DISCUSSION PAPER SERIES

No. 8571

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INDUSTRIAL ORGANIZATION and PUBLIC POLICY

Centre for Economic Policy Research

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ISSN 0265-8003

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Discussion Paper No. 8571
September 2011

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CEPR Discussion Paper No. 8571

September 2011

ABSTRACT

Nudging with information: a randomized field experiment on reminders and feedback*

Can people be helped to stick to their plans with a little help from information? We provide a theoretical and empirical analysis of the effects of reminders and feedback on investment activities involving up-front costs and delayed benefits, such as education and healthy behavior. By means of a randomized field experiment, we show that simple weekly reminders induce users of a gym to substantially increase their levels of physical exercise. We show that limited attention helps explain our results, and we find evidence of mental accounting in users' response to the stimulus of reminders. These results show that virtuous behavior, such as following a healthy life style, can be promoted without the need for monetary incentives: providing incentives through information is both effective and cheap.

JEL Classification: C93, D03 and D11
Keywords: feedback, inattention, limited memory, mental accounting, randomized field experiment, reminders and sunk cost

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* We thank Gary Charness, Paul Heidhues, Matthew Levy, Andrea Ichino, Margherita Fort, seminar participants at the University of Bologna, Beelab conference on behavioral economics Florence 2011, 10th Tiber Symposium on Psychology and Economics Tilburg University, Ecole Polytechnique Paris, and also EIEF for the financial support of the field experiment. We also thank David Kovo for excellent research assistance. This paper is part of SONIC project on behavioral and experimental economics at the University of Bologna, Miur Firb grant no. RBFR084L83.

Submitted 09 September 2011

1 Introduction

When individuals perform activities requiring immediate costs or effort, and delivering benefits in the future, they tend to under-invest and perform poorly even by their own judgment. For example, education requires the up-front effort and investment of pupils and parents, and may guarantee higher income in the future; consequently under-education is a common phenomenon often leading to poverty traps. Similarly, a healthy life-style requires to restrain from certain current unhealthy behavior and to do physical activity, but the benefits are not immediately tangible, and are in fact delayed. It is also commonly accepted that an unhealthy life-style and limited physical exercise may lead to diabetes, cardiovascular disease and obesity, which the same individuals regret ex-post.

In these and other similar cases, public policies are often advocated on two grounds: firstly, in an attempt to alleviate the negative impact, and treat the consequences, of sub-optimal behavior; secondly, in order to prevent individuals from making poor, uninformed choices. With regard to the question of prevention, monetary incentives have been widely used to try and induce virtuous behavior, with largely beneficial effects. For example, within the context of suboptimal physical exercise as documented by DellaVigna and Malmendier (2006), Charness and Gneezy (2010) (CG hereafter) have shown just how effective monetary incentives can be. In one of their studies (costing \$6000 for eighty individuals), they offered up to \$125 for at least nine visits over a period of five weeks, and observed that after treatment the chosen individuals continued to attend with greater frequency than had been the case before. As for education, the program studied by Angrist and Levy (2009), costing \$650,000 and designed to increase school certification rates, proved to be a success, albeit mainly for girls.[1]

Given the enormous direct and indirect social costs of poor individual behavior on education and health, it is not surprising that all of these studies show that the large amounts of money at stake in these programs were indeed employed in a worthwhile manner.[2]

In this paper we are going to investigate whether desirable, comparable effects can be obtained by motivating individuals without providing them with monetary incentives. In particular, we shall be focusing on the idea that providing individuals with information,

[1] Fryer (2010) has studied highly-effective incentive schemes in public schools in four US cities, involving the distribution of a total of \$6.3 million in the form of educational input-based, rather than outcome-based, incentives. Similar programs in the New York City school system have successfully awarded \$600 for each pass grade, while the Baltimore City Public School District has paid a bonus of up to \$110 in order to improve scores obtained during state graduation exams, and similar programs thorough the US award up to \$500 for each exam passed.

[2] In the US, obesity may be responsible for almost \$40 billion of increased medical spending in 2006, and the medical costs of obesity are estimated to have risen to \$147 billion per year by 2008.

through reminders and feedback on past activities, may affect their behavior as desired, and we shall explore the underlying mechanisms of such incentives. We believe this to be important since providing monetary incentives, although effective, can prove very costly for public finances, as the previous figures show, and in the case of certain countries it may not even be affordable. On the other hand, providing incentives with the help of information, if effective, is very cheap, especially in this age of mass information and telecommunication technology.

To this end, we offer an empirical and theoretical analysis of the effect of information, in the form of reminders and feedback, on "investment activities" in the language of DellaVigna and Malmendier (2004). Firstly, we provide a parsimonious theoretical framework based on a few behavioral assumptions, namely present-bias preference, limited attention and a form of mental accounting related to sunk costs, which delivers a number of testable implications regarding the effect of reminders and feedback. We then provide related empirical evidence based on a randomized field experiment concerning exercising in a gym, which has been the subject of many recent studies. Within this context, we have monitored membership and attendance to a given gym (managed by the sports association at the University of Bologna, Italy), both before, during and after the delivery of information to certain individuals, our treatment. In particular, the informed (treated) users received a weekly e-mail reminding them of the possibility they had to exercise in the gym, and to obtain feedback about their own past activity through a personalized web page (accessible with personal credentials). Users in the control group, on the other hand, received no such reminders and were not able to access the aforesaid feedback. Our membership and attendance data span the entire population of the gym from January 2008 to August 2010 (967 student users for the academic year 2008-2009 together with 568 new users who joined the following year). The experiment was run from 1 September 2009 to 15 March 2010, with 243 users participating (55% of the active population in this time window).[3]

We identified the remarkably strong effect of information, which proved capable of significantly increasing monthly attendance figures. By subdividing the population into high-attendance and low-attendance users (on the basis of mean monthly attendance figures prior to the treatment period), we saw that treated low-attendance users exercised 2 more times per -month during treatment compared with the control group, representing an increase of more than 25%. This effect is remarkably strong since our low-attendance users are quite active at the baseline, exercising nearly 7 times per -month, a figure which would put them in the group of regular users of Charness and Gneezy. Following termination of the treatment, i.e. when e-mails were no longer sent out, treated and control groups'

[3]We dropped certain users since they quit the gym permanently shortly after the first subscription. The gym has no automatic subscription renewal policy.

behavior converged, although treated users continued to attend more frequently, possibly as the result of habit formation (as also reported by CG and Acland and Levy, 2011, in the case of monetary incentives). We also use regression analysis to show that reminders have a strong, highly- significant impact by increasing the probability of attending during the 12-36 hours following receipt of the e-mail.[4] Remarkably, reminders foster attendance not only at the beginning but also after months of treatment with seemingly increasing effect.

Why do simple reminders lead to increased attendance? Our theoretical model shows that individuals with standard preferences, and even present-biased users, should not be affected by reminder, whereas they might have an effect on individuals with limited attention and/or who adopt some form of mental accounting based on sunk membership costs. Our field experiment provides some interesting observations regarding this question. Firstly, if we consider all users (both treated and controls) in the period prior to treatment, the daily probability of attendance for those with a flat-rate monthly membership significantly decreases from the first to the fourth week of the month in question. Secondly, reminders have a non-diminishing effect during a person's membership. Thirdly, we show that reminders have a strong effect as long as an individual's attendance does not yet "justify" purchase of the flat-rate membership, i.e. when the up-front membership payment is greater than the overall cost of a pay-per-visit alternative (the difference between these two costs being the current status of the user's "mental account", which is "in the red" in this case). We use our theoretical analysis to show that these findings are not consistent with users uniquely affected by present-biased preferences. What is more, we illustrate that our evidence is instead consistent with reminders inducing people to get more physical exercise, since they not only increase individuals' attention, but they also rekindle the initial expense of joining and attending the gym (mental accounting). This second element could also contribute to explain the flat-rate bias often observed in these markets (e.g. DellaVigna and Malmendier 2006 show that users tend to take out flat-rate gym contracts more than would be expected according to optimal choice). Indeed, membership may serve as a commitment device for sophisticated users not only by reducing the immediate cost of exercise compared with pay-per-visit contract, but also for the extra motivation to attend that is present as long as a person's mental account is in the red.

Our results are related to the vast amount of theoretical and empirical studies of investment goods and behavioral biases. CG were interested in verifying whether, after a period of intense exercise induced by monetary incentives, healthy habits persisted over time, and

[4]In all our regressions regarding attendance to the gym, we also control for several individual characteristics (such as age, gender and the physical distance between a person's place of residence and the gym), seasonality and local weather conditions (daily frequency).

they showed that this is the case for non-regular users (attending up to 3 times per month) when observed for a period of up to two-and-a-half months after treatment. These results have been confirmed by Acland and Levy (2011), who also used monetary incentives and showed that habits indeed persist, although they tend to weaken over time and are significantly diminished by long vacations.[5] Our results are comparable when considering the effects we document during treatment, and observing that our low-attendance users are very active at the baseline. What is more, we were able to obtain these comparable effects at no cost, and this has significant implications for public policy.[6] Monetary incentives may crowd out intrinsic motivation, as documented by CG regarding their regular users who reduce attendance when monetary incentives are removed. Our findings, on the other hand, show no such effects, probably because nudging individuals "softly" through the provision of information allows them to continue with their pre-treatment decisions. This is another important policy implication, as targeting monetary incentives to the "right group" may be difficult, whilst information seems to self select as required.

This paper is also related to the recent studies of limited memory. Karlan et al. (2009) test a theory of limited attention span by randomly reminding account holders to make savings deposits, and showing that reminders increase savings balances by about 6%. Stango and Zinman (2010) and Zwane et al. (2009) have shown that exposure to surveys may affect savings and investment behavior since they catch people's attention. As with these studies, we share the effectiveness of repeated reminders, although we differ from them in our analysis of alternative motivation and the role of feedback.

Thaler's theory of mental accounting (1999) is clearly pertinent to our experiment, providing a motivating environment for some of our results. Gourville and Soman (1998) provide a qualitative analysis showing a decreasing path for exercise during gym membership among a small pool of 33 gym users , although they used semester-long contracts which may have been affected by seasonal trends. A number of psychological studies also show, through real and hypothetical experiments, that individuals seem to be affected by sunk costs (see Arkes 1996 among others). Baliga and Ely (2011) explain the sunk cost effect as a consequence of a memory bias when a decision-maker does not remember the reasons for undertaking a project in the first place, and the initial sunk cost may thus bring back information on future utility. Our results seem to be inconsistent with this idea, since our users respond to reminders when the status of the mental account is "in the red". Finally feedback has been shown to be effective in reducing electricity consumption as well (Sexton et al. 1987).

[5] By eliciting beliefs, they also identify the presence of a projection bias.

[6] The total cost of setting up the server technology for our dedicated web site amounts to approximately $1000, while thousands of users can be addressed.

This paper proceeds as follows. Section 2 presents a simple theoretical model that will be used to derive certain testable implications of different behavioral biases. Section 3 illustrates our field experiment and the data in question. Section 4 presents the main results regarding the effects of reminders. The ensuing Section 5 illustrates why reminders may lead to an increase in attendance. Section 6 presents our conclusions.

2 A model of investment with limited attention and mental accounting

In any period $t \in [1, T]$ an individual may perform an investment activity involving "attending" (a gym) with immediate cost c_t and a benefit b (better health and fitness) which is delayed by one-period. The cost is stochastic, IID, with distribution F and strictly positive density f over the support $[0, \bar{c}]$, $\bar{c} \leq b$. To perform the activity, the individual must purchase one of the following options. She may subscribe a *flat-rate membership* at $t = 0$ paying L_T up-front for the right to freely attend in any of the following T periods. Alternatively, he/she can *pay-per-visit* at unitary price p for each session. The discount factor is normalized to one for the sake of simplicity and we assume risk neutrality and no cash constraints. The decision to attend in t, or otherwise, is indicated, respectively, with $d_t = 1$ and $d_t = 0$.

The individual may be subject to certain behavioral biases. He/she may be *present-biased* in which case all future payoffs are discounted by the same factor $\beta \leq 1$.[7] He/she may also be *inattentive* so that with probability λ_t the possibility of attending at t is not salient compared with alternative activities, and thus, necessarily, $d_t = 0$. Finally, if the individual subscribes a membership at $t = 0$, he/she may introspectively construe a *mental account* A_t which affects his/her decisions through a "transaction utility" $v(A_t)$ which is weakly increasing and concave, with $v(0) = 0$ (Thaler, 2004). This accounts for the possibility of the up-front payment L_T continuing to be salient over the T periods and affecting decisions, even if sunk after $t = 0$. Although several different accounting rules could be used, we have adopted a reasonable, simple rule which we will empirically test, and which implies an account

$$A_t = -L_T + pD_t \tag{1}$$

where $D_t = \sum_{i=1}^{t-1} d_i$ is total past attendance in the current membership. When $A_t < 0$, past attendance D_t is still too low at date t to rationalize the cost of membership and the account at that date is in the "red", whereas when $A_t \geq 0$ the account is said in the

[7] For simplicity's stake, but with no effect on our analysis, we assume full sophistication (O'Donoghue and Rabin, 1999).

"black". By attending at t, the individual who subscribed a membership obtains the payoff $-c_t + \beta b$ and also the introspective payoff associated with the change in the transaction utility for one additional session, i.e. $\Delta v(A_t) \equiv v(A_t + p) - v(A_t)$. Since the salience of the up-front payment L_T may decrease over time, we posit that the mental accounting effect at t is depreciated according to $\delta_t \in [0, 1]$ (when $\delta_t = 0$ mental accounting has no effect).[8]

Hence, at $t > 0$, with probability $1 - \lambda_t$, the individual is attentive and attends if

$$\beta b - c_t + \delta_t \Delta v(A_t) \geq 0. \tag{2}$$

Reminders. At date t the individual may receive a reminder of the chance to attend (i.e. a stimulus, indicated with $r_t = 1$) in which case the probability of being attentive at a later date $t' = t + dt$ becomes $1 - \lambda\rho(dt)$ where $\lambda \in [0, 1]$ and $\rho(\cdot)$ is a non-decreasing, concave function, with $\rho(0) = 0$ and $\rho(\infty) = 1$. At the date of receipt of the reminder, the probability of being inattentive temporarily drops to zero (i.e. $\lambda_{t'} = 0$ for $dt = 0$) and then starts rising again towards λ.[9] The stimulus of the reminder may also revamp the sunk cost and its associated mental accounting, so that the depreciation rate $\delta_{t'}$ becomes $\delta(1 - \rho(dt))$ with $\delta \in [0, 1]$.[10]

Hence, upon receiving a reminder at date t, the probability of attendance at a later date $t' = t + dt$ is

$$\Pr(d_{t'} = 1 | r_t = 1) = \Big(1 - \lambda\rho(dt)\Big) \times F\Big(\beta b + \delta(1 - \rho(dt))\Delta v(A_t)\Big). \tag{3}$$

Regardless of the possibility of receiving reminders in the future, we naturally posit that the decision to subscribe a membership at $t = 0$ is equivalent to the stimulus of a reminder provided at that date. Hence, if no reminder is received, the probability of inattention at any $t' > t = 0$ is $\lambda\rho(t')$ which converges to λ, and, similarly, the mental accounting effect depreciates at a rate of $\delta(1 - \rho(t'))$ which converges to zero.

Testable implications. This simple model implies certain testable implications which we will consider in the ensuing empirical analysis.

[8] Although mental accounting is intuitively related to the possible regret of an individual after subscribing a membership, one can show that the direct application of regret theory first developed by Loomes and Sugden (1982) does not enable us to identify any specific effect of reminders based on this different behavioral assumption.

[9] The decaying effect of memory stimulus is supported by a considerable number of empirical psychological studies, which would suggest that a good fit for the function $1 - \rho(\cdot)$, also known as the "retention function", is a power function with an asymptote. See Rubin and Wenzel (1996) among others.

[10] In order to simplify the presentation, without any loss of generality, we assume that any new reminders supersede the effects of previous reminders.

Implication 1. *"With no reminders, the probability of attending at any date t is constant in t when the individual is present-biased (i.e. $\beta < 1$) but is fully attentive (i.e. $\lambda = 0$) and is not a mental accountant (i.e. $\delta = 0$)."*

Indeed when $\lambda = 0$ and $\delta = 0$, the probability of attending at t is simply $F[\beta b]$, which is time invariant.

Implication 2. *"With no reminders, if the individual is inattentive (i.e. $\lambda > 0$) and / or is a mental accountant (i.e. $\delta > 0$), then the probability of attending at any date t' is decreasing in t'."*

This is an immediate consequence of the fact that the probability of attention $1 - \lambda\rho(t')$ and the discount factor $\delta(1 - \rho(t'))$ are both decreasing in t'.

We shall now consider the effect that reminders have, by comparing two individuals, one of whom receives reminders every τ period, while the other never receives reminders (this user's attention is only attracted by the initial stimulus of membership). Consider two dates: a first date $t = z\tau$, at which the former individual has received the last of z reminders, and a later date $t' = z\tau + dt$ with $dt < \tau$. For the individual who receives reminders, the time span between date t' and the last stimulus is dt, while for the second individual it is simply t' (the stimulus being just the membership subscription in this case). The difference in the probability of attending at t' of the two individuals in question is thus:

$$\begin{aligned}&\Pr(d_{t'} = 1 | r_t = 1) - \Pr(d_{t'} = 1) = \\ &\lambda[\rho(z\tau + dt) - \rho(dt)] \times F\Big(\beta b + \delta(1 - \rho(t'))\Delta v\Big) + [1 - \lambda\rho(t')] \int_{\beta b + \delta(1-\rho(z\tau+dt))\Delta v}^{\beta b + \delta(1-\rho(dt))\Delta v} dF(c),\end{aligned} \tag{4}$$

where $\Pr(d_{t'} = 1)$ is the probability of attending at t' of an individual receiving no reminders. The first term is the result of limited attention (it vanishes when $\lambda = 0$), while the second is due to mental accounting (it vanishes when $\delta = 0$) and both effects are positive. We will refer to this positive difference as the *"attendance-increasing effect of reminders"*.

Implication 3. *"The probability of attending at any date is unaffected by reminders if the individual is both fully attentive and not a mental accountant. If, on the other hand, the individual is a mental accountant and / or inattentive, then reminders will increase the probability of attendance."*

Implication 4. *"If the individual is inattentive but not a mental accountant (i.e. $\lambda > 0$, $\delta = 0$), then the attendance-increasing effect of reminders rises over time during the period of the membership."*

Re-writing (4) with $\delta = 0$, the difference in the probabilities in fact increases in t' for a given t.

Implication 5. *"If the individual is a mental accountant but attentive (i.e. $\lambda = 0$, $\delta > 0$), then the attendance-increasing effect of reminders may wane during the course of*

the membership, and will certainly decline in the mental account (possibly vanishing when the account is in the black).”

Rewriting (4) with $\lambda = 0$ and assuming uniform cost distribution for the sake of simplicity, we obtain

$$\Pr(d_{t'} = 1|r_t = 1) - \Pr(d_{t'} = 1) = \delta \Delta v(A_{t'}) \left[\rho(t') - \rho(dt)\right].$$

Now we have two contrasting forces, since the square bracket is increasing but $\Delta v(A_{t'})$ is decreasing in t' (remember that A_t is weakly increasing in t and $v(\cdot)$ is concave). When the second effect prevails then the increase in the probability of attendance induced by reminders decreased over time. Likewise, for a given date, a larger mental account implies the weaker effect of reminders. This is even more so if function $v(\cdot)$ is discontinuous at zero, being more concave when the account is in the red and less so when it is in the black.[11]

We shall be examining implication 3 regarding the effects of reminders on attendance in Section 4. Implications 1, 2, 4 and 5 will be examined in Section 5.

3 The field experiment

We conducted our study in a gymnasium owned and managed by a sports association for university students in Bologna (Italy).[12] The gym offers a menu of contracts as is customary in this sector consisting of flat-rate memberships of various lengths (one, two, three months and the entire academic year) as well as pay-per-visit ticket.[13] Unlike other gyms (DellaVigna and Malmendier, 2006, for example), there is no automatic renewal of contracts; thus users who discover they do not enjoy the gym's activities, are very likely to stop going altogether after the first membership expiries. For each student purchasing a right to enter the gym (a contract) during the period January 1st 2008 - July 31st 2010, we observed the choice of contracts and that student's actual attendance (with the date and

[11] One explanation for this possibility (which is reminiscent of prospect theory applied to transaction utility) is that the individual cares about mental accounting if and only if the account is in the red (and then $v(\cdot) = 0$ for any $A_t \geq 0$).

[12] The gym is not strictly reserved for students, although they represent the vast majority of customers (80% of the total) since the purposes of the association is to promote sport activities among university students. Our analysis focuses on the students sub-sample.

[13] The Appendix shows the entire menu with prices and actual purchases (membership and pay-per-visit account for more than 90% of all purchases). Prices are roughly 30% lower than in other gyms thanks to subsidies from the university, but they are still of a substantial entity students. The price of a monthly membership amounts to 22% of the standard disposable monthly income of a student (€200, net of the cost of board and lodging).

time of each visit) as recorded at the gym entrance by means of an electronic key.[14] The average monthly attendance in the gym is 7.3, which is high when compared with other studies in this field.

We conducted our field experiment starting in September 2009. We recruited students by sending e-mails to the gym's mailing list of all students who had ever purchased any type of contract, and by distributing posters and fliers at the gym. The advertisement announced a remunerated online survey of sports and of students' lives, without mentioning the nature of our field experiment.[15] Students willing to participate registered through our web site with personal credentials. At the moment of registration, each user was assigned to a treated group or to a control group (8 subjects out of 10 were assigned to be treated). Each treated user then received a *weekly e-mail* containing no individual information, but simply reminding him/her the opportunity to attend the gym (see the appendix for the wording of the message and the exact delivery dates). Reminders did not provide any information about other users, or the list of recipients of the reminders. At any time, treated users could also freely decide to log-in to a personalized web page, which we monitored, displaying actual attendance during the current membership (i.e. the number of visits so far) and the implicit final price of each visit based on a forecast steady frequency of attendance until the end of the membership. Finally, they could unsubscribe the weekly e-mail (although only two users did so).[16] Users in the control group did not receive any reminders, nor could they access the personalized web page.

The timing of the experiment was as follows. On September 1st 2009 our web-site became accessible. Once they had registered, treated users started receiving the weekly reminders, and these ended either when the recipients permanently quit the gym, or at the end of the experiment which, unknown to them, was set for March 16th 2010. The gym closes for one month on July 31st (in line with the academic year), so that we were able to collect data on attendance also after treatment (up to July 31st).

Figure 1 illustrates the treatment timeline for a user who subscribed memberships pre-,

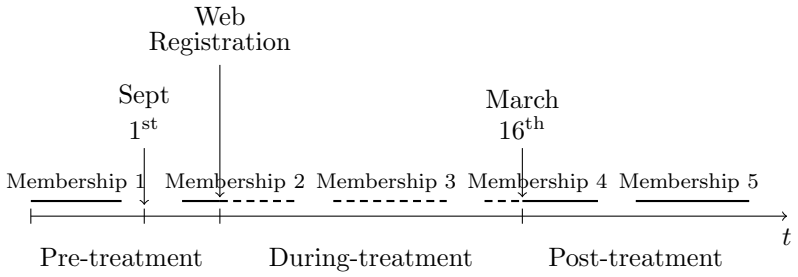
[14]The performance of the gym and its staff is monitored by the sport association which pays the staff's salaries and provides incentives to monitor gym access and to utilize the electronic keys provided.

[15]In addition to the survey, we organized online cognitive and non-cognitive tests and experiments on risk and time preferences (Holt and Laury, 2002). For the survey and the tests we paid each participant €5. For the risk and time experiment, one out of five participants received a payment based on actual choices (this payment ranged from €10 to €80, with an average of €25). For a detailed analysis of all these activities see Nardotto (2010). We set up the web site to be employed for the purposes of our survey, using PHP, MySQL and a dynamic interface in Javascript.

[16]We prepared a calendar tool to plan the dates of future activities and to check actual attendance ex-post, but this was given scant attention (only 15 users). We also provided a "contract optimizer" which would find the least costly solution based on expected attendance and given time horizon, but once again this tool was little used.

during- and post- treatment. Each line represents the time span of a given membership of this user: a *dashed* line indicates that the user did not receive any reminders, while a normal line indicates that the user received the weekly e-mails in those periods. Since users may register at different times, and may also terminate their activity at the gym on different dates, the precise dates separating the three periods pre-, during- and post- treatment, differ from one user to another. We consider as *pre- treatment* those contracts (or portions

Figure 1: Timeline of the experiment



of contracts) falling before the web site registration date, *during- treatment* those falling between registration and the end of the experiment (March 16$^{\text{th}}$ 2010), and *post- treatment* those falling after that date.

In the counterfactual for our treatment, we also included users who had attended the gym during the previous academic year (2008–2009) provided that they have signed contracts in the corresponding periods of that year (i.e. pre-, during and after treatment). Indeed, their attendance in the corresponding pre- treatment period of the previous year was very similar to attendance of the treated group during the year of the experiment.

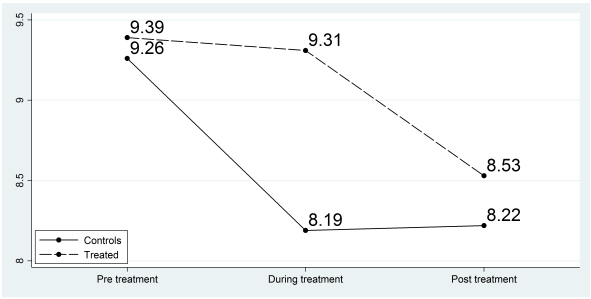
Our analysis will be based on two samples: the first, a restricted sample limited to users who purchased at least one contract in each of the three periods, pre-, during- and post- treatment (we will refer to them as "*non-quitters*" since they are active for a long period even after treatment), and second, larger sample of those who purchased at least one contract in the first two periods. The former sample consists of 144 users (50 treated users and 94 control users), while the latter sample consists of 247 users (89 treated users and 158 control users).[17]

[17] 243 users registered through our web site, corresponding to more than half (55%) of the gym population. Within this group, we cannot use all treated users since some of them purchased just one contract before treatment, and then quit the gym permanently.

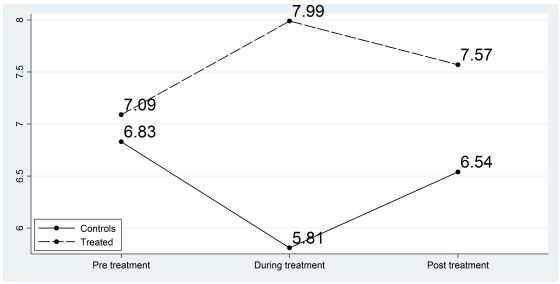
4 Reminders increase attendance

We now compare the monthly attendance of treated and control users during the three periods in question: pre-, during- and post- treatment. Using first the sample of *non-quitters* enables us to compare the performance of treated and control groups also after treatment has ceased. Since none of these users quit during treatment, we can investigate the effects of reminders at the intensive margin. We shall then verify whether reminders also affected the decision to quit the gym or not after the treatment, thus verifying the effects of reminders at the extensive margin.

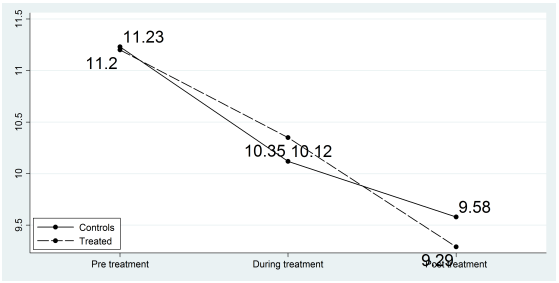
Attendance figures are reported in Figure 2. The upper panel shows average attendance



All users



Low-attendance users



High-attendance users

Figure 2: Average monthly attendance pre-, during- and post- treatment, of the users in the treated group (red line) and in the control group (blue line). The pooled samples (top panel) are subdivided into low-attendance users (bottom left) and high-attendance users (bottom right).

of all treated and control users during the three periods. In the two lower panels we can distinguish *high-attendance* and *low-attendance users* by separating users according to a threshold corresponding to the average attendance of the entire population during the pre-treatment period (i.e. 9 visits per month).[18]

[18]For a graph of monthly visits where the population is broken in quintiles, see Figures 5 and 6 in the

Comparing pre- and during- treatment, the change in attendance for each one of the six groups (treated and controls for all users, for high-attendance and for low-attendance users) is shown in the first column of Table 1, together with the difference between such changes among treated and control users (a difference-in-difference, shown in the second column).

Table 1: Changes in the monthly attendance of treated and control users, comparing pre- and during- treatment.

		Change Pre-Dur.	Difference--in-difference	p-value
All users	Treated	-0.08	0.99**	0.0422
	Controls	-1.07		
Low attendance	Treated	0.9	1.92***	0.0084
	Controls	-1.02		
High attendance	Treated	-0.85	0.26	0.7354
	Controls	-1.11		

We first investigate all users. Before treatment, control and treated users display very similar behavior in terms of monthly attendance. On average they attend the gym 9 times a month, and statistical tests do not reject the null hypothesis of equal mean for treated and control users (Wilcoxon test, p-value=0.72). It should be said that our users are quite active compared with those featured in previous studies (for more on this see below). Now consider the evolution of attendance over the three periods (the top panel in Figure 2). The attendance of control users (the solid line) strongly decreases when entering the during-treatment period. This decline is mainly due to two factors. Enthusiasm at the moment of enrolment tends to diminish over time (this has been documented also by other studies). Seasonal factors are also important since the treatment months are characterized by cold winter weather, which is associated with lower attendance.[19] On the contrary, the attendance of treated users (the dashed line) does not decline significantly when entering the during-treatment period, reaching on average one more visit than that of the control users. The difference-in-difference of behavior of the treated users compared to the control users is statistically significant (Wilcoxon test, p-value=0.028), as shown in Table 1 (first row, first column). Hence, reminders do have an effect in increasing attendance and preventing treated users from attending less frequently over the course of time, as is the case instead for

appendix.

[19]The mean annual temperature in the city is 14°C. The treatment period turns out to be characterized by mean monthly temperature ranging in between 2.3-13°C. Interestingly, estimating the probability of attendance at any calendar date in the model (6) (see below), we show that temperature has a hump shaped effect with an attendance maximizing temperature precisely at 14°C.

the control users. This is a first test of Implication 3 illustrated in Section 2, and shows that a significant part of our population is composed of individuals who are, at the very least, inattentive and / or mental accountants. Many of our individuals are also present–biased (as shown in details in Nardotto, 2011), but, as explained in Implication 3, this bias alone cannot explain users' positive reaction to reminders.

Regardless of the treatment and periods in question, on average our user were active accessing the gym more than twice a week.[20] This attendance rate is significantly higher than in other studies conducted on students and non-students (see the Introduction), and thus the result of reminders is even more striking. CG reported that their monetary incentives had a (post- treatment) effect on their "non-regular" users but had no significant effect on "regular" users, that is, on those attending more than 1.6-2 times per week before treatment, a figure which is actually even less than that of our low-attendance users.

It is thus interesting to further specify the previous analysis by subdividing the population into *high-attendance* and *low-attendance* users, defined according to the average pre-treatment attendance, as shown in the bottom two panels of Figure 2 and the bottom rows of Table 1. Results here are even more striking: for low-attendance users, comparing pre- with during-treatment, treated users reveals an increase of 1.92 visits per month compared with control users, an increase of 25% in monthly visits. This (difference-in-) difference is significant despite the reduction in the sample size (Wilcoxon test p-value=0.0084). Although our result on the effect of reminders is statistically significant also for the entire population, this effect is mainly driven by low-attendance users. For high-attendance users, we observe a decreasing trend in attendance for both treated and control users. Differences that we observe for these high-attendance users are very small and never statistically significant.

What is the change of attendance following the end of the treatment? Coming back to all (high-attendance and low-attendance) users, the treated group displayed a decline in attendance and convergence towards the control group, although a (non-significant) difference persists. Focusing on low-attendance users and considering a shorter post-treatment period of two months, i.e. between March 16$^{\text{th}}$ and May 16$^{\text{th}}$, the (difference-in) difference of (pre- and post-treatment) attendance between the treated and control groups reduces from 1.92 to 1.44 visits per month, a substantial difference which, expanding to the entire post- treatment period (on average 4.5 months), further reduces to 0.75 visits per month. This path for low-attendance users closely resembles the one reported by CG and Acland and Levy (2011).[21]

[20] This is also a consequence of non-automatic renewal as users who do not enjoy the gym simply quit after the first membership period (more than 40% of new users quit the gym permanently after one contract).

[21] Splitting *non-quitters* into tertiles with low-, medium-, and high- attendance (pre-treatment), the

We can now confirm our results regarding the effects of reminders, with the help of a regression analysis, where we also employ the larger sample with those users who purchased at least one contract in the pre-treatment and one in the during-treatment periods. We perform a difference-in-difference estimation which exploits the panel dimension of our data. The empirical model is:

$$\Delta Monthly\ visits_i = \beta_0 + \beta_1 \Delta Treatment_i + \varepsilon_i \tag{5}$$

where $\Delta Monthly\ visits_i$ is the change in monthly visits of user i observed pre-treatment and during-treatment, $\Delta Treatment_i$ is a dummy equal to one for treated users. Table 2 reports the estimated coefficients. The first two panels refer to the restricted sample of non-

Table 2: Difference-in-difference estimation of treatment's effect on monthly visits

Dep. Variable: change in monthly visits (pre vs. during treatment)						
	Non-quitters				*Larger sample*	
	All users		*Low attendance users*		*Low attendance users*	
	Coeff.	P-value	Coeff.	P-value	Coeff.	P-value
Δ Treatment	0.989*	(0.061)	1.917**	(0.013)	1.755***	(0.003)
Constant	-1.072***	(0.001)	-1.022**	(0.023)	-1.080***	(0.002)
Observations	144		64		118	
R-squared	0.024		0.096		0.075	

P-values in parentheses, *** p<0.01, ** p<0.05, * p<0.1

quitters (i.e. those purchasing contracts in all the three periods, pre-, during, and post-treatment), the first one showing the estimated coefficients of the regression performed on all these users, the second one considering only low-attendance users. The last panel also considers the low-attendance users but in the larger sample of those who purchased in at least the first two periods. The estimated coefficients confirm previous findings, namely that reminders have a substantial effect on the number of monthly visits to the gym, and this effect is much stronger in the case of low-attendance users. The constant captures the change in attendance in the during-treatment period, independently of the treatment. As pointed out above, in this period attendance is subjected to a decline with respect to the previous one. The coefficient of the treatment variable quantifies the difference, between treated and controls, in their change in attendance when the during period is compared to

strongest during-treatment effect is observed for the medium-group, whilst the strongest post-treatment effect is in the first one with low-attendance users.

the pre-treatment period. As highlighted above, the treatment has a large positive effect on visits, which more than compensate, especially for low attendance users, the decline in attendance experienced in the during period. In the whole sample (first panel) it amounts to one monthly visit and the estimated coefficient is significant at 10% level. Considering low attendance users, both with the sample of *non-quitters* and the larger one, the effect of the treatment is larger, ranging from 1.76 to 1.92 increased monthly visits, and strongly significant.

In a second regression, using the sample of *non-quitters*, we estimate the probability of attendance at any calendar date t for user u, employing the following model

$$\Pr(Attendance\ in\ day_{t,u}) = \Phi(Reminder_t, MD_t, W_t) \tag{6}$$

where $Reminder_t$ is a dummy equal to one when we consider a day t featuring a reminder, MD_t is a vector containing monthly dummies and dummies for the days of the week, W_t is a vector of daily local weather conditions.[22] We perform the regression using individual fixed effects. Since we do not observe precisely when our e-mail is actually read (this depends on how frequently users check their e-mails), we consider a day to be treated if we sent the e-mail the day before, or on the same day before 12:00 (the gym is open from 7:00 to 22:00). The strong, highly significant effect of reminders is shown in the first two columns of Table 3. In the first column of the table we consider treated and controls users in all the three periods, while in the second column we use only the data relative to the during period. The estimated effect of remainders in the 24 hours after the dispatch is to increase the probability of observing a visit by roughly 7%.

Do reminders foster attendance at the beginning of the treatment but then the effect fades out over time becoming ineffective? Our experimental environment in which treatment may take place over a considerable period of time (up to six months), allows to answer this question. The third column of Table 3 reports estimates of the same model as in (6) but using different dummy variables for the remainders sent in the first treated membership, in the second, in the third and in the fourth or subsequent treated memberships.[23] As the results show, remainders' effect is not decreasing over time and the path of the coefficients is instead compatible with an increasing effect of the intervention over the treatment period.

Finally, our treatment may also have an effect on the composition of the treated group (i.e. an effect on the extensive margin). For example, treatment may discourage those who

[22] In order to guarantee homogeneity of the day-to-day incentive to attend (as defined by inequality (2)), we restrict the analysis to monthly memberships, which are by far the most common choice from among the gym's menu of contracts (representing 63% of all purchases in the gym, see Table 7 in the appendix).

[23] Few users purchased more than four memberships in the during-treatment period. Hence, we aggregate all the reminders sent during the fourth or later memberships.

Table 3: Immediate effects of reminders

Dep. var: probability of a visit in day t			
	Treated and Controls		
	All periods	During-Treatment	
Remainder	0.065***	0.078***	
	(0.000)	(0.000)	
Remainder 1st contract			0.030
			(0.424)
Remainder 2nd contract			0.069**
			(0.044)
Remainder 3rd contract			0.86**
			(0.023)
Remainder after 3rd contract			0.109***
			(0.000)
Month & Day dummies (MD_t)	YES	YES	YES
Weather (W_t)	YES	YES	YES
Observations	23,711	10,222	10,222
R-squared	0.120	0.136	0.136

P-values in parentheses, *** p<0.01, ** p<0.05, * p<0.1

do not perform well and attend very rarely, or on the contrary it may mean that treated users, who are induced to attend more, are also more likely to continue exercising, thus renewing their memberships. In a regression reported in the appendix (see Table 8), we show that being treated with our reminders has no statistically significant effect on the probability of quitting the gym.

5 Why do reminders lead to an increase in attendance?

Results in the previous section show that reminders do in fact increase attendance levels, while our theoretical model in Section 2 shows that (Implication 3) individuals with standard preferences, and even present-biased users, should not be affected by reminders. On the other hand, individuals paying limited attention and / or using mental accounting ought to be affected by reminders. As further verification of the presence of at least one of these two biases in our population, we shall first test Implications 1 and 2 according to which attendance should decrease over time within a given membership period if an individual is

inattentive and / or is a mental accountant. We shall then try to identify which of the two biases is more responsible for the effects of reminders, by testing Implications 4 and 5.

Figure 3 plots the density of recorded attendance in the gym (probability of visit) in each of the 31 days of monthly memberships (we consider the before-treatment period so that reminders have no effect here).[24] Simple inspection shows that there is a clearly

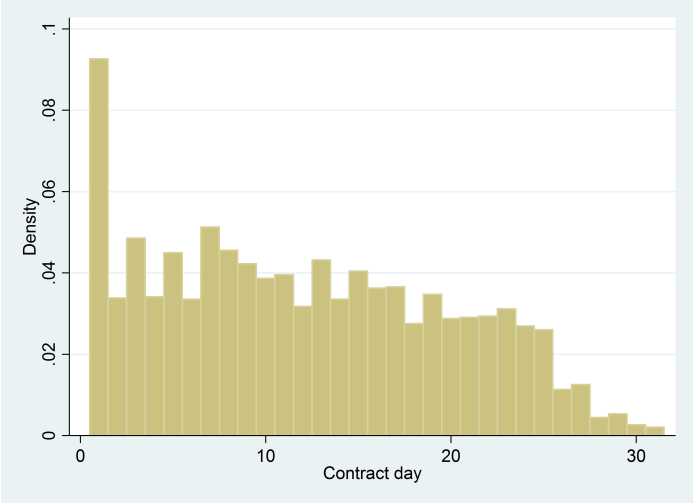


Figure 3: Probability of a visit on each contract day in the case of monthly memberships (pre- treatment).

decreasing trend over the course of a month. The spikes correspond to the first day, given that when users pay for membership they are physically present at the gym and immediately take advantage of their entitlement to attend, and every seven days, since the week day of purchase and of first attendance tends to be the preferred day of the week. The day after a spike the probability of a visit drops, since although our users are quite active, it is rare for them to attend on two consecutive days.

In order to further and more precisely analyze this decline in attendance within a membership period, we explicitly model attendance during a given membership period using the following linear probability model for observing a visit in day t during membership j taken out by user u,

$$\begin{aligned} P(Visit\ in\ day_{t,j,u}) = \gamma_2\ 2^{nd}week + \gamma_3\ 3^{rd}week + \gamma_4\ 4^{th}week + \\ + \gamma_5\ Remaining\ days + \beta_1\ MD_t + \beta_2\ W_t + \varepsilon_{t,j,u} \end{aligned} \tag{7}$$

[24] We exclude longer contractual options which may be strongly affected by seasonal factors. The analysis in this section is based on non-quitters, i.e. those users with subscriptions pre-, during, and post- treatment.

The main explanatory variables of interest are the dummy variables for the four weeks of the membership period (plus a dummy for the remaining days). We use the first week as the baseline for these dummies.[25] As before, we control for weather conditions with W_t, seasonality with MD_t (monthly dummies), and we include individual fixed effects. The analysis is performed on two samples: the first, labeled "pooled", refers to pre-treatment attendance and pools all users, the second, labeled "treated" refers to the attendance of treated users only, during the treatment period. All regressions are performed with individual fixed effects. The results of the estimation are reported in the first two columns of Table 4.

Table 4: Regression for the probability to attend in day t

Dep. Var: Probability to observe a visit in t				
	Before treatment pooled	During treatment treated	Before treatment pooled	During treatment treated
Red account			0.018	0.068***
			(0.236)	(0.002)
Week 2	-0.030**	-0.045**	-0.026*	-0.037*
	(0.035)	(0.021)	(0.062)	(0.062)
Week 3	-0.053***	-0.070***	-0.041**	-0.034
	(0.000)	(0.001)	(0.015)	(0.136)
Week 4	-0.090***	-0.103***	-0.074***	-0.051*
	(0.000)	(0.000)	(0.000)	(0.058)
Remaining days	-0.083***	-0.136***	-0.065***	-0.081**
	(0.000)	(0.000)	(0.009)	(0.020)
MD_t	YES	YES	YES	YES
W_t	YES	YES	YES	YES
Observations	8,854	4,104	8,854	4,104
R-squared	0.123	0.177	0.124	0.184

P-values in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The estimated coefficients of the first column (pre- treatment) delineate the decreasing

[25] We divided the month on a seven day basis in order to obtain the first (preferred) day of each week. The first week spans from the 1st to the 7th day, the second from the 8th to the 14th, the third from the 15th to the 21st, and the fourth from the 22nd to the 28th. We include the dummy on the remaining days since some monthly memberships, due to calendar effects, may be slightly longer than others.

path identified in Figure 3: attendance falls during the course of the month, at an ever-increasing rate, reaching a reduction of 9% in the last fourth and final week. A standard t-test on the week dummy variables leads us to reject the null hypothesis of joint equality to 0 (p-value= <.00001).[26] This result is confirmed by estimated coefficients in column 2 of the Table, where the same regression is performed on the sample of treated users during-treatment[27]. It is also worth to emphasize that all the analyses in this section are based on users buying several memberships over time (i.e. precisely those defined above as "non-quitters"). Thus we can exclude that the observed declining attendance is simply a consequence of users purchasing just one membership, the first, and then gradually reducing attendance when they realize they do not like the activity at the gym.

The results shown so far refer to Implications 1 and 2, and suggest that a significant part of our users is affected by limited attention and / or mental accounting. The next step in our investigation is to try and disentangle these two biases (Implications 4 and 5).

In Table 5 we consider the effects on the daily probability of attendance (of those with monthly memberships), as in Table 3 above, the difference being that we now study the effects of the different reminders sent during the course of the month's membership (reminders are aggregated in pairs in the first column or in groups of three in the second column). The table shows that reminders continue to increase attendance throughout the membership period, and, if anything, the effect is stronger in the case of the last reminders sent. This observation, although interesting in itself, is not conclusive since it does not enable us to exclude either limited attention or mental accounting (Implications 4 and 5 could have led us to exclude limited attention had we found a decreasing effect of reminders during the membership).

A direct test of mental accounting comes with Implication 5, which shows that for a mental accountant the attendance-increasing effects of reminders ought to diminish as the account shifts from the red into the black. This is precisely what Table 6 shows: the daily probability to attend is increased by reminders by a measure which is much higher when the account is in red than when it is in black (in the latter case its statistical significance also diminishes). This observation suggests that mental accounting ought to be considered an important factor, at least when users receive reminders.

[26] A single t-test performed on couples of coefficients led to the following results: firstly, $H_0 : \gamma_2 = \gamma_3$ is not rejected (p-value=0.101); secondly, $H_0 : \gamma_2 = \gamma_4$ is strongly rejected (p-value= <0.0001); thirdly: $H_0 : \gamma_3 = \gamma_4$ is rejected at 5%, (p-value=0.013); and fourthly: $H_0 : \gamma_2 = \gamma_5$ is strongly rejected, (p-value=0.0083).

[27] Although the coefficients in the second columns are all higher in magnitude with respect to the corresponding ones in the first column, in a joint regression (not reported) we reject the null hypothesis of a difference in the decreasing trends along the membership.

Table 5: Effect of reminders, sent at different dates, on the probability of paying a visit to the gym (LPM).

Dep. Var: Probability of observing a visit				
	1st specification		2nd specification	
	Coefficient	S.E.	Coefficient	S.E.
Reminders 1 and 2	0.057**	(0.021)		
Reminders 3 and 4	0.065**	(0.020)		
Reminders 5 and 6	0.090**	(0.042)		
Reminders 1, 2 and 3			0.051**	(0.016)
Reminders 4, 5 and 6			0.096***	(0.002)
Daily dummies	YES		YES	
Monthly dummies	YES		YES	
Weather	YES		YES	
Individual effects	YES		YES	
Observations	23,771		23,771	
R^2	.149		.149	

Reminders x and y is a dummy that takes value 1 if reminder x or reminder y is affecting this day. E.g. Reminders 1 and 2 takes value 1 if the day is affected by the first or by the second reminder within the subscription.

Mental accounting, however, seems not to be the only explanation of our observations: whether the account is in the red or in the black is of little importance in normal times, i.e. pre-treatment, as shown by column 3 of the previous Table 4 (the sign of "Red account" is positive, as expected, but small and not significant). In this case, the leading factor for observed decreasing attendance throughout the membership period should rather be limited attention.

In keeping with what we have just shown in the previous Table 6, column 4 of Table 4 enables us to show that the status of the account is, on the contrary, strongly significant during treatment: an account in the red increases the probability of a daily visit when users *also* receive reminders. A mental account in the red becomes the dominant factor during the first weeks of the month, when users are reminded to attend and strive to reach the goal of going into the black in their mental account. Indeed, the figures show that more than 75% of the switches (from red to black) are made in weeks 2 and 3 (36.7% and 40.4%, respectively), while the change in magnitude of the weekly dummy between column 2 and column 4 (both related to treated users in the during-treatment period) further testifies to the importance of the mental account in determining attendance behavior. The effect of

Table 6: Effects of reminders on the probability of making a visit when the account is in the red or in the black

Dep. Var: Probability of observing a visit				
	Account is Red		Account is Black	
	Coeff.	S.E.	Coeff	S.E.
Reminder	**0.071*** **	**(0.021)**	**0.042**	**(0.03)**
Daily dummies	YES		YES	
Monthly dummies	YES		YES	
Weather	YES		YES	
Individual effects	YES		YES	
Observations	14,925		8,786	
R-squared	0.167		0.143	

going into the black in the second and third weeks is reflected by the account dummy, and the weeks thereafter (the third and fourth weeks, together with any remaining days), which display a strongly reduced effect.[28]

We conclude this section illustrating the information that we have collected about users acquiring feedback information on past attendance of their actual membership through the personalized web page set up for the purposes of our experiment (see Section 3 for more details). These were 26 such (treated) users and the picture illustrates the density (across all users) of the decision to access the feedback web-page, setting at zero the day on which the status of the mental account switches from "in the red" to "in the black". We observe two spikes: the first at 3 to 6 days, prior to the switching day of the account; the second spike just after the switch is made.[29] This may suggest that these users seek gratification by seeking confirmation of having performed well at the gym, and looking for this information at two precise moments in time: when they are close to the pivotal visit rendering the account positive, and right after this visit to the gym.

The evidence presented in this section would thus seem to show that our reminders revamp the status of the mental account and thus induce users to attend more frequently. This may, however, not be the only explanation of how it is that reminders have an effect

[28] In an unreported regression, we ascertained that the status of the mental account is more important for low-attendance users than for high-attendance ones.

[29] The days are grouped into threes, so that, for example, the first bar on the left of the switch day covers the three previous days, the second bar considers the fourth, fifth and sixth day before etc...

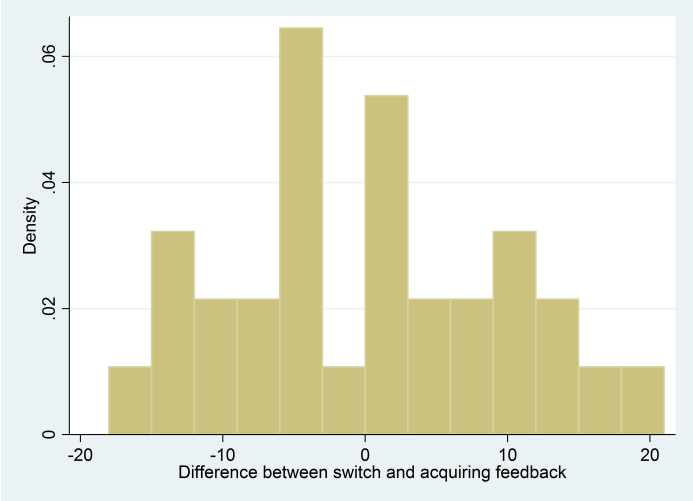


Figure 4: Days between the day of switch (set at t=0) and of acquiring feedback.

within our framework, since we also found some evidence of limited attention during the pre-treatment period, and also when considering the increasing effect of reminders along the membership period. Finally, although our e-mail simply reminded the possibility to attend with no explicit information on actual attendance, they may have primed some users to actually think and act in terms of the mental account.

6 Concluding remarks

We have investigated the effects of providing reminders of consumption opportunities to individuals who are likely to be inattentive and to use mental accounting strategies. We have tested this possibility by running a field experiment on a sample of individuals joining a gymnasium. We have found that reminders strongly increase the attendance (by up to 25 percent) of those treated users receiving weekly e-mails, especially those who attended the gym less frequently (than the average) prior to treatment. Reminders have an immediate effect a few hours after being received and they foster attendance not only in the first periods but also after months of treatment with seemingly increasing effect. With the aid of a simple theoretical analysis, we have seen that the common present-preference bias, which has been documented in investment activities such as exercising in a gym, cannot explain the effects of reminders that we observe. Inattention and mental accounting, on the other hand, are two concurrent channels through which reminders may foster attendance. Individuals indeed respond to reminders in a way that is consistent with being sometimes inattentive about the opportunity to attend the gym, since the effect of reminders increases

over time throughout the membership period. Furthermore, reminders have a strong effect on an individual as long as that person's attendance has yet to justify the purchase of a flat-rate membership (i.e. when the up-front membership cost is larger than the overall cost of opting for the alternative pay-per-visit ticket, the difference between these two costs being the current status of that person's mental account). This is further confirmed by individuals' access to feedback on past attendance, as observed during the course of our experiment.

As a result of our field experiment, and simply through the use of reminders, we were able to obtain results comparable to those that have been obtained in similar contexts but through resorting to significant monetary incentives. This was the case when considering the during-treatment effect (i.e. when individuals were receiving the weekly e-mails) and, to a smaller extent, also post- treatment when the reminders ceased to be sent.

A word of warning should be given, as always, when extrapolating our results to include different contexts and situations. Nevertheless, we think that they are important in terms of policy implications, since they show that virtuous behavior can be induced persistently using a very inexpensive, but highly effective instrument, namely information, which also limits the risk of crowding out intrinsic motivations.

Our analysis is limited to individuals who, regardless of our treatments, decided to enter the market, in this case the gym, and to attempt to get some exercise. An interesting avenue for future research would be to see if, and how, reminders also induce individuals to actually begin (and then continue) investment activities such as exercising.

A simplistic extrapolation of our results in terms of policy, is that we could try to encourage individuals to undertake various desirable investment activities by simply sending them as many reminders as the activities themselves. However, we envisage that the problem of limited attention would emerge again if many different reminders were competing for an individual's attention, leading to an eventual information overload. An interesting line of research would thus be the determination of the optimal timing and frequency of such competing reminders.

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Appendix

Additional tables

Table 7 illustrates the menu of contracts offered by the gym, the prices and the number of actual purchases of each type of contract during the course of academic year 2009-2010. Table 8 reports marginal effects on the probability to renew (see section 4).

Table 7: The gym's menu of contracts (year 2009-2010)

Type of contract	Price (€)	No.	Rel. freq.
Single entrance	6,00	548	8.8%
Carnet (10 visits)	50,00	122	2%
Carnet (20 visits)	90,00	62	1%
One month	45,00	3918	63.1%
Two months	85,00	308	5.0%
Three months	118,00	518	8.3%
Academic flat	270,00	58	0.9%
Flat 1 euro promotion	–	281	4.5%
Specific contracts	–	384	6.2%

Table 8: Effect of the treatment on the probability to renew

Dep. var: Probability of renewing				
	All users		**Low attendance users**	
Treated	-0.012	(0.069)	-0.003	(0.108)
Gender	0.124*	(0.071)	0.227**	(0.109)
Age	0.012	(0.013)	0.037 *	(0.021)
Distance	-0.007	(0.023)	0.044	(0.035)
Humanities	-0.063	(0.217)	0.246	(0.331)
Social science	0.014	(0.228)	0.313	(0.271)
Math science	-0.114	(0.214)	0.207	(0.360)
Medicine	-0.205	(0.235)	0.102	(0.392)
Mean temperature	0.054***	(0.016)	0.075***	(0.024)
Fin. aid	-0.046	(0.092)	0.087	(0.153)
Observations	247		118	

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1
Marginal effects are reported

The treatment

The text of the e-mail sent to treated users during the treatment period is as follows (English translation).

Dear student,
would you like to know about your present use of GymCus?
Go to your personal web page at www2.dse.unibo.it/gymcus/ (send an e-mail to cusb.gym@unibo.it if you have forgotten your login).
At the web page entitled "Information about your activities at the gym: learn how to get the most from GymCus!" you can:
1- Check your weekly attendance and associated actual price for single entrance;
2- Plan and check your visits to the gym;
3- Find out the least costly solution that best fits your needs (very useful when you are about to sign up a new membership);
4- Unsubscribe to this e-mail service.
Use these information services for a more beneficial use of GymCus!

Regards,
cusb.gym@unibo.it

Table 9: Dates of dispatch of e-mails

Monday, 21 September 2009	Sunday, 27 September 2009	Saturday, 3 October 2009
Sunday, 11 October 2009	Wednesday, 21 October 2009	Sunday, 25 October 2009
Sunday, 1 November 2009	Sunday, 8 November 2009	Sunday, 15 November 2009
Sunday, 22 November 2009	Sunday, 29 November 2009	Sunday, 6 December 2009
Sunday, 13 December 2009	Sunday, 20 December 2009	Sunday, 27 December 2009
Monday, 4 January 2010	Sunday, 10 January 2010	Friday, 15 January 2010
Sunday, 17 January 2010	Wednesday, 20 January 2010	Monday, 25 January 2010
Friday, 29 January 2010	Sunday, 31 January 2010	Friday, 5 February 2010
Sunday, 7 February 2010	Friday, 12 February 2010	Monday, 15 February 2010
Tuesday, 16 February 2010	Sunday, 21 February 2010	Wednesday, 24 February 2010
Sunday, 28 February 2010	Friday, 5 March 2010	Wednesday 9 March 2010
Saturday, 13 March 2010		

Figures

In the Figures 5 and 6 below we report the average monthly visits of treated and control users dividing the groups into quintiles based on attendance.

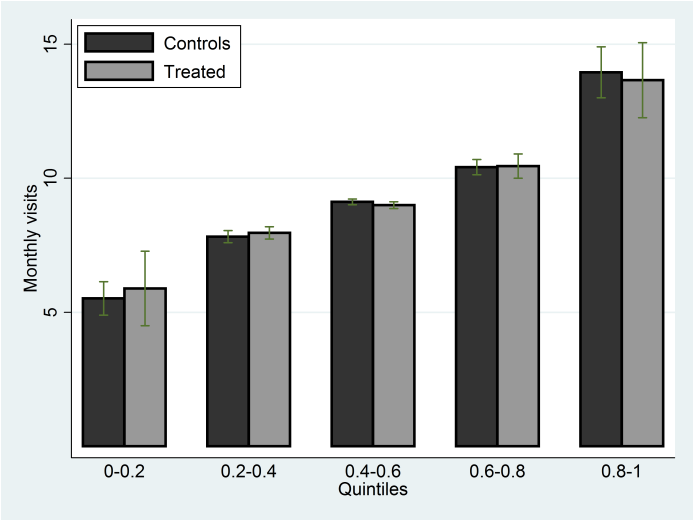

Figure 5: Monthly visits of treated and control users by quintile. Pre- treatment.

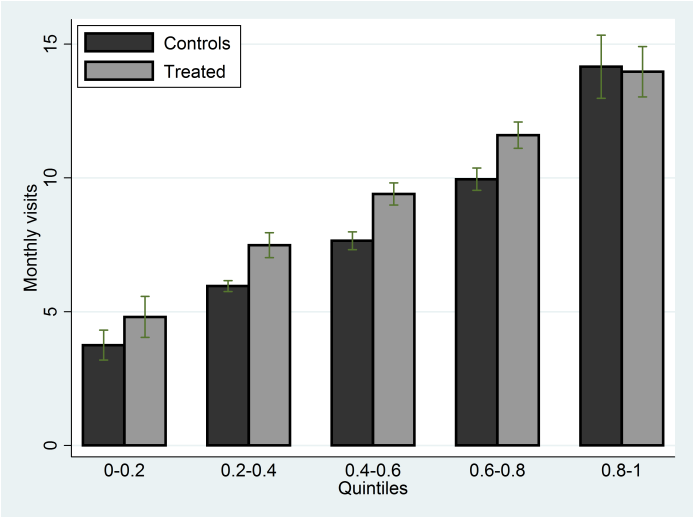

Figure 6: Monthly visits of treated and control users by quintile. During- treatment.