

SELECTION IN A FIELD EXPERIMENT WITH VOLUNTARY PARTICIPATION

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SUMMARY

The external validity of experiments in economics can be ensured only if participants reflect the relevant market population. We study data from a promotional campaign of NH-Hoteles to study sample selection problems in a gift exchange field experiment. The promotion allowed guests to pay any non-negative amount for a stay in one of 36 hotels in Belgium and the Netherlands. We distinguish between *involuntary participants*, who booked prior to the announcement of the promotional campaign, and *voluntary participants*, who booked after the campaign was announced. The involuntary participants pay, on average, substantially more. This different behavior cannot be explained by differences in satisfaction or observed compositional differences between both groups. During the promotion we varied the posted price of a room that was communicated to the guests. Only the involuntary participants respond to this exogenous variation in the posted price. We argue that the promotional campaign mainly attracted individuals with relatively few prosocial reputational concerns, because they benefit most from a name-your-own-price scheme. Copyright © 2010 John Wiley & Sons, Ltd.

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1. INTRODUCTION

Although experiments have the advantage of full control over the institutional environment, they lack control over the composition of the participants. Participation in experiments (particularly laboratory experiments) is often voluntary. Harrison and List (2004) and Levitt and List (2007) mention self-selection of participants as one of the potential problems of generalizing the results from laboratory experiments to the outside world. They argue that those who select into laboratory experiments are more likely to be cooperative or seek social approval. The selection can also go the other way. Altruistic individuals may, for example, be less likely to participate in experiments, where participation can signal prosocial behavior at a cost, than selfish individuals.¹ Indeed, Lazear *et al.* (2005) provide experimental evidence that some participants are willing to pay money in order to avoid playing a dictator game. Furthermore, Eckel and Grossman (2000) show that pseudo-volunteers (recruited in class) are more generous in a dictator game than voluntary participants, who were recruited in the usual way. This paper investigates the importance of self-selection in experiments by comparing the behavior of voluntary and involuntary participants in a gift exchange setting.

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¹ In most experiments the participants are not informed about the content *ex ante*. However, participants are often recruited from a population of students, and in many laboratories up to 50% of the experiments test prosocial behavior in either a dictator, trust, gift exchange or public good game. Participants might thus have reasonable good prior knowledge about the experiment (even if they have not been informed by fellow students).

The issue of sample selection bias in experiments is not new. It was, for example, addressed in Dyer *et al.* (1989), who in a laboratory auction experiment compared the behavior of (unexperienced) students with experienced managers.² For experiments to be generalizable, it is desirable that the participants are representative for the market participants. What is meant by a representative group depends on the context. In complicated auctions, the market participants are typically experts in the field, while participants in experimental studies typically are not. Thus the problem is not selectivity as such, but the fact that participants in an experiment may behave in a fundamentally different way from the relevant group they are supposed to represent.

Our data are from a promotional campaign of NH-Hoteles, in which during the weekend of 16–18 December 2005 hotel guests could name their own price. All 36 NH hotels in Belgium and the Netherlands participated. When checking out, the hotel guests had to decide how much they wanted to pay for their one-night stay (including breakfast). Paying nothing was allowed. Before the hotel guests made their payment, they had to fill in a short questionnaire. Among other things, this questionnaire announced the *usual* price for a stay in the hotel. At our request, NH-Hoteles raised this posted price by €20 on the first day of the promotional weekend. We exploit this exogenous variation to investigate the causal effect of the posted price on the payments of guests. The promotional activity was announced 4 weeks before the weekend in which it took place. About 6% of the hotel guests in our data had already booked prior to the announcement. These hotel guests were also allowed to pay any non-negative amount. Since the promotion took place in a weekend, the vast majority of the guests were non-business people. This gives us a unique opportunity to investigate the consequences of self-selection in (field) experiments by comparing the behavior of these *involuntary participants* with the behavior of individuals who participated *voluntarily*, because they booked a hotel after the promotional activity was announced.

The setup of the campaign has strong similarities to gift exchange and tipping games, and to a lesser extent to dictator and trust games.³ These types of games are often evaluated in the laboratory. Our paper contributes to the substantial literature on testing prosocial behavior, because to our knowledge there are very few (laboratory) experiments on prosocial behavior for such a large and diverse group where the stakes are so high. A notable exception is Bellemare and Shearer (2009), who show that tree planters increase their productivity by 10% after having received a one-time bonus of \$80. Gneezy and List (2006) also study a gift exchange experiment in the field. They mainly focus on the representativeness of the environment, and argue that great care should be taken when extrapolating from the laboratory to the field.⁴ Our concerns are based on the composition of the participants in an experiment, rather than the institutional environment.

The main contribution of this paper is that we present evidence that legitimates concerns with regard to self-selection. Not only do the involuntary participants pay much more than the voluntary participants, but—more importantly—they also respond to changes in the posted price, which is something the voluntary guests do not do. Compared to laboratory experiments, our data are relatively rich on explanatory variables, but controlling for these observables does not solve the problem of self-selection. Finally, to explain our empirical findings we develop a model for prosocial behavior in the spirit of Bénabou and Tirole (2006) that deals with selection effects.

² More studies have found that students, who are the typical participants in laboratory experiments, behave differently from community members (e.g. Carpenter *et al.*, 2008; Belot *et al.*, 2009).

³ There is a huge literature on dictator games; see Camerer (2003) for an overview. Fehr *et al.* (1998) is an example of a gift exchange experiment, while Ruffle (1996), Azar (2003) and Parrett (2006) are examples of tipping games.

⁴ Benz and Meier (2008) study the behavior of a group of students in a dictator game setting both in the field and in the laboratory, and find only very weak correlations in donations.

We also discuss some alternative explanations for the differences in behavior of voluntary and involuntary participants.

The paper is organized as follows. Section 2 discusses the design of the experiment. Section 3 presents our main results, while Section 4 provides a simple model to interpret our results and discusses some alternative explanations for our findings. Finally, Section 5 concludes.

2. DESIGN OF THE FIELD EXPERIMENT

During the weekend of the promotion activity, NH-Hoteles allowed guests to book a hotel for at most one night. The aim of the promotional activity was to expose the brand name to a wide audience. During check-out, each hotel guest had to hand in the short questionnaire that they had received while checking in. Appendix A contains a copy of the questionnaire. This questionnaire stated a *usual* price for a stay in the hotel, which we refer to as the posted price. This posted price depends on the type of hotel. When actually checking out, the hotel guests handed in the completed questionnaire, together with their voluntary payment, to the receptionist of the hotel, who wrote the amount of the payment on the questionnaire. The questionnaire explicitly stated that the receptionist would ask for a reason if a guest opted to make a payment of €0.⁵ It is very likely that this statement increases donations, since a great deal of evidence suggests that people increase their level of cooperation when they are being watched (e.g., Milinsky *et al.*, 2002; Soetevent, 2005).

All 36 hotels of NH-Hoteles in Belgium and The Netherlands participated in the promotional activity. The promotion was announced 4 weeks in advance in an advertisement campaign using billboards, newspapers and magazine ads, mailings and the Internet. Appendix B contains a translation of the press release announcing the campaign. The texts in the advertisements were based on this release. The guests who booked via an external travel agent were not allowed to participate. The questionnaire contained a question about how the guests had learned about the promotion. A small fraction of the guests were not aware of it until the moment they checked in. Most of these individuals had booked already before the start of the promotional campaign.⁶ They also were able to decide how much they wanted to pay for their stay. We call these individuals *involuntary participants*, and refer to the other guests as *voluntary participants*.

In addition, the questionnaire contained three blocks of questions. The first set of questions involved gender, age, place of residence and nationality of the guest. The second block contained questions on how often the individual usually stays in hotels, and how familiar the guest is with NH-Hoteles. The third block of questions had to do with guest satisfaction with the stay. The guests were asked to give an overall grade for the stay, and to give separate opinions on the quality of the personnel, room and breakfast. Just before this third block of questions concerning the guest's satisfaction, the questionnaire posted the usual price for the stay. At our request this posted price was increased by €20 for the first night of the promotion.⁷ Since room prices vary over the season and with excessive capacity, both the posted price and the posted price plus the

⁵ With regard to paying nothing, the following text appeared on the questionnaire: '*What happens if you don't want to pay anything? That's possible, but it indicates that you did not like your stay at all. In that case we will ask you to explain why you rated a stay in our hotel as worthless.*'

⁶ Most hotels were actually fully booked shortly after the promotion was announced.

⁷ Two hotels distributed the questionnaires with the increased prices on Saturday and Sunday (and the lower prices on Friday). In one hotel, both types of forms were distributed on each day.

Table I. Summary statistics

	Involuntary participants	Voluntary participants
Observations	301	4721
Payments (in €)	48.75	24.41
Paid nothing	8.0%	14.4%
Paid less than 10% of usual price ^a	13.0%	27.0%
Paid more than 90% of usual price ^a	12.3%	1.0%
Three-star hotel	50.8%	46.0%
Four-star hotel	36.9%	35.8%
Five-star hotel	12.3%	18.2%
Hotel grade	7.35	7.26
Female	30.6%	44.2%
Age	39.5	33.1
Belgium	9.6%	10.8%
Dutch	58.8%	87.0%
Often in hotels	45.8%	25.4%

^a The usual price is €80 for a three-star hotel, €120 for a four-star hotel and €160 for a five-star hotel.

additional €20 are in the range of possible prices. The intervention is thus not some kind of trick. In total, 5885 guests completed the questionnaires. The non-response rate was less than 1%. We deleted 237 questionnaires from our data, because either the amount paid or the overall hotel grade was missing. Furthermore, we excluded 234 questionnaires for which gender or age was missing or the age of the individual was below 16 years. Finally, we dropped 392 individuals from the data for which we could not ascertain whether their participation was involuntary or voluntary. This left us with 5022 observations: 301 involuntary participants and 4721 voluntary participants.

Table I provides some summary statistics of the data. We observe that involuntary participants pay, on average, about twice as much as the voluntary participants.⁸ This difference cannot be explained by the fact that involuntary participants stay in different hotels from the voluntary participants. The distribution of involuntary participants and voluntary participants over three-, four- and five-star hotels is roughly the same. Both the fraction of individuals who do not pay anything, and those who pay less than 10% of the usual price, is about twice as large among voluntary participants as among involuntary participants. Furthermore, while only 1% of the voluntary participants pay more than 90% of the usual price, about 12% of the involuntary participants pay more than 90% of the usual price. The difference in donations is also not due to the fact that the group of involuntary participants contains more business people who are on expense accounts. Recall that the experiment was held on a weekend (with few business travelers). We also have information on whether the guests often stayed in hotels, which is strongly correlated with being a business traveler. Below, we show that even when we control for this, the difference remains large. Furthermore, we checked whether the involuntary participants paid themselves or whether someone else paid for them. We could do this because the hotel records unique custom numbers of their visitors and links this information with, among other things, the name of the person paying the bill.⁹ Within the group of involuntary participants we have this information for

⁸ Although the promotional activity was held in a usually quiet weekend, all hotels were fully booked as a result of the promotion. Because the mean donation was above the average cost of hotel rooms, NH-Hoteles did not make a loss in this weekend. In fact, the total amount of donations was far above turnover in the same weekend in earlier years.

⁹ The checking of who made the payment had to be done on our request on a case-by-case basis by an employee from NH-Hoteles; because this was time intensive, this could only be done for the group of involuntary participants.

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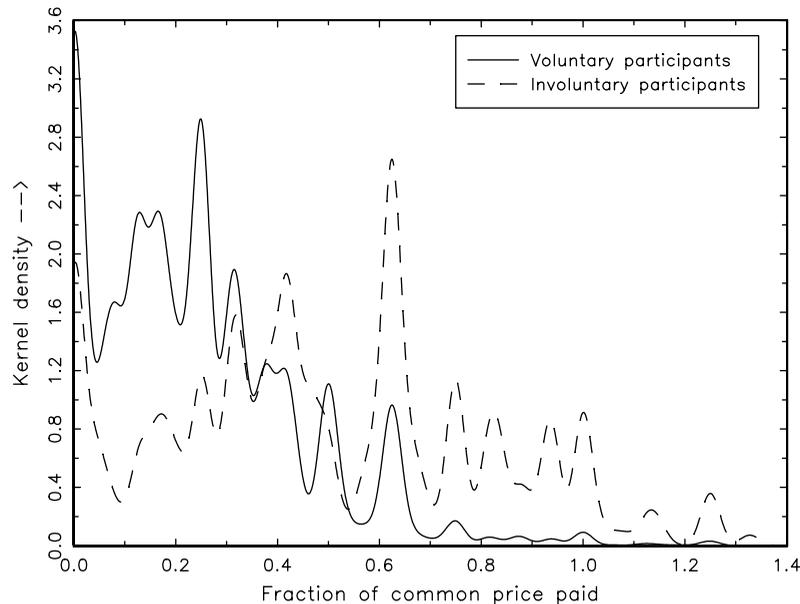


Figure 1. Kernel density estimation of the payments of involuntary and voluntary participants as a fraction of the usual hotel price (this usual price is €80 for a three-star hotel, €120 for a four-star hotel, and €160 for a five-star hotel)

194 of the customers (64%). We find that within the group of involuntary participants, 93% paid themselves. Those who did not pay themselves paid, on average, €6 less than those who paid themselves, but the difference is not significant.

Figure 1 shows kernel estimates for the density function of payments of the voluntary participants and the involuntary participants. Payments are taken as a fraction of the common price, which is €80 for the three-star hotels, €120 for the four-star hotels and €160 for the five-star hotels (these are the posted prices on the questionnaires distributed on Saturday and Sunday). Some values are above one because some people paid more than the usual price. Most of this occurred on Friday, when the posted price was €20 above the one on Saturday and Sunday. From the figure it is clear that there is a lot of variation in what people choose to pay, and that involuntary participants pay more than the voluntary participants over the entire distribution.

These differences cannot be explained by differences in satisfaction about the hotel. The average grade is about 7.3 for both the involuntary participants and the voluntary participants. Figure 2 shows histograms for grades.¹⁰ The histograms for the involuntary participants and the voluntary participants are rather similar. Table I shows that there are considerable compositional differences between the two groups. Among the voluntary participants, the fraction of females is higher.¹¹ Furthermore, voluntary participants are, on average, younger, and more often have Dutch

¹⁰ It should be noted that most people give whole-number grades.

¹¹ The questionnaire did not ask if an individual stayed alone in a room or as part of a couple. According to the hotel managers the vast majority were couples. We assume that the person who completed the questionnaire was also the decision maker on the payment.

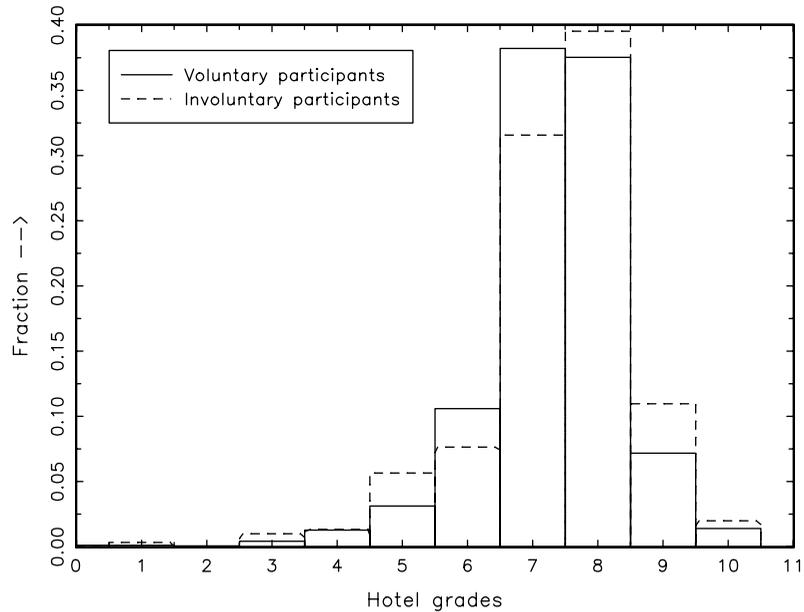


Figure 2. Histogram of the hotel grades given by involuntary and voluntary participants

nationality. The group of involuntary participants contains a larger share of individuals who stay often (at least five nights per year) in hotels.

3. RESULTS

3.1. Payments

Our main variable of interest is the payment of the guests. We have already established that the involuntary participants pay approximately €24 more than the voluntary participants. However, there are large compositional differences between both groups. The first column of Table II presents results from a regression that accounts for observed compositional differences (and for hotel fixed effects). The estimation results show that involuntary participants pay about €18 more than voluntary participants with similar observed characteristics, and indicate that this difference is highly significant. This implies that observed compositional differences can only explain about 25% of the differences in donations between involuntary participants and voluntary participants. This is in line with the experimental evidence of Eckel and Grossman (2000). They compared donations in a dictator game that was held in a classroom without prior announcement, with donations in a setting where students were recruited in the usual way. They also find that the voluntary participants were substantially more likely to pay nothing and less likely to donate the full amount, and that, on average, the voluntary participants paid between 22% and 50% less (depending on the treatment) than the classroom students.

Our estimates show that payments increase with age (until age 81). Guests of Belgian or Dutch nationality paid significantly less than individuals of other nationalities (also the difference between Dutch and Belgians is significant), and women paid less than men. Surprisingly, whether or not

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Table II. Price paid

	All	Involuntary participants			Voluntary participants		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Involuntary participant	18.088** (1.302)						
Posted price	0.035 (0.032)	0.658** (0.206)	0.566** (0.204)	0.595** (0.202)	0.010 (0.033)	0.004 (0.032)	0.009 (0.032)
Female	-1.469** (0.572)		1.767 (4.279)	0.609 (4.237)		-1.586** (0.559)	-1.728** (0.557)
Age/10	7.566** (1.341)		13.145* (7.876)	9.509 (7.863)		0.749** (0.134)	7.829** (1.337)
Age squared/100	-0.466** (0.166)		-0.877 (0.894)	-0.603 (0.886)		-0.481** (0.167)	-0.551** (0.166)
Belgium	-8.630** (1.772)		-9.972 (7.771)	-11.285 (7.674)		-6.694** (2.058)	-6.725** (2.049)
Dutch	-11.184** (1.559)		-10.759** (4.711)	-12.421** (4.679)		-9.037** (1.885)	-8.959** (1.877)
Often in hotels	0.218 (0.648)		0.691 (3.900)	1.761 (3.862)		0.091 (0.642)	0.506 (0.643)
Hotel grade				4.687** (1.602)			1.671** (0.259)
Fixed hotel effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.152	0.169	0.228	0.252	0.023	0.084	0.092
Sample size	5022	301	301	301	4721	4721	4721

* Significant at 10%; ** significant at 5%.

people stay often in hotels did not affect payments. Obviously, there are unobserved characteristics that cause involuntary participants to pay more than the voluntary participants. The involuntary participants made their hotel reservation expecting to pay the usual price, while the voluntary participants booked after they learned about the promotional campaign. Therefore, the marginal willingness to pay is relatively higher for the involuntary participants. Therefore we cannot attribute the full difference in average payments to the fact that they participated involuntarily.

Our main parameter of interest is the effect of the posted price on payments. From the first column of Table II we see that the posted price does not significantly affect the amount actually paid if we consider the entire sample of guests. In fact, raising the posted price by €20, on average, only increases the payment by about €0.7. Columns (2)–(7) of Table II present the results from separate regressions for the involuntary participants and the voluntary participants. We are mainly interested in the effect of the posted price on the payments made by both types of guests. Columns (2) and (5) show that involuntary participants pay significantly more in response to the posted price increase, while the voluntary participants do not respond to exogenous changes in the posted price.¹² As can be seen in columns (3) and (6), these results remain present after controlling for individual characteristics. A €20 increase in the posted price causes the involuntary participants to increase their payment by about €11.32, which is about 23% of their average payment. The voluntary participants only pay €0.08 extra if the posted price is increased by €20. This implies

¹² Recall that three hotels distributed the questionnaires with the increased price on evenings other than Friday. We can exploit this mistake by including indicators for the day. The effect of the posted price remains large for the involuntary participants, and becomes slightly negative for the voluntary participants. However, because identification now only comes from three hotels, standard errors increase enormously and both effects are statistically insignificant.

Table III. Effect of the posted price on the price paid from quantile regression

	Involuntary participants (1)	Voluntary participants (2)
20 th percent	0.045 (0.224)	0.000 (0.029)
50 th percent	0.450 (0.348)	0.000 (0.031)
80 th percent	0.909** (0.394)	0.000 (0.048)
Controls	Yes	Yes
Fixed hotel effects	Yes	Yes
Sample size	301	4721

* Significant at 10%; ** significant at 5%.

Note: Controls included for gender, age, age squared, nationality and whether individuals often stay in hotels.

that involuntary participants not only pay more, but also respond differently from the voluntary participants to changes in the institutional setting.

To further investigate the responses to the increase in the posted price, we perform quantile regression. Table III shows the effects of the posted price on the 20th, 50th, and 80th quantile for both the involuntary and voluntary participants. For the voluntary participants, all estimated coefficients are almost zero. This implies that there are also no distributional effects of the posted price. For the involuntary participants, the effect of the posted price is almost zero at the 20th percent quantile, but increases for higher quantiles. Distributional effects are thus quite substantial for the involuntary participants.

3.2. Satisfaction

Recall from the previous section that involuntary participants and voluntary participants gave, on average, approximately the same grade for their stay. However, if we account for differences in observed individual characteristics and hotel fixed effects, then involuntary participants give significantly higher grades (see the first column of Table IV). Either they are more satisfied, or they respond to the gift of a free room by giving a higher grade as a form of positive reciprocity. If the difference in payments between involuntary and voluntary participants would entirely be driven by satisfaction, then the returns to an additional point (on a 10-point scale) in grade should be around €118. This huge return makes it implausible that differences in satisfaction are the only reason for differences in payments. The posted price has a small negative effect on satisfaction; a €20 increase in the posted price reduces the hotel grade by less than 1% of the average grade.

Again, we performed separate regressions for the involuntary participants and for the voluntary participants. The results of these regressions appear in columns (2)–(5) of Table IV. Columns (2) and (4) show that the posted price has a small negative effect on the satisfaction of both the voluntary participants and involuntary participants. Only for the voluntary participants is this effect significant (but only at the 10% level). Once we control for observed individual characteristics (see columns (3) and (5)), the posted price no longer significantly affects satisfaction.

The regressions above show that involuntary participants pay much more. They are also significantly more satisfied, but this difference is not sufficiently large to explain the difference in payment behavior. Furthermore, a higher posted price increases the payments of involuntary

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Table IV. Hotel grades

	All	Involuntary participants		Voluntary participants	
	(1)	(2)	(3)	(4)	(5)
Involuntary participant	0.154** (0.070)				
Posted price	-0.003* (0.002)	-0.006 (0.008)	-0.006 (0.008)	-0.003* (0.002)	-0.003 (0.002)
Female	0.090** (0.031)		0.247 (0.163)		0.085** (0.031)
Age	-0.145** (0.072)		0.776** (0.300)		-0.204** (0.075)
Age squared	0.035** (0.009)		-0.059* (0.034)		0.042** (0.009)
Belgium	0.218** (0.096)		0.280 (0.296)		0.018 (0.116)
Dutch	0.149* (0.084)		0.355* (0.179)		-0.047 (0.106)
Often in hotels	-0.249** (0.035)		-0.228 (0.149)		-0.248** (0.036)
Fixed hotel effects	Yes	Yes	Yes	Yes	Yes
R^2	0.074	0.154	0.254	0.046	0.076
Sample size	5022	301	301	4721	4721

Note: * Significant at 10%; ** significant at 5%.

participants, but this cannot be caused by increased satisfaction, as the posted price does not affect satisfaction. This raises the question of whether a higher level of satisfaction is associated with higher payments. Indeed, there is a positive (and significant) correlation between satisfaction and payments: more satisfied hotel guests donate more. The size of the raw correlation, however, is larger for the involuntary participants (0.18) than for the voluntary participants (0.12). Columns (4) and (7) of Table II show that controlling for hotel fixed effects and other observed characteristics does not affect the correlations. For involuntary participants, a one-point increase in satisfaction is associated with an additional donation of €4.7, which is 9.6% of the average donation. This association is much lower for the voluntary participants. The voluntary participants, who are one point more satisfied, pay, on average, €1.7 extra, which is 6.8% of their average donation. It should be stressed that these results should not be interpreted as causal, because the donation and level of satisfaction are jointly determined by the hotel guests. Even though these regressions suffer from endogeneity problems, the results suggest that the effect of the posted price on the payments cannot be explained by an increased level of satisfaction. Consequently, the difference in payment strategies between involuntary participants and voluntary participants cannot be attributed to differences in level of satisfaction.

3.3. Sensitivity Analyses

Of course, differences in payment behavior may to a large extent be explained by differences in income. Most likely, involuntary participants have a higher income than voluntary participants. However, our data contain no direct information on income. NH-hoteles thought that a question regarding income would be too private to ask in the questionnaire. Age might control for some

differences in income, and the questionnaire also includes information on where people live. We have tried to use this additional information by adding regional indicators and dummy variables for whether or not individuals live in a big city. This should capture some variation in income, but the covariate effects of these variables were always small and insignificant. Also, controlling for these additional covariates did not affect the effects of the posted price.

More importantly, we know how many stars each hotel has, and usually prices are strongly correlated to the quality of the hotel. For the involuntary participants, we expect lower-income people to stay mainly in three-star hotels, while high-income people are more likely to stay in the expensive five-star hotels. Therefore, the involuntary participants staying in three-star hotels have, on average, a lower income than the involuntary participants staying in the five-star hotels. For the voluntary participants, we do not expect much variation in income between the hotels, since all hotels, and in particular the five-star hotels, were filled rapidly after the announcement of the promotion.

Table V presents the results for the three types of hotels. For the involuntary participants, the average donation increases with the number of stars of the hotel, while it marginally decreases for the voluntary participants. It should also be noted that for both the involuntary and the voluntary participants the fraction paying nothing is highest in the five-star hotels (21% for both groups).

Table V. Separate analyses for three-star, four-star and five-star hotels

	Three-star hotel	Four-star hotel	Five-star hotel
<i>Paid price for involuntary participants</i>			
Average price (in €)	46.50	48.86	57.68
Effect of posted price	0.480** (0.241)	0.181 (0.303)	3.034** (0.903)
Fixed hotel effects	Yes	Yes	Yes
R ²	0.192	0.173	0.286
Sample size	153	111	37
<i>Paid price for voluntary participants</i>			
Average price (in €)	24.99	24.25	23.25
Effect of posted price	-0.017 (0.044)	0.030 (0.051)	0.068 (0.127)
Fixed hotel effects	Yes	Yes	Yes
R ²	0.039	0.016	0.002
Sample size	2170	1692	859
<i>Hotel grade for involuntary participants</i>			
Average grade	7.41	7.31	7.18
Effect of posted price	-0.002 (0.012)	-0.006 (0.011)	-0.020 (0.030)
Fixed hotel effects	Yes	Yes	Yes
R ²	0.116	0.201	0.155
Sample size	153	111	37
<i>Hotel grade for voluntary participants</i>			
Average grade	7.21	7.27	7.38
Effect of posted price	-0.002 (0.003)	-0.004 (0.003)	-0.006 (0.006)
Fixed hotel effects	Yes	Yes	Yes
R ²	0.050	0.059	0.002
Sample size	2170	1692	859

* Significant at 10%; ** significant at 5%.

If we look at the response to the exogenous posted-price increase, we see no clear pattern. The involuntary participants who stay at a five-star hotel respond strongly, but we have only 37 observations for this group. In a comparison of the three-star with the four-star hotels, the involuntary participants in the three-star hotels (who have a lower expected income) respond more to the posted-price increase than the ones who stayed in a four-star hotel. As expected, the voluntary participants do not respond in terms of their payments to our intervention, irrespective of whether they stay in a three-star, four-star or five-star hotel. Finally, for the involuntary participants, average grades decrease slightly with the stars of the hotel, while the opposite is true for the voluntary participants. However, the effect of the posted prices on grades is almost zero for both groups in all hotel types. We conclude that payments are likely to increase with income, but that the responses to changes in the posted price cannot be explained by income differences.

4. EXPLANATIONS AND IMPLICATIONS OF OUR RESULTS

This section first constructs a simple model (in the spirit of Bénabou and Tirole, 2006) that is consistent with our findings. A key feature of the model is that individual decisions are driven by external motivations and intrinsic motivations. Individuals have a desire to signal prosocial behavior both to themselves (internal reputational concerns) and to others (external reputational concerns). After we have presented our model, we discuss some alternative explanations.

4.1. The Model

Suppose that individuals have reputational concerns that depend on one's private value y , and on the value that the hotel attaches to the gift. Individuals believe that the hotel's value equals the booking price x for the night they stay in the hotel.

Since regular hotel guests made their hotel reservation prior to the announcement of the promotional activity, their participation constraint implies $y \geq x$. For the voluntary participants, who made the reservation after the announcement of the promotional activity, the value of staying in a hotel must exceed the voluntary monetary contribution a^* they have in mind. The participation constraint for voluntary participants, therefore, implies $y \geq a^*$.

When checking in, the hotel reveals its perceived value of the gift: namely, the posted price p . At this moment, the hotel guests update their beliefs about the hotel's value from x to p . Individuals with strong intrinsic reputational concerns mainly base their payments on y , while individuals with strong external reputational concerns mainly base their payments on p . Intrinsic reputational concerns are defined as a fraction r_y of y , and the external reputational concerns by a fraction r_p of p . We assume that payments are only driven by reputation concerns, so total investments in reputational capital must add up to the actual contribution:

$$r_y y + r_p p = a \quad (1)$$

Note that this specification does not rule out that individuals pay more than the posted price, although in our data this did not occur. Therefore, this specification and

$$\min[p, r_y y + r_p p] = a \quad (2)$$

are observably equivalent in the data, although this latter specification clearly explains the finding from the quantile regressions that the posted price affects the upper tail of the payment distribution much more than it does the lower tail.

The preferences of each individual in the population can be characterized by the triplet $t \equiv (y, r_y, r_p) \in \mathbb{R}^3$, which is drawn from a continuous distribution with density $f(t)$ and mean $(\bar{y}, \bar{r}_y, \bar{r}_p)$. All guests know their realization. From staying the night in a hotel during the promotional activity, an individual derives utility

$$U = y - a \tag{3}$$

Next, we take a closer look at the participation constraint. The participation constraint of the involuntary participants only depends on y and x . Since x is similar for all individuals, the group of involuntary participants is characterized by individuals with relatively high values of y . Furthermore, the participation decision does not depend on r_y and r_p .

At the moment of booking, the belief held by a voluntary participant about the hotel's value is x . The inequality $y \geq a^*$ implies that the participation constraint for voluntary participants is $y \geq \frac{r_p}{1-r_y}x$. The group of voluntary participants contains individuals with relatively small values of y if the values of $\frac{r_p}{(1-r_y)}$ are smaller than 1 (as will be shown below).

The expected donation of the involuntary participants equals

$$E[a|y \geq x] = E[r_y y | y \geq x] + E[r_p p | y \geq x]$$

From the exogenous changes in p we find for $\frac{\partial a}{\partial p}$ an estimated coefficient in the order of 0.6. This implies that $E[r_p | y > x]$ should be around 0.6. The expected payments of the voluntary participants can be written as

$$E \left[a | y \geq \frac{r_p}{1-r_y}x \right] = E \left[r_y y | y \geq \frac{r_p}{1-r_y}x \right] + E \left[r_p p | y \geq \frac{r_p}{1-r_y}x \right]$$

and the estimate for $\frac{\partial a}{\partial p}$ is about 0 for this group. Therefore, $E \left[r_p | y \geq \frac{r_p}{1-r_y}x \right]$ is also about 0. The two results combined imply a strong positive correlation between r_p and y . In words, this means that those who consider the gift to be valuable donate money for reasons of external reputation.

The voluntary participants pay, on average, €24.41, which implies that $E \left[r_y y | y \geq \frac{r_p}{1-r_y}x \right]$ is about €24.41. The involuntary participants pay, on average, €48.75. Since the mean posted price for this group is €114, $E[r_y y | y \geq x]$ should equal €48.75 - 0.6 · 114 = -19.65. This implies that y and r_y are negatively correlated to each other. Intrinsic reputational concerns thus diminish as the value of the gift increases or external reputation concerns increase.

We cannot rule out the possibility that the value of $E[r_p | y > x]$ (which we identified from the response of the involuntary participants to our intervention) is partly due to the fact that involuntary participants have a higher income from which we abstracted in our model. If we only consider the involuntary participants who stayed in the less expensive three-star hotels, our findings indicate

that they pay, on average, €46.50. The mean posted price for them is €88, and $E[r_y y | y \geq x]$ now becomes positive and equal to $€46.50 - 0.48 \cdot 88 = 4.26$.

We can conclude from the above that: (i) the voluntary participants have no external reputational concerns, while the involuntary participants have strong external reputational concerns; (ii) the higher the private value of the gift y is, and/or the stronger the external reputational concerns r_p are, the lower are the internal reputational concerns r_y .

4.2. Alternative Explanations

This section discusses a couple of alternative explanations for: (i) why agents donate; (ii) the difference in payments between the involuntary and voluntary participants; and (iii) the difference in response to exogenous variations of the posted price. We argue that (i) and (ii) are consistent with many behavioral assumptions, while (iii) is harder to explain. It is particularly difficult to explain without selection arguments why the voluntary participants do not respond at all to the increase in the posted price.

The behavioral economics literature has no shortage of explanations for why people care more than only their own monetary payoffs; see Camerer *et al.* (2003) for a selection of the most important contributions in this field. The fact that the involuntary participants pay more could be due to mental accounting (see Thaler, 1980). If the involuntary participants subjectively framed a higher price (their booking price) than the involuntary participants, they have a higher willingness to pay, and this can explain why their average payments are higher. Anchoring stories (e.g., Kahneman and Tversky, 1979; Tversky and Kahneman, 1974) are also consistent with the fact that the involuntary participants pay more. This requires, however, that they must ignore the posted price on the questionnaire. Köszegi and Rabin (2006) developed a model with reference-dependent preferences, where the reference point of an agent is determined by rational expectations, and willingness to pay (conditional on purchase) is increasing in expected prices.

Another explanation is that when making the hotel reservation some voluntary participants did not end up at their first choice, because the top hotels were fully booked so quickly. The involuntary participants could therefore derive a higher utility from staying in the same hotel than the voluntary participants. Hence at this stage we cannot rule out that both involuntary participants and voluntary participants pay a particular fraction of their marginal willingness to pay—and then it is not surprising that involuntary participants pay significantly more. Those explanations cannot explain, however, why voluntary participants do not respond at all to the increase in the posted price (see again Table III, which shows a zero response at the 20th, 50th and 80th percent quantiles), while the involuntary participants pay substantially more in response to this intervention.

A possible payment strategy that might explain the difference in behavioral response to the posted price is one in which hotel guests pay a fraction of the posted price—but only if this is lower than their marginal willingness to pay. For reasons mentioned above, the willingness to pay for the involuntary participants is likely to be higher—implying that the (fraction of the) posted price is more likely to be binding, and, therefore, they are more likely to respond to changes in the posted price. However, also from this explanation it would be difficult to explain the quantile regression results. On the other hand, the involuntary participants probably expected a quiet stay, and not a fully booked hotel with queues for breakfast, etc. Also, not finding the environment they might have expected might have lowered their willingness to pay. This would imply that the true selection effects are even higher than what we find.

Another possibility is that the involuntary participants are involved in a repeated game, while the voluntary participants play a one-shot game. In that case, the payments of the involuntary participants could be interpreted as investments in a good relation with (the personnel of) NH-hoteles. We have repeated the earlier empirical analysis on the payments for guests who had never before stayed in an NH hotel. Most likely these are all hotel guests playing one-shot games. For the voluntary participants, a €20 higher posted price decreases average payments by €0.44, while for the involuntary participants it increases average payments by €4.96. The latter estimate is significant at a 10% level. Furthermore, the voluntary participants who had stayed in NH hotels before only increased their payment, on average, by €1.10 in response to a €20 higher posted price, and this estimate is insignificant. Thus stratifying our groups further by according to whether guests had stayed in NH hotels before does not change our results.

4.3. Relation with Experimental Evidence

The fact that many hotel guests make substantial payments is in line with the enormous amount of evidence from dictator, gift exchange, public good and trust games in the laboratory. Those results also suggest that individuals do not care only about monetary rewards. If they did, they would pay nothing in the final stage of the game. Our paper contributes to this literature by extending it to a non-undergraduate student population in a real-world setting. Moreover, our relatively large sample allowed us to show how payments vary by gender, nationality and age. We find that people are very heterogeneous in terms of their payments.

As mentioned before, there is experimental evidence that cooperation increases if agents know or perceive that they are being observed. Soetevent (2005) shows that in church people donate more in an open basket than in a closed basket. Bateson *et al.* (2006) show that even photocopied images of a pair of eyes increase contributions to a university coffee donations box that is on the honor system. Compared to having an image of flowers, people paid, on average, 2.76 times as much when the image contained the photocopied eyes. Finally, Krupka and Croson (2008) give evidence from a mail fund-raising campaign that people donate significantly more when the letter includes an eyespot logo (two dots on top, one below) than a baseline logo (two dots below, one on top). In our experiment the hotel guests paid non-anonymously to the personnel, which explains the high average payments. If even very weak subconscious cues like photocopied eyes make people behave more altruistically, it is likely that in many anonymous experiments there might have been small cues that gave people the perception that they were being observed. If this is correct, the experimental evidence on reciprocity can also be driven by standard reputational concerns.

4.4. Profitability of Name-Your-Own Price Schemes

Given that most hotel guests have a desire to pay a decent price for a stay in a good hotel, it is not puzzling why a profit-maximizing hotel chain chooses a promotional campaign like this. The management of NH-Hoteles informed us that total profits on this weekend were higher than profits for the same weekend a year earlier. This is because there is usually substantial excess capacity in the week before Christmas, while during the promotional activity most hotels were fully booked (and the marginal cost of a booked room is low). A natural question that then arises is: why, then, don't we observe more deals like this?

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Before answering this question, it may be useful to consider another recent and well-known example of a binding name-your-own-price scheme: namely Radiohead's sale of its *In Rainbows* album through the band's official site. Initially this project was seen as a failure.¹³ However, Warner Chappells revealed that the digital publishing income from this album exceeded that of all the bands previous digital publishing income, and that it made more money before *In Rainbows* was physically released than they made in total on the previous album *Hail to the Thief*. Of course, Radioheads existing digital income was low, and because Radiohead was the first group to use this pricing strategy it got a lot of extra publicity. This also explains why the physical album sold 1.75 million copies (including downloads, more than 3 million copies were sold), while the previous albums sold in the hundreds of thousands. It suggests the Radiohead experiment was a success in terms of income and sales. A study by ComScore reports that 38% of the global downloaders paid something, while 62% paid nothing.¹⁴ This is considerably more than the 8% of the involuntary and 14% of the voluntary participants who paid nothing in our hotel experiment. One important difference is, of course, that the freeloaders could act anonymously in the Radiohead case, while they faced a receptionist in the NH-Hoteles case.

Finally, Gneezy (2009) gives evidence from a day-cruise ship field experiment that a name-your-own-price scheme can be profitable. For some of the cruises, the pricing scheme of the photographs that could be bought at the end of the day were changed from posting \$15 to a name-your-own-price scheme—and it turned out that the latter was more profitable. An important reason for this is the surprise effect, and the fact that a boat ticket had to be bought as well. Therefore, there were no selection effects.

To sum up, our results indicate that NH's name-your-own-price scheme attracted individuals with relatively low prosocial concerns. We conjecture that if the hotel were to offer a name-your-own price scheme repeatedly, the payments would get lower and lower because of the overrepresentation of individuals who have no problem with either paying nothing at all or trivial amounts. Possible reasons that a similar experiment worked well for Radiohead (besides the already mentioned surprise effect) are that a large share of the buyers were loyal fans, and the product they sold was non-rival and non-excludable.

5. FINAL REMARKS

We studied a field experiment of a gift exchange game where the gift was a stay in a three-, four- or five-star hotel in the Netherlands or Belgium. The data allow us to distinguish between voluntary participants and involuntary participants. We find that only the involuntary participants respond to an exogenous increase in the posted price of the gift by paying more for their stay. We explain these behavioral differences with heterogeneity in prosocial preferences. Individuals who consider themselves as highly prosocial give higher payments to confirm and to signal their type to others and themselves. Therefore, individuals with strong reputational concerns benefit less from the gift exchange game than do individuals who put more weight on direct material gains. Consequently, the latter group will be substantially overrepresented in the group of voluntary participants. Therefore, laboratory or field experiments with voluntary participation that aim to

¹³ It ended up at number 59 on the CNN Fortune list of 101 Dumbest Moments in Business http://money.cnn.com/magazines/fortune/101dumbest/2007/full_list/index.html.

¹⁴ See http://www.comscore.com/Press_Events/Press_Releases/2007/11/Radiohead_Downloads.

test prosocial behavior are at risk of underestimating prosocial behavior. In market environments, agents can often avoid situations in which they must make costly contributions to signal their generosity. We also give evidence that as the private value of the gift increases and/or *external* reputational concerns increase, *internal* reputational concerns become weaker. The most important lesson from our study is that both in laboratory and field experiments we should worry as much about problems related to self-selection of participants as we do in non-experimental studies.

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APPENDIX A: QUESTIONNAIRE FILLED IN AT CHECK-OUT



**20.000 HOTELKAMERS
EN JIJ BEPAALT ZELF DE PRIJS!**
20.000 ROOMS AND YOU SET THE PRICE!

04-ZA17+2018DEC2005-03

WELKOM BIJ NH HOTELES

Graag heten wij je van harte welkom bij NH Hoteles. Het is je gelukt om één van de 20.000 hotelkamers te reserveren waarvoor jij zelf de prijs zal bepalen.

NH Hoteles is een sterk groeiende internationaal opererende hotelketen met meer dan 250 hotels in 19 landen. Omdat NH Hoteles nog niet zo lang actief is in Nederland en België, willen we graag dat iedereen kennis maakt met NH Hoteles en zelf ons 'oog voor detail' ervaart. Dit weekend bieden wij jou die mogelijkheid. We zijn dan ook erg benieuwd hoe je onze hotels ervaart en wat je het verblijf in dit hotel waard vond

Wij wensen je een aangenaam verblijf.

1 Je checkt in en ontvangt de sleutel van je kamer
You check in and receive the key of your room

2 Je geniet van een lekker bed (sweet dreams!) en een heerlijk ontbijt
You enjoy a good bed (sweet dreams!) and a lovely breakfast

3 Je checkt uit, bepaalt zelf de waarde van je verblijf en ontbijt en betaalt dat bedrag
You check out, determine the price of your stay, including breakfast and pay that amount

4 We zien je graag nog eens terug in een NH hotel!
See you again in an NH Hotel!

WELCOME TO NH HOTELES

We welcome you to NH Hoteles. You have managed to book one of the 20.000 rooms for which you set the price.

NH Hoteles is a fast growing, international hotel chain with more than 250 hotels in 19 countries. NH Hoteles has only recently entered the Dutch and Belgian markets. We want everyone to get to know NH Hoteles and experience our 'Eye for Detail'. This weekend we offer you this possibility!

We are curious how you will experience and value a stay in our hotels.

We wish you a pleasant stay.

nh
HOTELES

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<p>JIJ BEPAALT ZELF DE PRIJS</p> <p>Je maakt gebruik van een speciaal aanbod; bij vertrek bepaal je immers zelf hoeveel je het verblijf (inclusief ontbijt) bij ons waard vond. Dit is het bedrag dat je bij de receptie betaalt.</p> <p>Voor alle overige bestedingen – zoals het restaurant, de minibar, Pay TV en telefoon – betaal je de normale prijzen.</p> <p>We verplichten je verder tot niets. Je hoeft hier niet het diner of iets anders te gebruiken. Het enige dat we willen is dat je straks met een positief gevoel terugkijkt op een aangenaam verblijf bij NH Hoteles.</p> <p>Moet ik apart voor het ontbijt betalen? Nee, je bepaalt zelf de prijs voor de overnachting in een 2 persoonskamer voor maximaal 2 personen, inclusief ontbijt.</p> <p>Maar wat gebeurt er als ik niets wil betalen? Dat is mogelijk. Maar dat zou betekenen dat je een verblijf in het hotel niets waard vond. Wij zullen dan uiteraard wel aan je vragen waarom je dat vond.</p> <p>Zit er echt geen addertje onder het gras? Nee, echt niet! NH wil graag dat je kennis maakt met haar prachtige hotels.</p> <p>Wie betaalt de toeristenbelasting? Het bedrag dat je wilt betalen is incl. toeristenbelasting.</p> <p>Ben ik verplicht om het diner of iets anders te gebruiken in het hotel? Nee, wij verplichten je tot niets.</p> <p>Waarom doet NH Hoteles dit? NH Hoteles is nog niet zo lang actief in Nederland en België. Wij willen dat iedereen kennis maakt met NH Hoteles en ons 'Oog voor detail' ervaart.</p> <p>Hoe laat moet ik weer uitgecheckt hebben? Om 12 uur 's morgens moet je uitgecheckt zijn. Vergeet de enquête niet mee te nemen!</p> <p>Ik heb nog een vraag, waar kan ik terecht? Je kunt altijd even langs de receptie lopen. De receptionist beantwoordt graag je vraag.</p>	<p>YOU SET THE PRICE!</p> <p>We are offering you a unique opportunity: you determine the value of your stay, including breakfast, after you have experienced it. This is the amount to pay at check-out.</p> <p>For all other expenses, like restaurant, mini bar, Pay TV and phone, normal rates are charged.</p> <p>There are no obligations. Not for diner, not for any other things. We only want you to enjoy your stay at NH Hoteles.</p> <p>Do I have to pay for breakfast separately? No, you determine the price for the night's stay in a double room for a maximum of 2 people, including breakfast for two.</p> <p>What happens if I don't want to pay anything? That's possible, which would mean that you did not like it at all. We will, of course, ask you why you experienced a stay in our hotels worthless.</p> <p>Is there really no catch? No, really! NH wants you to get to know its great hotels.</p> <p>Who pays the city tax? The amount you are willing to pay includes the city tax.</p> <p>Do I have to eat lunch or diner in the hotel? No, there are no obligations</p> <p>Why is NH Hoteles doing this? NH Hoteles has only recently entered the Dutch and Belgian markets. We want everyone to get to know NH Hoteles and experience our 'Eye for Detail'.</p> <p>At what time do I have to check-out? Check-out time is 12:00 noon. Do not forget to bring the questionnaire!</p> <p>I have another question, who can I ask? Please address you question to the receptionist. He/she is more than willing to answer it.</p>
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GELIEVE DIT FORMULIER IN TE LEVEREN BIJ CHECK-OUT

WE KINDLY ASK YOU TO HAND OVER THIS FORM AT CHECK OUT

PERSOONLIJKE GEGEVENS* PERSONAL DETAILS*

Naam Name

Achternaam Surname

Geslacht Gender **man** male **vrouw** female

Geboortedatum Date of birth

Postcode Postal code

Woonplaats City

Land Country

E-mail E-mail

VERDERE GEGEVENS ADDITIONAL DETAILS

Hoe vaak overnacht u gemiddeld per jaar in een hotel? (aantal keren, niet aantal nachten)
How often do you stay at an hotel, in average a year? (nr. of times, not nights)

Nooit Never

1 tot 2 keer per jaar 1 to 2 times a year

3 tot 5 keer 3 to 5 times a year

Vaker More often

Kende je NH Hoteles al voor deze actie?
Did you know of NH Hoteles prior to this promotion?

Ja, ik heb al eens eerder in een NH Hotel overnacht Yes, I have stayed at an NH Hotel before

Ja, maar kende het alleen van naam Yes, but only by name

Nee, nooit van gehoord No, never heard of

Hoe heb je kennis gemaakt met deze actie? (meerdere antwoorden mogelijk)
How were you informed about this promotion?

<input type="checkbox"/> E-mail van NH Hoteles E-mail from NH Hoteles	<input type="checkbox"/> Bericht in de krant Announcement in newspaper
<input type="checkbox"/> Banner op website Banner on website	<input type="checkbox"/> Bij check-in (reeds geboekt) At check-in
<input type="checkbox"/> Advertentie Advertisement	<input type="checkbox"/> Via-via Word of mouth
<input type="checkbox"/> Poster op straat Poster on street	<input type="checkbox"/> Anders Other

*Gegevens worden vertrouwelijk behandeld / Information will be handled confidentially

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JIJ BEPAALT DE PRIJS!
YOU SET YOUR PRICE!

Normaal gesproken betaalt een gast ca. €160 per nacht (incl. ontbijt) voor een kamer in dit hotel.
Vandaag bepaal je zelf de prijs! Natuurlijk vernemen wij graag hoe je het verblijf hebt ervaren.

Normally a guest pays approx. €160 per night (incl. breakfast) per room at this hotel.
Today you determine the price! Of course we would like to know how you experienced your stay.

	slecht bad	onvoldoende insufficient	goed good	zeer goed very good
Wat vond je van het NH personeel? How did you like the NH employees?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wat vond je van je kamer? How did you like your room?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wat vond je van het ontbijt? How did you like your breakfast?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wat vond je van het hotel? How did you like the hotel?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Waardeer je verblijf met een cijfer (van 0 tot 10): Rate your stay (from 0 to 10):	<input type="checkbox"/>			

Opmerkingen Remarks

.....

.....

.....

IN TE VULLEN DOOR HOTEL TO BE FILLED IN BY THE HOTEL

- Nacht van vrijdag 16 op zaterdag 17 december
- Nacht van zaterdag 17 op zondag 18 december
- Nacht van zondag 18 december op maandag 19 december

Party ID

Value

06-ZA17+ZO18DEC2005-03

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APPENDIX B: PRESS ANNOUNCEMENT OF THE PROMOTIONAL CAMPAIGN

Below we provide the text (translated from Dutch) of the press statement sent out at the start of the advertisement campaign. Billboards, advertisements in magazines, newspapers and on the Internet were all based on this press announcement.

You can decide your own price for 20,000 rooms in all NH hotels in the Netherlands and Belgium on 16, 17 and 18 December. So do you want to spend a night in a two-person room in a comfortable NH hotel? Then participate in this spectacular deal.

NH hopes to acquaint 40,000 people with their hotels, quality and service. The guests can spend one night at NH, and enjoy a breakfast for two persons the next morning.

How does it work? Make a reservation for €0 (really!) in one of our 36 beautiful hotels in the Netherlands and Belgium, and determine at the end how much you value your stay, including breakfast. This is the amount that you are charged. Besides that, you will of course be charged for additional expenditures like restaurant, mini-bar, etc. Now, a night in the famous Krasnapolsky (located at Dam Square in Amsterdam) may become a reality.