

**Trapped By Wisdom:  
How Non-Overestimating Leads to Underuse**

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**Abstract**

This paper analyses time-consistency of decisions to visit the gym when individuals are asked to choose between their current fixed fee and a menu of three new variable fees, according to three different time commitments of permanency. We conduct a natural experiment on 290 members of a health-club, located in Barcelona from December 2009 to May 2010. Subjects are offered to switch from their former flat fee to a multi-part tariff one in June 2009. For the study period we collect for each subject: former fee, new fee (if changing), number of attendances per month during the study period, gender and age. We first look for consistency in their pre-decision behavior by comparing their flat fee with the one-day-entrance ticket option. Second, we measure consistency in their decision of changing or not to the new menu of fees according to their pre- decision number of attendances. Finally we observe post decision attendances in order to detect behavioral biases derived from the change in the structure of the contract. We find a relation between expected attendance estimation's accuracy and level of consistency. We observe statistically significant behavioral bias for switchers that show a tendency to underuse their "free" units of their multi-part tariff.

**Key words:** Contract structure, Natural experiment, Gym attendance, Decision making and Time-Consistency

**JEL Classification:** D12, D21

## **1. INTRODUCTION**

Behavioral patterns of people enrolling and not going to the gym are one if the recursive examples economists tend to use to exemplify individuals time inconsistency. This inconsistency has been explained by assuming that individuals are overconfident about their expected attendances.

This is the case of Malmendier and Dellavigna (2006) that study inconsistency in choosing between a menu of different contracts to attend a gym and their posterior behavior, reaching the conclusion that rational expectations hypothesis might induce biases when trying to estimate consumer's preferences.

Malmendier and Dellavigna compare the possibility to pay a flat rate with the possibility to pay per visit finding that when subjects are asked to make a decision based on their expected future attendances, people choose a flat rate contract rather than a pay per visit one, but when their behavior ex-post the pay per visit contract is analyzed, the pay-per-use option appears as the right decision or at least as the consistent one.

This idea of how the structure of a contract might induce some behavioral biases in consumer's choice has been studied in other access services, specially the cell phone market. Leider and Sahin (2011) study consumption models and test them in an experimental study finding that a majority of individuals correctly use a nearly optimal heuristic, however they tend to overuse the free units, they show that errors are partially driven by mistaken beliefs and also measure subjects' willingness to pay for a contract with free access units, and they find that a portion of subjects are willing to pay at least the full per-unit price, with a substantial fraction willing to overpay.

Ascarza, Lambrecht and Vilcassim (2012) consider a cell phone market in which the current contract has a two- part tariff and a three-part tariff introduced for the first time and they offer subjects to freely change to the new contract. Their study shows that the ones who switch to the new contract tend to overuse compared with their previous two- part tariff contract.

So is not only that subjects when making a decision on their future consumption tend to it but it is also that changing the structure of the contract might induce subjects to over-consume.

Both papers recommend companies to take advantage of these inconsistencies and to implement multi-part tariffs in order to increase their profits.

## **2. OBJECTIVES**

The first aim of this paper is to identify the "paying not to go to the gym" effect in our experimental setting in order to determine the influence of overestimating gym attendances in subjects' posterior decisions.

Our second objective is to observe behavior according to the degree of attendance overestimation in subjects that are offered a change in the structure of their gym contract. Finally we observe post-decision behavior in order to detect behavioral biases.

## **3. METHODOLOGY**

The study involves a natural experiment on 290 members of a health-club, located in Barcelona from December 2009 to May 2011. Subjects were offered to switch from their former flat fee to a multi-part tariff in June 2010. For the study period we collected for each subject:

former fee, new fee (if changing), number of attendances per month during the study period, gender and age. In order to reach the aims of our study we develop a three-stages model.

### 3.1. FIRST STAGE: Flat rate versus pay-per use. (December 2009 – May 2010)

In this stage subjects are paying one of the flat fees shown in Table 1 according to their previous situation in the gym.

We observe consistency by comparing the flat rate each subject is paying for with the amount paid, according to their number of attendances, if they were opting for the 10€ one day entrance ticket each time they visit the gym.

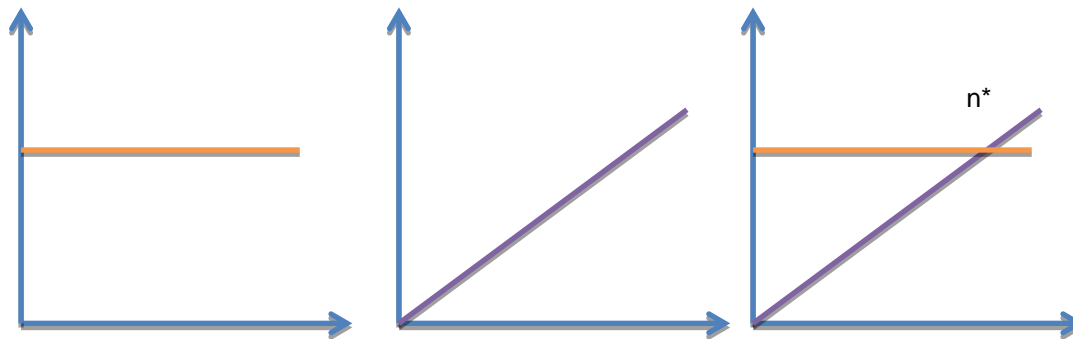
**TABLE 1**

FEE	DESCRIPTION	€/month
SENIOR	FREE ACCESS 60 Y OLD AND UP	39
FAMILIAR	FREE ACCESS IF 4 OR MORE MEMBERS OF THE SAME FAMILY	41
JUNIOR	FREE ACCESS 14 Y OLD OR LESS	48,50
Q12	FREE ACCESS BEFORE 12:00 HOURS	51
FITNESS	FREE ACCESS	52
Q18	FREE ACCESS BEFORE 18:00 HOURS	56
Q23	FREE ACCESS	61

#### 3.1.1. COMPARING CONTRACT STRUCTURES S1:

In the same way Malmendier and Dellavigna (2006) make their comparison between a flat rate contract and a pay per unit one, we assume that it would be rational to choose the flat rate if the expected number of attendances is higher than  $n^*$  and the pay per unit rate if the expected number of attendances is lower than  $n^*$ .

GRAPH 1:



This comparison allows us to identify subjects that are not being consistent according to the flat rate they pay for.

**3.2. SECOND STAGE: Flat rate versus multi-part tariff (June 2010)**

We ask subjects to make their choice between their former flat rate and three different multi-part tariffs listed in table 2. Multi-part tariffs are paid according to the number of attendances subjects make each month and have a discount according to each subject's commitment of permanency. They have the option to commit of three months so they pay the full fee, they can commit for one year, then they have a linear 10 % discount and they can commit for two years in which case they have a 15% discount.

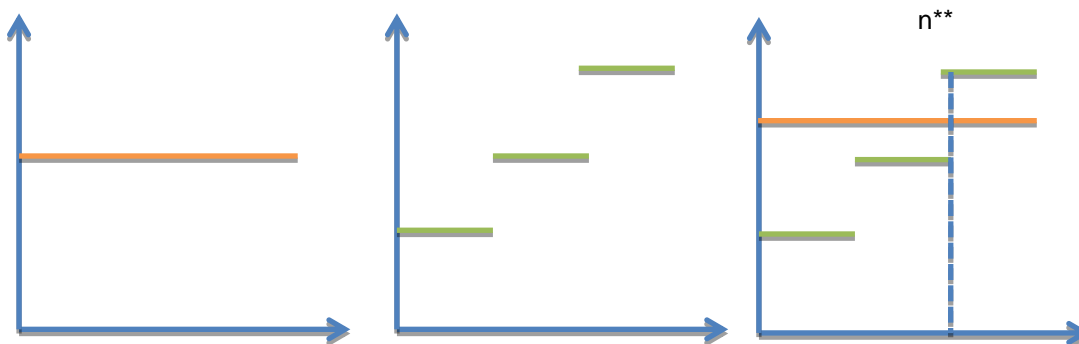
**TABLE 2**

ATTENDANCES	Q BASIC	Q RESULTS	Q SUCCESS
if $0 \leq n \leq 1$	21€	18,90€	17,85€
if $2 \leq n \leq 5$	39€	35,10€	33,15€
if $6 \leq n \leq 9$	49€	44,10€	41,65€
if $6 \leq n \leq 14$	59€	53,10€	50,15€
if $n \geq 15$	66€	59'40€	56,10€

**3.2.1. COMPARING CONTRAC STRUCTURES S2:**

In the second stage of our study we offer subjects the possibility to switch from a flat rate to a multi part tariff. As it is shown in Graph 2, we consider a consistent decision to switch to the multi part tariff if the expected number of attendances is lower than  $n^{**}$  and we consider consistent not to switch if the expected number of attendances is lower than  $n^{**}$ .

GRAPH 2:



According to this, we determine the maximum number ( $Max n$ ) of expected attendances a subject must consider in order to make her rational choice. So if the expected number of attendances is higher than this  $Max n$  it would be rational to stay in her former flat fee, on the other side if the number of expected attendances is lower than the  $Max n$  then the rational choice

would be to switch to the multi-part tariff. We show the *Max n* for each former fee to each new fee in table 3.

**TABLE 3**

Max. n NOT SWITCH	TO	QB	QR	QS
SENIOR		5	5	5
FAMILIAR		5	5	5
JUNIOR		5	9	9
Q12		9	9	14
FITNESS		9	9	14
Q18		9	14	14
Q23		14	ALWAYS	ALWAYS

### 3.2.2. HEURISTICS

We assume subjects to estimate their future number of attendances, look at their current flat fee, choose one permanency commitment and compare the fee they would pay if not changing with the fee they would pay if changing according to their estimated future attendances and choose the lower one.

*Consider a subject that is paying the Q18 flat fee (green row in TABLE 1) and would agree to commit for one year. She would consider to **switch to Q RESULTS** (purple column in TABLE 2), if she has an expected number of attendances **above 15** per month (orange cell in TABLE 2), would pay 59,40 euros (red cell in TABLE 2) if switching and 56 euros if not, so she should **not switch**.*

According to this heuristics overestimation would lead to a non-consistent choice.

### 3.3. THIRD STAGE: Post decision attendances (December 2010- May 2011)

In this stage we observe the number of attendances after the decision to switch is made and compare it with the number of attendances in the same period in the previous year when subjects were paying a flat-fee.

Gym attendances tend to be highly seasonal and given that the decision was to be made in June 2009 we take the December-May periods in order to make a proper comparison.

**3.3.1. CHANGES IN THE STRUCTURE OF THE CONTRACT AND BEHAVIOR:**

Leider and Sahin (2011) and Ascarza, Lambrecht and Vilcassim (2012) study changes in consumption when subjects are offered to switch from a pay per use contract to a three part tariff and observe an overconsumption of the “free units” of the flat part of the tree part tariff.

In our study we aim to detect changes in consumption when subjects are offered to switch from a flat fee to a multi-part one.

Assuming that in the moment the subject was asked to make her decision had an expected number of attendances lower than  $n^{**}$  (Graph 2) and did a rational choice so she switched, we expect her real number of attendances after the decision not to overpass  $n^{**}$  in order to be post-decision consistent.

**4. RESULTS**

**4.1. FIRST STAGE:**

In order to detect pre-decision inconsistency we compare the flat fee subjects pay with the cost of a pay-per use option and we can observe the same phenomenon as Malmendier and Dellavigna (2006).

Table 4 shows the minimum number of attendances that are consistent to each flat fee and the percentage of inconsistent and consistent subjects per former flat fee. A number of attendances lower than  $n^*$  should lead to the pay-per-use option, so subjects with a real number of attendances lower than  $n^*$  have been considered over estimators of their future attendances and consequently inconsistent.

**TABLE 4**

<b>FEE</b>	<b><math>n^*</math></b>	<b>INCONSISTENT</b>	<b>CONSISTENT</b>
SENIOR	4	33.33%	66.67%
FAMILIAR	5	78.57%	21.43%
JUNIOR	5	62.50%	37.50%
Q12	6	53.85%	46.15%
FITNESS	6	59.55%	40.45%
Q18	6	46.15%	53.85%
Q23	7	73.75%	26.25%
TOTAL		61.73%	38.27%

We observe an average percentage of around a 62% of subjects to be inconsistent in the first stage of the study, which could be indicating overestimation of future attendances for these individuals in the population.

**4.2. SECOND STAGE:**

We look at the subjects’ decision making by following the heuristics described in 3.2.2. As we do not observe the subjects expected number of attendances, we take as a proxy the mean real number of past attendances during the first stage.

Most of the subjects do not change to the new fees and remain in their former fee. We also observe that the majority of subjects that do not switch should have done it, which is consistent with an overestimation of their future attendances.

We also state that most of the subjects that switch to a new fee are being coherent with their mean past number of attendances, so we consider them consistent in their decision.

Table 5 shows the percentages of subjects from each former fee that remain in the same fee and the ones that switch to one of the new fees. We use a color code to identify consistent and inconsistent behavior in this stage. In reddish colors we show inconsistent behaviors and in green we highlight consistent ones.



**TABLE 5**

	SENIOR			FAMILIAR		JUNIOR		Q12			FITNESS				Q18				Q23			INAC	1D	TOTAL		
n	<5	<9	14<	<5	<9	<5	<9	<5	<9	<14	<5	<9	<14	14<	<5	<9	<14	14<	<5	<9	<14	14<	<5	<9		
SAME	4%	4%	1%	1,10%	0,30%	1%	1%	4%	2%		1,0%	5%	5%	2%	2%	1%	0,60%	0,40%	11%	6%	3%	1%	0,70%	4,70%	71,80%	
QB				0,40%		0,40%					0,70%								0,40%							1,80%
QR				0,40%		1%					1,10%	2,90%	0,30%	0,40%	1%	1,90%			1,40%	1,50%	0,30%	0,40%		0,40%		12,60%
QS										0,40%	2,20%	2,10%	0,80%		1%	0,80%	0,40%		1,80%	1,10%				1,10%		11,60%
INAC																								0,40%		0,70%
FAM																				0,70%	0,40%					1,10%
1D																0,40%										0,40%

**4.2.1. OVERESTIMATION AND CONSISTENCY**

In this point we check for relation between consistency in the first stage and in the second one and we observe the following data:

We would like to check if inconsistent non-switchers are also inconsistent in the first stage, of the experiment, and if switchers are consistent in the first stage of the experiment.

This would suggest overestimation as the cause of inconsistency. On one hand because overestimation of future attendances is coherent with inconsistent behavior in both stages. On the other hand, because proper estimation of future attendances explains consistent behavior in both stages.

In other words: Observed inconsistency can be explained by the level of overestimation of their own future attendances subjects have.

#### 4.2.2. MODELS

In order to analyze this relationship between inconsistency and overestimation we set the following Logit regression models (using Stata 11.1):

##### MODEL 1 For non switchers:

$$S2I = \beta_{S1I} \cdot S1I + \beta_G \cdot G + \varepsilon$$

Being *S1I* (Inconsistency in the Stage 1) a dummy variable that has value one if the fee being paid in stage one is higher than the fee that would have been disbursed if subjects had paid per visit (10€ per attendance).

Being *S2I* (Inconsistency in the Stage 2) a dummy variable that has value one if the fee being paid in stage two is higher than the fee that would be paid if subjects had switched to Q-Results (one year commitment) for the same number of attendances in stage one.

Being *G* (Gender) a dummy variable that has value one if the subject is a female.

Using the variable *Age* has been discarded given the fact that some former fees in stage 1 were related to the subject's age, this fact would generate some biases.

In table 6 we show the results of this first model

**TABLE 6**

Dependent variable: S2I Non switchers	LR chi2 (Prob>chi2)	Independent variables	P> /z/	Odds ratio
Y= Pr(S2I) predict= 0.93405448	42.11 (0.0000)	Gender	0.626	Not mention
		S1I	0.000	0.30065**

\*\* significant at the level of 5% error

The model's statistic is highly significative and it has a prediction capacity of a 93%. We observe that there is no significance for gender. We observe significance for Inconsistency in stage one. The probability of being inconsistent in stage 2 increases in a 30% when showing inconsistency in stage1. Meaning that subjects that tent to overestimate their future attendances in stage one still overestimate their future attendances in stage two.

##### MODEL 2 For switchers:

$$S2C_{sw} = \beta_{S1C} \cdot S1C + \beta_G \cdot G + \varepsilon$$

Being *S1C* (Consistency in the Stage 1) a dummy variable that has value one if the fee being paid in stage one is lower than the fee that would have been disbursed if subjects had paid per visit (10€ per attendance).

Being *S2C<sub>sw</sub>* (Consistency in the Stage 2 for switchers) a dummy variable that has value one if the fee being paid in stage two is lower than the fee that would be paid if subjects wouldn't have switched for the same number of attendances in stage one.

Being *G* (Gender) a dummy variable that has value one if the subject is a female.



In table 7 we show the results of this first model.

**TABLE 7**

Dependent variable: S2Cswitchers	LR chi2 (Prob>chi2)	Independent variables	P> /z/	Odds ratio
Y= Pr(S2I) predict= 0.939205	2.71 (0.1000)	Gender	0.648	Not mention
		S1C	0.100	0.949242*

\* significant at the level of 10% error

As it can be seen the model's statistic is significative and we also observe that gender has no effect but Consistency in stage one has significance. The model's prediction probability is very high so being consistent in stage one increases in almost a 95% the probability of being consistent in stage two.

These data show that subjects that estimate in a realistic way their future attendances in stage one do it in the same way in stage two.

These two models suggest subjects' behavior is coherent with the heuristics we suggest in 3.2.2.

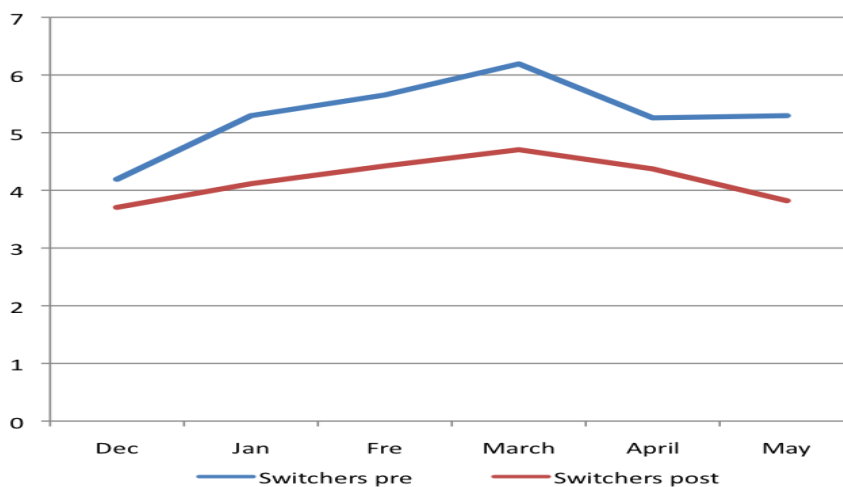
### 4.3. THIRD STAGE

In order to determine behavioral biases in the post decision period we compare pre and post-decision attendances and run t-tests that show a statistically significant decrease in gym attendances for switchers and no statistical significance differences in behavior for non-switchers.

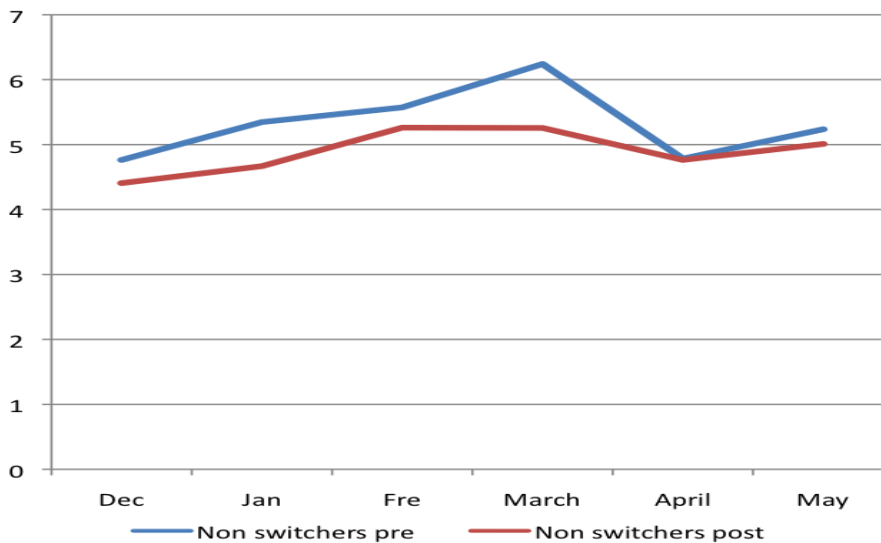
Our analysis shows not only that switchers do not overpass n\*\* number of attendances, but also they tend to significantly reduce their number of attendances after switching to the new contract.

In Graph 3 we show the mean number of attendances for switchers for the December-May period in the pre and post decision situations. In Graph 4 we show the mean number of attendances for non-switchers for the same period in the pre and post decision situations.

**GRAPH 3: SWITCHERS** (t= 2.1498 sig>95%)



**GRAPH 4: NON SWITCHERS** (t=1.097 no sig)



We observe no significant change in behavior for non-switchers, but results also show a statistically significant behavioral bias for switchers that tend to underuse the “free” units under  $n^{**}$ .

#### 4.4. AGE AND GENDER BIASES

Paying attention to each stage of our experiment we look for gender behavioral biases and we find no significant differences in the first stage, meaning that overestimating future attendances is not influenced by gender.

In the second stage we do not find gender biases, so gender does not affect overestimation of future attendances when making the decision to switch or not from a flat rate contract to a multi-part tariff one.

We find gender biases in the third stage, although there is no difference for non-switchers, we observe switcher-women tend to underuse less than switcher-men. So women seem to be more consequent with their decision of changing.

When looking at age biases we observe that inconsistency in the first and second stage seems to be increased with age, we observe no other age biases.

#### 5. CONCLUSIONS

This paper analyses time-consistency and behavioral biases when subjects are offered to change their health club contract structure .

We break the analysis down into three stages:

In the first stage we observe pre-decision consistency by comparing the flat rate subjects pay with the amount of money they would pay in a pay per use contract. We find that almost the 62% of the population is inconsistent. This behavior is coherent with subjects’ overestimation of future attendances

In the second stage we take as a proxy of the expected number of attendances the subject first stage’s mean number of attendances.

We observe decision consistency by comparing the flat fee with multi-part tariff according to their mean number of past attendances.

We find that most of the subjects do not switch to a new contract and a high percentage of them are making an inconsistent decision according to their past attendances.

We also find that most of the subjects that switch to a new contract are making a consistent decision according to their past attendances.

We check for relation between consistency/inconsistency in the second stage and consistency/inconsistency in the first stage of the experiment by looking at switchers and non-switcher separately by setting two logit models.

This analysis shows that inconsistent behaviors in the first stage have statistically significant effect on inconsistent behaviors in the second stage for non-switchers. We also observe statistically significant effect on consistent behaviors in the second stage being caused by consistent behaviors in the first stage for switchers.

These findings lead us to conclude that overestimation of future attendances is the cause of most of the inconsistent behaviors we observe in the experiment.

In the third stage we look for behavioral biases caused by the change in the structure of the contract by comparing real attendances after the decision with real attendances before the decision for the same sequence of months (December-May). We do the comparison for switchers and for non-switchers finding no behavioral biases for the non-switcher group. For switchers we observe a statistically significant decrease in the number of attendances that leads us to conclude that changing the structure of the contract leads subjects to underuse their multi-part tariff fee.

When looking for a gender bias in third stage; switcher-women tend to underuse their multi-part tariff less than switcher-men.

When we analyze how consequent people are according to their decisions, we observe that for people that change there is an important gender bias that shows women to be more consequent with their predictions. Subjects who did not change are less consistent with their decisions than the ones who change, there are no gender differences and we do observe inconsistency increasing with age.

According to our study we can conclude that subjects that do not have the tendency to overestimate their future attendances to the gym are more willing to switch to a multi-part tariff and so they end up by reducing their gym attendances.

On contrary over-estimators will not switch to a multi-part tariff and will not change their gym attendance behavior so we can conclude that subjects that overestimate their future attendances get some kind of immunization against contract-caused gym attendance reduction

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