits.* Consumers' choice of the monthly or annual contract could be due to contract-specific membership benefits. The only benefit not available under the per-visit payment, though, is the option to rent an overnight locker at an extra fee, and only 9.4 percent of the users ever rent a locker. If we exclude these users, the results on price per average attendance for the monthly contract do not vary.

Overall, we observe a robust deviation from Prediction 1. Nonsubsidized users enrolled in contracts with flat fees pay a price per average attendance that is significantly higher than the per-visit price available as an alternative contract. The result is robust to the type of contract (monthly or annual), the sample (the amount of subsidy), and the club considered. The results do not appear to depend on measurement error, ex post subsidies, or unobserved benefits. The deviation from Prediction 1 is large: unsubsidized members of a monthly contract pay 70 percent in excess of the \$10 fee.

TABLE 5—AVERAGE ATTENDANCE IN MONTHLY AND ANNUAL CONTRACTS
(Sorting)

	Average attendance during the n-th month since enrollment		
	Sample: All clubs		
	Month 2	Month 3	Month 4
Monthly contract	5.507	5.005	4.614
	(0.0668)	(0.0696)	(0.0709)
	$N = 6219$	$N = 5693$	$N = 5225$
Annual contract	5.805	5.629	5.193
	(0.1885)	(0.1934)	(0.1913)
	$N = 862$	$N = 841$	$N = 817$

Notes: Standard errors in parentheses. The number of observations is denoted by N. An enrollment spell starts whenever an individual enrolls (or reenrolls) in the club and ends whenever the individual quits or is censored. The spells in row "monthly contract" start with a monthly contract. The spells in row "annual contract" start with an annual contract. The sample in month n includes spells that are ongoing, not frozen, and not miscoded.

To test Prediction 2 on the initial sorting between the monthly and the annual contracts, we compare the average number of visits in months 2, 3, and 4 of tenure for individuals initially enrolled in the monthly and in the annual contract.[15] Given that the price per visit p is zero for both contracts, differences in attendance should reflect differences in the expected future attendance cost. Column 1 of Table 5 reports the results for the whole sample. In each month, expected attendance is higher under the annual than under the monthly contract, and significantly so in months 3 and 4. Overall, average attendance in months 2 to 4 is 10 percent higher under the annual contract. The magnitude of this difference is comparable to variation in average attendance by age groups and by gender. When we break down the sample into 24 age-gender-month cells, average attendance is higher under the annual contract in

[13] Detailed results are available in DellaVigna and Malmendier (2002, Appendix Table 1).

[14] We report the results in Appendix Table 3 in DellaVigna and Malmendier (2002). We thank Nancy Beaulieu for providing the list of HMOs.

[15] We exclude the first month because attendance is prorated over the number of effective days of membership, and the prorating procedure is slightly different for the annual and the monthly contract. We do not extend the comparison to months after the fourth, since users who experience a high cost can quit under the monthly contract but not under the annual contract.

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20 cells out of 24. Even after controlling for some heterogeneity, individuals with higher attendance are more likely to choose the annual contract at enrollment.

Finding 2 (attendance of monthly and annual members): *Average attendance in months 2–4 is 10 percent higher under the annual contract than under the monthly contract.*

While consumers' choice between flat-rate contracts and a per-visit fee is hard to explain in the standard framework (Finding 1), their choice between the monthly and annual contract (Finding 2) is consistent with standard preferences and beliefs. Consumers sort according to the expected attendance.

Finally, we elicit the expectations of health club members about their future attendance using a survey of 48 randomly chosen respondents interviewed in a mall.[16] The mall is not near a health club, so the respondents are not selected on health club attendance. We ask the ones that report to be members or to attend a health club how often they expect to visit their health club in the next month, September.[17] This question attempts to measure directly whether health club users have rational expectations. Although we do not observe actual attendance among these 48 survey respondents, it is unlikely to differ substantially from attendance in our dataset, which is very robust across demographic subgroups. Across 24 (gender)*(club)*(age) subgroups, the average monthly attendance over the membership is lower than 4.75 visits for 23 out of 24 groups, with an overall average of 4.17 monthly visits.

Finding 3 (forecasts of attendance): *The average forecasted number of monthly visits, 9.50 (s.e. 0.66), is more than twice as large as average attendance, 4.17.*

The overestimation displayed by the subjects matches Finding 1. If health club consumers expect to attend 9.5 times per month, they should indeed choose a flat-rate contract, rather than paying per visit.

We also present the subjects with the following scenario: Suppose that, based on your previous experience, you expect to attend on average five times per month (about once a week), if you enroll in a monthly membership. You plan to attend the health club throughout the next year. Would you choose a monthly contract with a monthly fee of $70 per month or ten-visit passes for $100 (each visit costs $10)? This question attempts to measure whether users endowed with realistic expectations about attendance would still overwhelmingly choose flat-rate contracts. In the hypothetical scenario, 18 consumers out of 48 prefer the monthly contract, and 30 prefer the ten-visit pass. With realistic expectations about attendance, therefore, the majority prefers to pay per visit.

These findings suggest that health club members have unrealistic expectations about their future attendance. One should take responses to hypothetical questions with caution, however, particularly because the survey sample differs from the health club sample.

III. Contract Choice over Time

A. *Predictions of the Standard Model*

In the previous section, we analyzed consumers' initial choice of membership contract. In this section, we compare the renewal decisions of monthly and annual members. We take advantage of two differences in the renewal procedure between the two flat-rate contracts. First, the renewal default differs. The monthly contract is automatically renewed and requires a (small) effort—sending a letter or cancelling in person—in order to discontinue the membership. The annual contract automatically expires after 12 months, and cancellation requires no effort. Second, members with a monthly contract can cancel at any month, while members with an annual contract are committed for a year. We evaluate the impact of these differences on cancellation lag, survival probabilities, and average attendance over time in a simple setup with standard preferences and beliefs (details are in DellaVigna and Malmendier, 2002).

Calibration.—We illustrate the effect of the renewal default on cancellation with the following calibration. Consider two agents with identical preferences and identical effort costs of attendance. One is enrolled in the monthly contract, the other in the annual contract. At the end

[16] The interviews were done in August 2002 in Walnut Creek, California.

[17] In our sample, average attendance in September is 5 percent lower than over the rest of the year.

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of the contractual period, each consumer can either renew with a monthly or an annual contract, or switch to the pay-per-visit contract (which is equivalent to dropping out). Denote with s the (possibly negative) daily savings from switching to the pay-per-visit contract, which we assume to be deterministic.[18] The savings s are decreasing in the future health club attendance. For example, a member with a monthly fee of \$70 who expects not to attend any more has $s = \$70/30 = \$2.33$. Denote by δ the daily discount factor and by k the one-time effort cost of cancellation.

Under the annual contract, this cost is zero, and the agent drops out if $\delta s/(1 - \delta) > 0$, that is, for $s > 0$. Under the monthly contract, the cost k is stochastic, with i.i.d. draws each period (day) from the c.d.f. F. In each period, the agent can switch to payment per visit at the realized cost k or postpone switching. The benefit of postponement is the option value of a lower future realization of k, while the cost is the foregone savings s. The value function V solves $V = E[\max(-k, -\delta s + \delta V)]$. The solution of the agent's dynamic programming problem is a threshold level k^*. The agent switches to payment per visit if the realized transaction cost is smaller than k^*. Without solving for k^*, we derive an upper bound on the expected number of periods (days) until cancellation, $E[T] = (1 - F(k^*))/F(k^*)$, under the assumption $\delta = 1$. In Section IIIB we then compare the predicted $E[T]$ with an empirical proxy. Denote by $k_{.2}$ the bottom quintile of the cost distribution, that is, $k_{.2} \equiv F^{-1}(.2)$, and denote by $\underline{k}$ the lower bound of the cost distribution. Then $E[T]$ must be smaller than $\max(4, [k_{.2} - \underline{k}]/s)$. The derivation is as follows. For a cost realization of $k_{.2}$, the agents either switch to payment per visit, or not. If they do switch for $k = k_{.2}$, the expected delay is at most $(1 - F(k_{.2}))/F(k_{.2}) = 4$ days. If they do not switch for $k = k_{.2}$, revealed preferences imply that the benefit of delay—bounded above by $k_{.2} - \underline{k}$—must be higher than the cost of delay, $E[T]s$. This yields the bound.

[18] For simplicity, we are neglecting the learning over time about the savings s. In a model with learning, agents may wait to cancel for two reasons. First, as we capture in the calibrations, they may wait for a lower realization of k. Second, they may wait for a lower realization of s. Our calibrations show that the predictions are robust to the first option value argument. Adding a second option value regarding s is unlikely to change the predictions substantially.

In order to calibrate the upper bound for the expected delay $E[T]$, we make the conservative assumptions $k_{.2} = \$10$ (corresponding to the value of one hour of time on a calm day) and $\underline{k} = 0$. For these values, an individual who expects not to attend the health club any more ($s = \$70/30 = \$2.33$) delays on average no more than $\max(4, 10/2.33)$, that is, 4.3 days. An individual who expects to attend four times a month ($s \approx (70 - 40)/30 = \$1$) delays on average no more than ten days. Under the standard model, therefore, monthly members with low expected attendance switch almost immediately to payment per visit. The switching behavior of monthly members is thus similar to the one of annual members. We summarize a first prediction on contract choice over time.

Prediction 4 (cancellation lags under the monthly contract): *Low attenders under the monthly contract delay cancellation for at most a few days.*

Survival Probability.—We now compare the renewal behavior for monthly and annual contracts when both contracts are up for renewal, i.e., after 12 or 24 months. The survival probability $S_{j,t}$ is the probability that a consumer initially enrolled in contract j (equal to *M*onthly or *A*nnual) is still enrolled in one of the flat-rate contracts—either monthly or annual—after t months, with $t = 12, 24$. For example, $S_{M,12}$ is the probability that a monthly member has not switched to payment per visit by month 12. Similarly, $S_{A,12}$ is the probability that an annual member renews with an annual or a monthly contract after 12 months.

Sorting at enrollment (Prediction 2) implies that users who selected into the annual contract are ex post more likely to be frequent users. These users are more likely to renew—either with a monthly or with an annual membership. This increases $S_{A,t}$ relative to $S_{M,t}$. Cancellation costs for the monthly contract, instead, act to increase $S_{M,t}$ relative to $S_{A,t}$. The calibrations above, however, suggest that in a standard model the effect of cancellation costs is very small. We therefore expect the sorting effect to dominate.

Prediction 5 (survival probability): *The survival probability after one and after two years is higher for agents who initially chose the annual membership than for agents who initially chose*

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the monthly membership: $S_{A,t} > S_{M,t}$, *for* $t = 12, 24$.

Attendance over Time.—Over time, monthly and annual members learn about their attendance patterns, and therefore about s. Learning induces selective exit of individuals with ex post low attendance. Define as stayers individuals initially enrolled in a flat-rate contract who do not switch to a pay-per-visit contract after the first year. Attendance of stayers in later periods should be higher than attendance of the initial group, since the low-attenders have switched to paying per visit. In the standard model, this prediction holds in similar form for both the annual and the monthly contract.[19]

Prediction 6 (expected attendance over time for annual contract): *Among users initially enrolled in an annual contract, the expected attendance in the second year among stayers is higher than the expected attendance in the first year for the initial group.*

Prediction 7 (expected attendance over time for monthly contract): *Among users initially enrolled in a monthly contract, the expected attendance among stayers should increase from month to month.*

B. *Empirical Analysis*

Cancellation Lags.—To test Prediction 4, we adopt a conservative measure of cancellation delay $E[T]$ for low attenders. We measure this lag as the number of full months between the last attendance and contract termination for users with a monthly contract at the time of termination. For example, if an agent attends the last time on March 10 and cancels on April 5, we count the 51 days between last attendance (March 10) and membership termination (April 30) as *one* full month. This is likely to understate the true cancellation lag for low-attenders on two grounds: (a) the measure does not include months with low, but positive, monthly attendance; and (b) members may attend the club one last time in order to cancel after a long period of nonattendance. We restrict the sample to users who paid no initiation fee, to ensure minimal costs of rejoining.[20]

Finding 4 (cancellation lags under the monthly contract): *On average, 2.31 full months elapse between the last attendance and contract termination for monthly members, with associated membership payments of \$187. This lag is at least four months for 20 percent of the users.*

Even though the transaction costs of cancellation are likely to be lower than \$15 (time cost of sending a cancellation letter or visiting the club), users spend on average \$187 in membership fees after their last attendance. This lengthy delay is at odds with the calibrations in Section IIIA, which imply an average delay of at most five to ten days.

Survival Probability.—To test Prediction 5, ideally we would compute the percentage of monthly members and of annual members still enrolled one year after the initial enrollment. We need to take into account, however, that (a) the first month in a contract is prorated, so every annual member is still enrolled in the thirteenth (calendar) month; and (b) 11.5 percent of annual contracts last one additional month due to promotions. We therefore define the survival probability as the share of members still enrolled in a flat-rate contract at the fifteenth calendar month. In order to estimate the survival probability, we set survival s_i to 1 if individual i is enrolled in the fifteenth month since enrollment, and 0 otherwise.[21] We use the following empirical specification:

$$(2) \quad s_i = 1 \text{ if } s_i^* = \alpha + \gamma M_i + BX_i + \varepsilon_i \geq 0,$$

where ε_i is normally distributed and M_i is a dummy variably that equals 1 if the first contract for individual i is a monthly contract, and 0 otherwise. The vector of controls X includes gender, a quadratic function of age, a dummy

[19] The main difference is that for the annual contract the comparison can be made only across years, since the selective exit is possible only every 12 months.

[20] We include users with an unsubsidized membership (monthly fee higher than \$70 or annual fee higher than \$700) who joined the club within a year since the start of the sample (April 1997).

[21] The survival measure, $s_i = 1$, applies also to members who have temporarily quit the club but have reenrolled by the fifteenth month since their initial enrollment.

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TABLE 6—PROBIT OF RENEWAL DECISION

Sample	Non-missing controls, all clubs						No subsidy, all		No subsidy II, all	
Dependent variable	Enrollment at 15th month		Enrollment at 16th month		Enrollment at 27th month		Enrollment at 15th month		Enrollment at 15th month	
Controls	No controls (1)	Controls + time dummies (2)	No controls (3)	Controls + time dummies (4)	No controls (5)	Controls + time dummies (6)	No controls (7)	Controls + time dummies (8)	No controls (9)	Controls + time dummies (10)
Dummy for enrollment with monthly contract	0.0483 (0.0218)**	0.066 (0.0221)***	0.0337 (0.0221)	0.0546 (0.0224)**	0.0011 (0.0260)	0.0271 (0.0254)	0.0634 (0.0479)	0.0694 (0.0501)	0.091 (0.0368)**	0.1019 (0.0372)***
Female		−0.0438 (0.0143)***		−0.0425 (0.0144)***		−0.0762 (0.0165)***		−0.0187 (0.0394)		−0.0186 (0.0277)
Age		0.0133 (0.0046)***		0.0155 (0.0046)***		0.0228 (0.0052)***		0.0304 (0.0111)***		0.0229 (0.0077)***
Age squared		−0.0001 (0.0001)**		−0.0002 (0.0001)**		−0.0002 (0.0001)***		−0.0003 (0.0001)**		−0.0003 (0.0001)***
Corporate member		0.0728 (0.0144)***		0.0676 (0.0145)***		0.0676 (0.0167)***		0.234 (0.0471)***		0.0024 (0.0319)
Student member		−0.1123 (0.0503)**		−0.0924 (0.0519)*		−0.0894 (0.0567)		0.1966 (0.2669)		−0.1173 (0.0666)*
Month and year of enrollment		X		X		X		X		X
Baseline renewal probability for annual contract	0.3983	0.4017	0.3906	0.3932	0.2609	0.2589	0.4701	0.5537	0.4252	0.4347
Number of observations	$N = 4,962$	$N = 4,962$	$N = 4,833$	$N = 4,833$	$N = 2,860$	$N = 2,860$	$N = 715$	$N = 715$	$N = 1,384$	$N = 1,384$

Notes: Standard errors in parentheses. The number of observations is denoted by *N*. Entries in the table represent the marginal coefficients of the probit in response to an infinitesimal change in the continuous variables, and a discrete change for the dummy variables. An enrollment spell starts whenever an individual enrolls in the club and ends whenever the individual quits or is censored. The sample "non-missing controls" consists of the individuals for whom the demographic controls "age" and "female" are available. The sample is further restricted to individuals who join at least 15 months before the end of the sample period. The sample "no subsidy" is a restriction of the sample "non-missing controls" to individuals paying on average a per-month fee of at least $70. The sample "no subsidy II" is a restriction of the sample "non-missing controls" to individuals paying on average a per-month fee of at least $60. The controls "month and year of enrollment" indicate that the probit contains 11 dummies for the month of enrollment and 4 dummies for year of enrollment. The baseline renewal probability for the annual contract is the predicted renewal probability for individuals starting with an annual contract.

* Significant at the 10-percent level.

** Significant at the 5-percent level.

*** Significant at the 1-percent level.

for corporate membership, a dummy for student membership, 11 dummies for the month, and 4 dummies for the year of enrollment. We restrict the sample to users who joined the club at least 15 months before the end of the sample period. We also drop users with missing values of a control variable, as well as spells that are censored before the fifteenth month.

The coefficient γ captures the difference in survival probability between users initially enrolled in a monthly contract and users initially enrolled in an annual contract. The coefficients in Table 6 are the marginal change in response to an infinitesimal change in the continuous independent variables, and a discrete change for the independent dummy variables. In the specification without controls (column 1), $\hat{\gamma}$ is positive and significant. Enrollment in a monthly contract increases survival by 4.83 percentage points relative to the baseline rate of 39.82 percent survival with the annual contract. The introduction of the controls increases the coefficient $\hat{\gamma}$ from 0.0483 to 0.0660 (column 2). Controlling for some of the unobserved heterogeneity reduces the downward bias on the coefficient due to the initial sorting (Prediction 2). For example, individuals enrolled with a monthly contract are significantly younger than users with an annual contract (Table 2), and young people are less likely to renew (column 2 of Table 6). Failing to control for age biases the coefficient $\hat{\gamma}$ downward.

Finding 5 (survival probability): *The survival probability after 14 months for the monthly contract is 17 percent higher than for the annual contract.*

It is worth reiterating that "survival" includes renewal with either of the two flat-rate contracts. We can thus rule out that liquidity concerns (i.e., the difficulty of making an annual payment all at once), and concerns about a second long-term commitment for one year induce annual members to quit.

Robustness.—In columns 3 through 10 of Table 6, we check the robustness of the findings. We measure enrollment at the sixteenth month

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after the joining date as an alternative measure of survival. With demographic controls, users initially enrolled in the monthly contract are 5.46 percentage points more likely to be enrolled in the sixteenth month (column 4) than users initially enrolled in the annual contract. Alternatively, we measure enrollment at the twenty-seventh month after the joining date (columns 5 and 6). The estimate of γ is positive, although not significantly different from zero.

We also replicate the results of columns 1 and 2 of Table 6 for the sample "no subsidy" (columns 7 and 8) and for the larger sample "no subsidy II" of users who pay at least \$60 per month in the monthly contract, or \$600 per year in the annual contract (columns 9 and 10). In the first, smaller sample the estimated $\hat{\gamma}$ has a similar magnitude as in the benchmark specification, but the estimates are imprecise. In the second, wider sample, the coefficient $\hat{\gamma}$ is positive and large (0.1019 with controls), as well as precisely estimated. Overall, the results on survival probability are robust to the measure of past attendance, the measure of survival, and the sample.

Attendance over Time.—Finally, we test Predictions 6 and 7 on the dynamics of average attendance. We first consider spells starting with an annual contract in the sample "no subsidy" and lasting at least two years.[22] We display the results in columns 1 to 3 of the bottom part of Table 7.

Finding 6 (average attendance over time in annual contract): *In the annual contract, average monthly attendance for the initial group in the first year, 4.36, is significantly lower than for stayers in the second year, 5.98.*

The difference in attendance between the two groups is large: the baseline group in the first year attends on average 27 percent less than stayers in the second year. Consequently, the price per average attendance in the first year, \$15.22, is significantly higher than in the second year, \$11.32. The results for the whole sample are comparable (columns 4 to 6 of Table 7).

Figure 2A shows the within-year dynamics of the price per average attendance. The sample at month t is given by users in the "no subsidy" sample who have joined with an annual membership and are still enrolled with a flat-rate contract in the t-th month of tenure. Over the first 12 months, the price per average attendance increases from 12.3 to 19, as negative shocks accumulate. At renewal (months 13 and 14), the price per attendance is halved.

For spells starting with a monthly contract, the sample for average attendance at month t is given by the users in the "no subsidy" sample who have joined with a monthly membership and are still enrolled with a flat-rate contract in the t-th month of tenure. Columns 1 to 3 of the top part of Table 7 show the results by six-month groups.

Finding 7 (average attendance over time in monthly contract): *Average monthly attendance in the first six months of a monthly contract, 4.36, is 20 percent higher than in the next six months and is significantly higher than in any of the later six-month periods among stayers.*

The price per average attendance in the first six months, \$17.27, is significantly lower than in any of the later six-month periods.[23] As Figure 2B shows, the price per average attendance increases over the first ten months from about \$15 to about \$20, and remains constant thereafter. The results are similar in the whole sample (columns 4 to 6).

Summary.—Unsubsidized monthly members spend on average \$187 for periods with no attendance before cancellation (Finding 4), despite small transaction costs of cancellation. In addition, after one year, more monthly members are still enrolled in a flat-rate contract than annual members (Finding 5). Surprisingly, members who pay higher fees for the option to cancel each month are more likely to renew past a year. This result does not arise because of sorting but despite sorting (Finding 2). The result is economically and statistically significant and robust across specifications. Finally, average attendance decreases by 20 percent between the first six months and the next six months in

[22] The results remain unchanged if we restrict the sample further to users who renew with an annual contract after 12 months.

[23] The results remain unchanged if we restrict the sample further to users who have had a monthly contract at all times until month t.

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TABLE 7—ATTENDANCE AND PRICE PER AVERAGE ATTENDANCE OVER TIME

	Sample: No subsidy, all clubs			Sample: All clubs		
	Average price per month (1)	Average attendance per month (2)	Average price per average attendance (3)	Average price per month (4)	Average attendance per month (5)	Average price per average attendance (6)
	Users initially enrolled with a monthly contract					
Months 1–6	75.26	4.36	17.27	44.77	4.33	10.35
	(0.27)	(0.14)	(0.54)	(0.23)	(0.05)	(0.13)
	$N = 866$	$N = 866$	$N = 866$	$N = 6,875$	$N = 6,875$	$N = 6,875$
Months 7–12	81.89	3.63	22.56	52.81	3.91	13.50
	(0.26)	(0.17)	(1.07)	(0.31)	(0.07)	(0.26)
	$N = 577$	$N = 577$	$N = 577$	$N = 3,867$	$N = 3,867$	$N = 3,867$
Months 13–18	81.27	3.89	20.88	52.99	4.41	12.03
	(0.34)	(0.23)	(1.26)	(0.41)	(0.10)	(0.29)
	$N = 331$	$N = 331$	$N = 331$	$N = 2,131$	$N = 2,131$	$N = 2,131$
Months 19–24	81.82	3.97	20.59	53.95	4.45	12.12
	(0.37)	(0.31)	(1.62)	(0.59)	(0.14)	(0.39)
	$N = 189$	$N = 189$	$N = 189$	$N = 1,130$	$N = 1,130$	$N = 1,130$
	Users initially enrolled with an annual contract					
Year 1	66.32	4.36	15.22	44.16	4.19	10.55
	(0.37)	(0.36)	(1.25)	(0.69)	(0.16)	(0.45)
	$N = 145$	$N = 145$	$N = 145$	$N = 598$	$N = 598$	$N = 598$
Year 2	67.70	5.98	11.32	46.72	5.82	8.02
	(1.07)	(0.87)	(1.67)	(1.68)	(0.45)	(0.68)
	$N = 35$	$N = 35$	$N = 35$	$N = 108$	$N = 108$	$N = 108$

Notes: Standard errors in parentheses. Standard errors for "average price per average attendance" measure computed using the bivariate Delta method. The number of observations is denoted by *N*. An enrollment spell starts whenever an individual enrolls in the club and ends whenever the individual quits or is censored. The sample "no subsidy" consists of the spells in which the average adjusted monthly fee is at least \$70 if the spell starts with a monthly contract, and at least \$58 if the spell starts with an annual contract. For the six-month periods, the sample includes spells that are ongoing, not frozen, and not miscoded in at least one month in the period. For year 1 in the annual contract, the sample includes only spells that started at least 14 months before the end of the sample period, and that were not prematurely terminated because of medical reasons or relocation. For year 2, the sample includes only spells that started with an annual contract at least 26 months before the end of the sample period, and that lasted at least 25 months. The spells in row "first contract monthly" start with a monthly contract. The spells in row "first contract annual" start with an annual contract. The "average price" in period *t* is the average fee across people enrolled in period *t*. The "average attendance" in period *t* is the average number of visits across people enrolled in period *t*. The measure in column 3 is the ratio of the measure in column 1 and the measure in column 2.

the monthly contract (Finding 7), a pattern opposite to the one found for annual contracts (Finding 6).

IV. Interpretations

We now consider which assumptions about consumer preferences and beliefs can explain the seven empirical findings, summarized in Table 1. Two findings are consistent with standard economic models. Health clubs members use information on expected future attendance to sort into the monthly and annual contract (Finding 2) and to sort out of the annual contract (Finding 6). The other findings, instead, are hard to reconcile with the standard framework. Consumers pay \$17 per expected attendance under the monthly contract (Finding 1) and appear to overestimate future attendance (Finding 3). In addition, monthly members with low attendance accumulate delays in cancellation (Finding 4), leading to a higher renewal probability after one year relative to the annual contract (Finding 5). Finally, average attendance among survivors decreases over time for the monthly contract (Finding 7). This finding is puzzling since we observe the opposite pattern for the annual contract (Finding 6).

We first consider if enriched versions of the standard model (Interpretations 1 and 2) can

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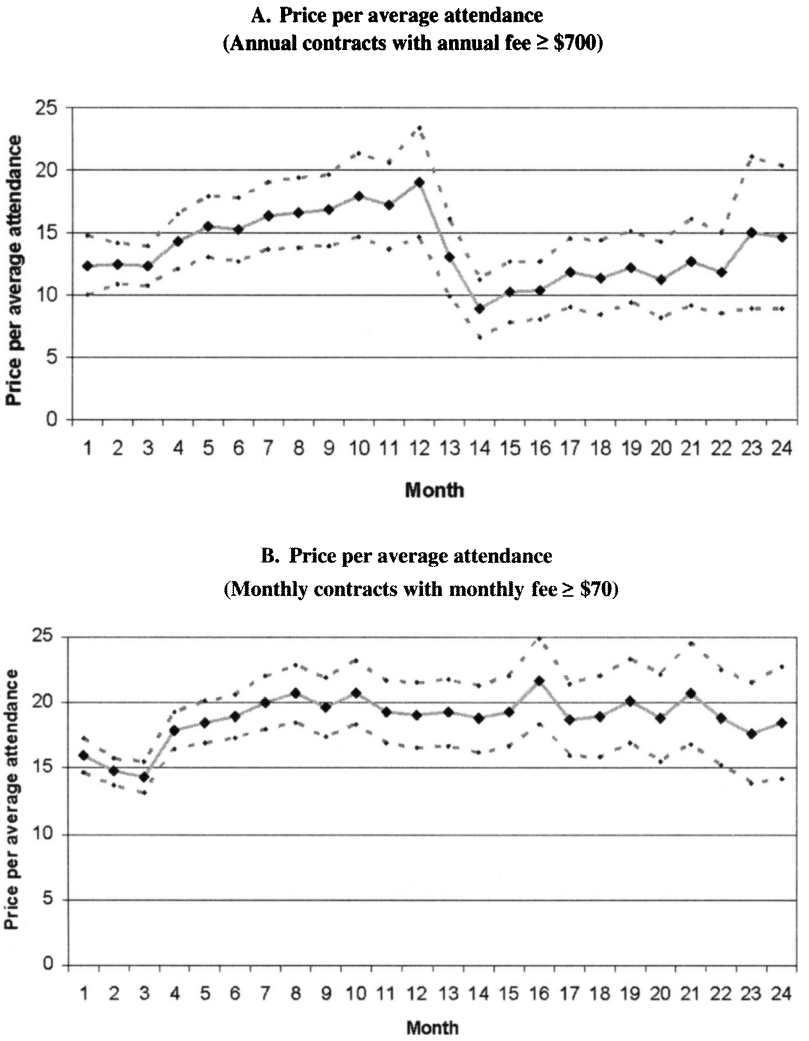

FIGURE 2. PRICE PER AVERAGE ATTENDANCE OVER TIME

Notes: Point estimates and 95-percent confidence intervals plotted. Figure 2A plots the ratio of average price and average attendance at month n of tenure. The sample is "no subsidy, all clubs" for individuals initially enrolled in the annual contract and still enrolled at month n of tenure. Figure 2B plots the ratio of average price and average attendance at month n of tenure. The sample is "no subsidy, all clubs" for individuals initially enrolled in the monthly contract and still enrolled at month n of tenure. Standard errors for the ratio of average price and average attendance computed using the bivariate Delta method.

explain the additional findings. We then discuss nonstandard preferences and beliefs (Interpretations 3 to 9) as possible explanations. In the end, we summarize which explanations rationalize all the empirical findings.

1. *Risk aversion.* Users who are risk averse in income may prefer a flat-rate contract to the pay-per-visit contract (Finding 1) because the former contract minimizes the variance of the payments.[24] Over the small amounts of money required for a monthly contract, however,

[24] This result requires a utility function that is additively separable in income and health club net benefits. Under the assumption that the utility function is a concave function of the sum of income and health club net benefits, the predictions are reversed: more risk-averse agents are more likely to choose the pay-per-visit contract.

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health club members should be locally risk neutral (Matthew Rabin, 2000).

2. *Transaction costs.* Users may choose a flat-rate contract even though they attend little (Finding 1) if paying per visit entails large transaction costs. For the same reason, they may also postpone the cancellation of a monthly contract (Finding 4). However, the actual transaction costs are small. Users can purchase a ten-visit pass by filling out a simple form, and can then enter the club for ten visits with the same procedure as users with a monthly or annual contract. A transaction-cost-based explanation requires a time cost of over $70 for the few minutes necessary to fill out the form. A related explanation involves psychological transaction costs, such as distaste for payment per visit (Drazen Prelec and George Loewenstein, 1998). These costs would also need to be high. Moreover, these explanations do not rationalize the overestimation of future attendance (Finding 3) or the differential renewal behavior for annual and monthly contract (Findings 5, 6, and 7).

3. *Membership benefits.* Findings 1 and 4 could arise from psychological benefits of the monthly and annual memberships. These contracts may make the member feel "virtuous" or provide the opportunity to impress others. Arguably, these psychological benefit should apply also to ten-visit passes, since in both cases consumers complete an initial registration procedure and receive a card, which can be shown to friends. Even if consumers treat monthly and annual memberships as special, however, it is hard to explain the differential renewal patterns for monthly and annual contracts (Findings 5 to 7). If anything, the annual contract provides more membership utility, given that it signals a stronger commitment. This would imply a higher survival probability for the annual contract, against Finding 5.[25]

4. *Time-variation in preferences for exercise.* If people enroll whenever they are most enthusiastic about exercise, a rational (but slow) updating process with mean reversion can explain the delay in cancellation (Finding 4) and the decrease in attendance among surviving monthly members (Finding 7). Mean reversion, however, explains neither the initial overpayment (Finding 1), nor the difference between renewal patterns of monthly and annual members (Findings 5 and 6).

5. *Limited memory.* Rational agents with limited memory may fail to cancel their monthly membership promptly after they stop attending (Finding 4) because they forget. Distraction can also explain Findings 6 and 7: nonattenders fail to cancel in time, but they get automatically disenrolled under the annual contract. Rational consumers, however, should anticipate their future limited memory and be wary of the monthly contract. Instead, over 90 percent of customers with flat-rate contracts choose the monthly contract (Table 2). In addition, even if we allow for overestimation of future memory, this interpretation does not explain Findings 1 and 3.

6. *Time inconsistency with sophistication.* Flat-rate contracts are attractive to sophisticated agents with (β, δ) preferences (Robert H. Strotz, 1956; Edmund S. Phelps and Robert A. Pollak, 1968; Laibson, 1997; Ted O'Donoghue and Rabin, 1999). These agents have, in addition to the usual discount factor δ, a discount factor $\beta < 1$ between present and future payoffs. Their discount function is $1, \beta\delta, \beta\delta^2, \ldots$. Given that health club attendance involves immediate costs and delayed benefits, such present-biased agents attend the health club less often than they wish at the time of enrollment. They may purchase a flat-fee membership as a commitment device that increases future attendance (Finding 1).

These agents also delay one-time activities with immediate costs, such as contract cancellation. The cancellation delays of these agents are too short, however, to account for Findings 4 through 7, as we show with an extension of the calibrations in Section IIIA. Using the same revealed-preference argument, we obtain a bound on cancellation delay for sophisticates given by $E[T] \leq \max(4, [k_{.2}/\beta - \underline{k}]/s)$.[26] Under the calibrated magnitudes[27] $k_{.2} = \$10$, $\underline{k} = 0$, and

[25] Taste for membership likely implies that high-attendance users switch from the monthly to the annual contract to signal commitment. This switch instead happens for only 1.5 percent of the 6,875 spells initiated with a monthly contract.

[26] The uniqueness of the equilibrium level of k^* can be proved along similar lines of Proposition 1 in James J. Choi et al. (2005).

[27] Laibson et al. (2004), M. Daniele Paserman (2004), and Shui and Ausubel (2004) estimate the hyperbolic model on field data and find values of β between 0.5 and 0.8.

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$\beta = 0.8$, nonattenders[28] ($s = \$2.33$) delay at most 5.33 days, on average. Under the same assumptions, low attenders ($s = \$1$) delay at most 12.5 days. These bounds do not depend on the assumption $\delta = 1$. To show this, we solve the dynamic programming problem as a function of β, assuming a discount factor $\delta = 0.9995$ (corresponding to a yearly discount factor of 0.83). We consider the low-attendance case ($s = \$1$) and assume $k \sim N(15, 4)$.[29] The resulting expected cancellation delay $E[T]$ (Figure 3A) is 5 days for $\beta = 0.8$ and is less than 15 days even for a β as low as 0.5. This calibrated delay is substantially smaller than the observed delay of over 60 days. Figure 3B shows the corresponding probability of a delay T of over 120 days (4 months). This probability is essentially zero for all β above 0.4, contrary to the empirical finding that 20 percent of users delay for over 4 months. Time inconsistency with sophistication, therefore, cannot generate the delays observed in the data.

7. *Time inconsistency with partial naiveté.* Agents with (β, δ)-preferences may be overconfident about their future self-control and expect to have a discount parameter $\hat{\beta}$, with $\beta < \hat{\beta} \leq 1$ (George A. Akerlof, 1991; O'Donoghue and Rabin, 2001). These (partially) naive agents may pay more than \$10 per expected visit (Finding 1) because they overestimate their future attendance (Finding 3). (This is in addition to the commitment device reason.) We now extend the calibrations in Section IIIA to show that naive (β, δ) agents may also accumulate substantial delays in the cancellation of an automatically renewed contract, the other major finding in the paper. Figure 3A plots the expected cancellation delay for a naive agent with low attendance ($s = \$1$), $\delta = 0.9995$, and costs $k \sim N(15, 4)$. For $\beta = 0.7$, the cancellation delay of the naive agent matches the delay of over 60 days observed in the data. Moreover, the same level of β also matches the probability of delays lasting over 120 days (Figure 3B), 0.2. Differently from time-consistent and time-inconsistent sophisticated agents, the predicted delay for naive agents matches the empirical estimates. A model of naive (β, δ) agents, therefore, can explain all the findings in the paper.[30]

8. *Overestimation of net benefits.* Users may choose flat-rate contracts (Finding 1) because they overestimate the future benefits of attendance or underestimate the expected future costs. Projection bias (Loewenstein et al., 2003) may reinforce the effect if health club consumers have high attendance expectations at sign-up. This interpretation is consistent with Findings 3 and 4, but it does not explain Findings 5, 6, and 8 on higher survival for the monthly than for the annual contract. In order for overestimation to explain all of the empirical findings, consumers need to have unrealistic expectations about both the costs of attendance and the costs of cancellation. This is the case if consumers overestimate their future efficiency, that is, their ability to perform desirable tasks such as health club attendance and contract switching.

9. *Persuasion.* Given that users attend on average fewer than eight times per month, flat-rate contracts are on average more profitable for the health clubs than pay-per-visit contracts. Health club employees, therefore, have incentives to persuade consumers to sign flat-rate contracts. They can do this either by not providing (sufficient) information about the pay-per-visit alternative or by urging people to take up the monthly or annual contract. We address the first concern, underprovision of information, by considering the contractual choices of a subgroup that is surely well-informed. In our data, members of a specific HMO can choose between a 20-percent discount on the flat-rate contracts and a \$6 payment per visit. Members claiming the discount must have obtained the information from the HMO itself, which explicitly lists both options. Nevertheless, the price per expected attendance over months 1 to 6 for the 1,566 HMO members enrolling with a monthly contract equals \$10.31 (s.e. 0.23), significantly higher than the \$6 price per visit. Thus, even informed members display the tendency to choose the more costly flat-rate contract.

[28] The savings s for sophisticated agents include the benefits of commitment to a higher future attendance under the flat-rate contract (see DellaVigna and Malmendier, 2002).

[29] The results are essentially insensitive to any choice of $\mu \in [10, 30]$ and $\sigma^2 \in [1, 49]$.

[30] The amount of delay predicted by the naive model is decreasing in the variance of the cost distribution. For σ substantially larger than 4, the calibrations of the naive model do not match the data.

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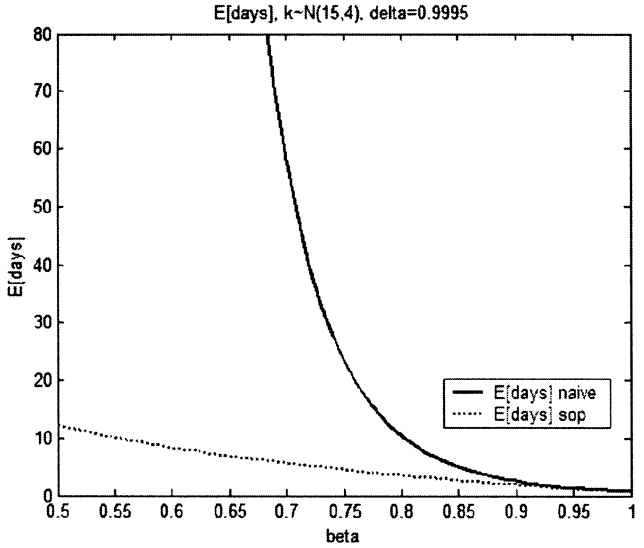
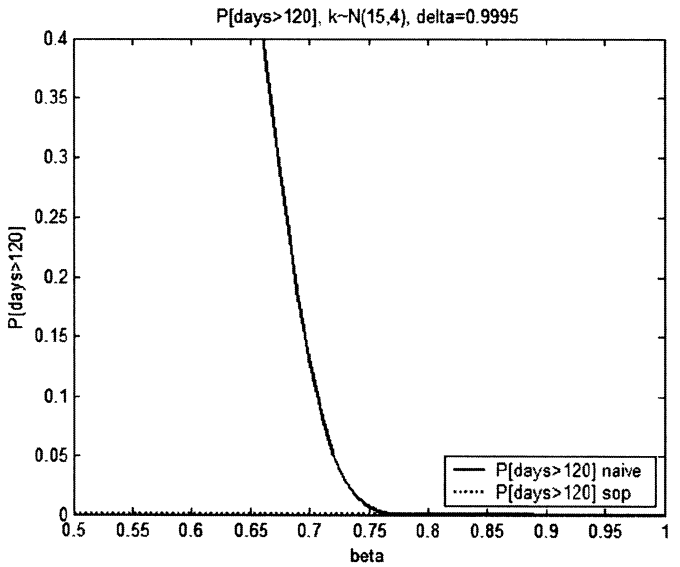


A. Simulated expected number of days before a monthly member switches to payment per visit
Assumptions: cost *k~N(15,4)*, daily savings *s=1*, and daily discount factor delta = 0.9995. The observed average delay is 2.31 months (70 days) (Finding 4)



B. Simulated probability that cancellation delays last more than 120 days. Assumptions as in Figure 3A. The probability for sophisticated agents is essentially zero. The observed share of agents with delay over 120 days is 20 percent (Finding 4).

FIGURE 3. CALIBRATION OF EXPECTED DELAY IN CANCELLATION

Alternatively, health club employees may exert pressure on members to choose a flat-rate contract (Finding 1) (B. Douglas Bernheim, 1994). Employee persuasion may also explain the cancellation lag for the monthly contract (Finding 4), even though members can also cancel in writing. Persuasion is unlikely to explain the difference in renewal between the monthly and annual contract, although health club employees can exert pressure to renew on both monthly members and annual members. Persuasion does not explain the survey evidence of overestimation of attendance (Finding 3).

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Out of the nine explanations above, the most successful ones, in our view, involve both overestimation of attendance and overestimation of cancellation. Overestimation of future attendance (Finding 3) leads consumers to choose flat-rate contracts (Finding 1). Overestimation of future cancellation leads consumers to delay cancellation in the monthly contract (Finding 4), but not in the annual contract which requires no cost to cancel (Findings 5 to 7). A model with these features is the partially naive (β, δ) model of O'Donoghue and Rabin (2001), which we calibrate to the data. A model of overestimation of future efficiency (which is not formalized in the literature) would make the same predictions, without reference to self-control. In addition, persuasion by health club employees is a plausible explanation for some of the findings.

A. *Heterogeneity*

The leading explanation suggests that one mechanism—overestimation of future self control or of future efficiency—is at the root of all findings. If this is the case, and there is heterogeneity in overestimation, we expect a correlation between the findings. In particular, monthly members who pay a high price per attendance should also be more likely to accumulate a long cancellation lag. This is not necessarily the case if the different findings are driven by different phenomena (such as, for example, risk aversion for Finding 1 and limited memory for Findings 4 to 7).

We test this prediction for users enrolled in the monthly contract. As a measure of cancellation lags, we use the number of consecutive full months between the last attendance and the expiration (as in Section IIIB). As a measure of price per attendance, we take the ratio of the payments to the health club over the attendance for the period between sign-up and n months before the last attendance, with n equal to 1, 2, 3, and 4. We limit the time frame in order to avoid a spurious correlation between the price per attendance and months of delay due to low attendance in the final months. Finally, we take the log of 1 plus the measures in order to reduce the skewness of both variables. The correlation between the cancellation lag and the price per attendance is positive and significant, with values between 0.192 ($n = 1$) and 0.182 ($n = 4$). Longer lags n between the two measures do not affect the estimate, suggesting that the correlation is not likely to be spurious.

Finding 8 (correlations): *Users who pay a high price per attendance in the monthly contract subsequently display a longer gap between last attendance and contract termination.*

These results are consistent with the idea that a unique explanation—such as overestimation of efficiency or self-control—drives both the results on the high price per attendance for flat-rate memberships (Section IIB) and the results on renewal behavior (Section IIIB).

V. Conclusion

How do consumers choose from a menu of contracts? In this paper we consider contract choice in health clubs. Using a new panel dataset from three U.S. health clubs, we find that members who choose a contract with a flat monthly fee of over $70 attend on average fewer than 4.5 times per month. They pay a price per expected visit of more than $17, even though they could pay $10 per visit using a ten-visit pass. On average, these users forego savings of over $600 during their membership. We also find that consumers who choose the monthly, automatically renewed contract are 17 percent more likely to stay enrolled beyond one year than users committing for a year. This is surprising because monthly members pay higher fees for the option to cancel each month. We present additional evidence, including results on cancellation delays and estimates of attendance expectations from a survey. These results are difficult to reconcile with a standard model. We present a number of explanations for the findings. The leading explanations involve overestimation of future self-control or of future efficiency.

The analysis of consumer behavior is a first step. Rational, profit-maximizing health clubs can observe the features of consumer behavior using datasets like the one analyzed in this paper. In DellaVigna and Malmendier (2004), we characterize the profit-maximizing contract for goods with immediate costs and delayed benefits, such as health club attendance. For consumers who are overconfident about future self-control—one of the leading explanations in

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this paper—the profit-maximizing contract involves below-marginal cost pricing of attendance and automatic renewal with a transaction cost of cancellation. The typical contract of health clubs in the Boston area indeed has these features. The evidence on contractual design is consistent with the findings on consumer behavior.

Data Appendix

The data on consumer behavior come from the attendance panel and the billing records. A seven-digit identification number allows us to link multiple spells of the same individual.

Attendance Panel.—Each time a user with a flat-rate contract exercises, a staff member swipes the electronic card of the user, and therefore creates an attendance record. An observation of the attendance panel consists of the individual identification number, the date of the visit, basic demographic information (birthday, gender), a code for short-term memberships, and the enrollment and the expiration date (for members who terminated the membership). All information other than the date of visit is constant across the observations for a given individual.

Billing Records.—The health clubs keep an official record of the customer payments. The billing data provide detailed and accurate information about the category of users—retail (the default), student, family, corporate—as well as the type of transaction. Each line of the billing panel consists of the individual ID, the date of the contractual transaction, the four-digit code that identifies the transaction, and the price paid (if any). For example, line "1234567 1/1/98 R564 55" indicates that user 1234567 paid an out-of-pocket monthly fee of $55 on January 1, 1998. This monthly fee applies to employees of the company linked to code R564. For the monthly contract, typical transactions are the payment of the initiation fee, the monthly fee, and such items as an overnight locker or a personal trainer. Other codes involve monthly freezes of memberships, bounced payments, and termination of a membership for delinquency in the payments. For the annual contract, typical transactions are the payment of the initiation fee and of the annual fee.

We use the price stated in the records as a measure of the monetary payments to the clubs. We could alternatively use the four-digit code and a conversion table (based on the prices as of August 2000) to recover an imputed price. The correlation between the two measures of price is 0.9668. None of the results changes if we use the imputed price instead of the actual price.

Monthly Panel.—We merge the attendance and the billing panel into a unique dataset, and we then transform the data into a balanced panel with monthly observations. Each observation consists of a variable defining the membership (not enrolled/enrolled in a monthly contract/enrolled in an annual contract/in a freeze), the number of attendances in the month, and the price paid for the month. For an annual contract, the monthly price is 1/12 the original price. We prorate the fees in the first month of monthly and annual contracts that start in the middle of a month. We also prorate the fees in the final month of an annual contract. Monthly contracts always terminate on the last day of the month, so no prorating is needed for the last month.

Enrollment Spells.—We define an enrollment spell as the time period of continuous monthly and/or annual membership, including possible freezes of the membership. If no more than one full calendar month of nonenrollment separates two contracts of an individual, we still include them in one spell. For example, this is the case if an annual contract expiring on 1/15/98 is renewed on 3/17/98. The missing monthly payment may be due to an (unrecorded) one-month promotional offer, a delay in payment, or missing data for a monthly payment.

We consider an enrollment spell *censored* if it is either ongoing at the end of the panel or if it is followed by a short-term contract or a promotional membership. Otherwise, the spell is completed. Short-term contracts are one-month, two-month, three-month, and four-month memberships with automatic expiration. These are uncommon contracts designed for summer users. We identify promotional contracts as a sequence of months with no contract and attendance in at least half of the months. We assume that in these periods health club members are using a free temporary membership, which the clubs grant in various promotional or charitable initiatives.

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