

**TRADEOFFS BETWEEN COSTS AND BENEFITS:
LESSONS FROM “THE PRICE OF 0”¹**

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Introduction

One of the most generic and common choices that consumers face are choices of one option among competing alternatives that vary on quality, quantity, and price. Examples for such decisions range from selecting one’s morning coffee, to picking vacations and cars and even larger decisions such as selecting a house to live in. When researchers conceptualize how consumers make such choices the standard perspective common to both economic theory and behavioral decision theory is that consumers behave as decision analysts – trading off costs and benefits. In particular, when making a choice of a single item out of many substitutes, the standard perspective prescribes that consumers assess the benefits of each product, subtract the cost from these benefits and select the option that has the highest positive net value.

In the current work we focus on the most extreme case involving easy tradeoffs – ones that involve no cost and thus no tradeoffs. The experiments presented have the same general structure: the cost conditions respondents are offered a choice between a moderately priced high-end candy (e.g. a Lindt truffle), a low priced lower-end candy (e.g. a Hershey’s kiss), or neither. In the free conditions the prices of both goods are discounted by an amount equal to the price of the lower priced candy in the cost condition. Thus in the free condition respondents are given a choice between a discounted moderately priced high-end candy (e.g. a Lindt truffle), a free lower-end candy (e.g. a Hershey’s kiss), or neither.

The predictions regarding the results are different for the standard model and for the model that includes tradeoff aversion. In the standard model, where the option with the highest benefit cost difference is chosen, demands for both goods should weakly increase in the free condition compared with the cost condition. These increases in demands would presumably be caused by the consumers who buy nothing in the cost condition, but buy something in the free condition due to price drop. Moreover, because both candies’ prices are reduced by the same amount, the relative comparison of the two items remains constant, which implies that no consumer should switch candies across these two conditions. Thus, as depicted in Figure 1, the rational model predicts that as prices decrease: the behavior of those who were buying one of the objects would not change and demands for both objects would weakly increase. The people whose behavior changes are precisely those with $0 \leq L < \epsilon$ and $H < p + \epsilon$ and these people will switch from nothing to one of the objects. It follows that if ϵ is small (say 1¢) then the changes in behavior should be negligible².

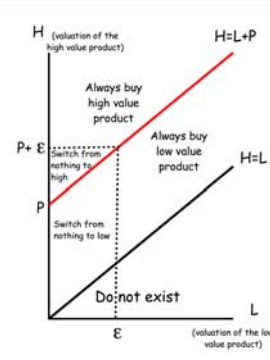


Figure 1: A graphical illustration of choosing between a low value product, a high value product and neither as prices go from ϵ and $p + \epsilon$ to 0 and p .

In contrast to this model the notion of tradeoff aversion suggests, that free options are more attractive than one would predict from the preferences revealed when all prices are positive, because a free option does not include a tradeoff between benefits and price. Thus, we expect that in

¹ For more information, please refer to the working paper, “Tradeoffs between costs and benefits: Lessons from “the price of 0” by Dan Ariely and Kristina Shampan’er.

² Even if people differ on how they rank the attractiveness of the two goods, it is still true that when both prices go down by the same amount no fall in any of the demands is theoretically possible.

the free condition the market share of the low value good will increase and the market share for the high value good will decrease beyond the theoretical predictions. This prediction will be supported in the following six experiments.

Experiment 1: Hypothetical Experiment

This experiment was conducted to test whether intuitions agreed with ours, that reducing a cost to zero would disproportionately increase the attractiveness of the free option, shifting demand from the high-end product whose benefit cost difference was presumably higher before the discount. In addition to the two main conditions described earlier, a third condition was included in order to examine the effect of price changes that maintain positive (non 0) prices. By comparing this condition to the cost condition, we could isolate the effect of price change from the effect of price change to 0. The contrast of this condition with the cost condition has another advantage; namely that this effect is predicted to be the same by both the standard model and the tradeoff aversion model (as prices go down demands weakly go up) so we could use it to make sure that there is nothing inherently wrong with using this procedure, stimuli, etc. and that the standard model predicts the results in non-zero cases.

Results. As can be seen in Figure 2 the results were not in line with the standard model. In the 0&25 condition the demand for Hershey’s increased substantially in comparison with 1&26 condition [t(31)=3.8, p<0.001] while, more importantly, the demand for Ferrero decreased substantially [t(31)=-2.3, p<0.03]³. Note that while the increase in demand as a function of price decrease is in principle consistent with the standard model, the decrease in the demand for Ferrero suggests that the increase in demand for Hershey between the cost conditions and the free condition was beyond the standard effect of price reduction. The decrease in demand for the Ferrero is inconsistent with the standard model, but is consistent with the hypothesis of tradeoff aversion⁴. Finally the fact that the difference in demands between the 1&26 and 2&27 conditions was unnoticeable (for Hershey’s [t(38)=-0.3, p=0.76], for Ferrero [t(38)=0, p=1])

³ All the p-values reported are for two-tailed tests.

⁴ A second version of this hypothetical experiment was conducted in a within subjects design where each participant saw and reacted to both conditions side by side. The results replicated those of the between subjects design suggesting that even direct comparison of these two conditions provides the same intuitions to participants.

demonstrates that once all the prices are positive, a 1¢ change in prices does not have a large effect on the demands, and it is only when one of the prices becomes zero, that the observed perturbations take place.

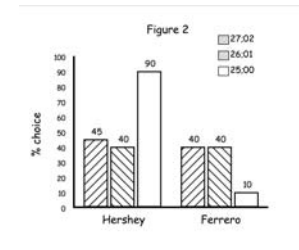


Figure 2: Results from the hypothetical experiment

Experiment 2: Real Purchasing Experiment

While the results of the hypothetical experiments provided support for the tradeoff aversion hypothesis, it is still important to test whether they will hold with real transactions. In addition, in order to test the robustness of this effect the current experiment also included a condition that compared the reduction in price of the low-end candy to a larger nominal reduction in price in the high-end candy.

Results. As can be seen in Figure 3, the results were in line with the tradeoff aversion hypothesis. In the 0&14 condition the demand for Hershey’s increased substantially [t(263)=5.6, p<0.001] compared with the 1&15 condition, while the demand for Lindt decreased substantially [t(238)=-3.2, p=0.002]. In addition, there was no significant difference between the demands for chocolate in the 0&10 and 0&14 conditions [for Hershey’s t(263)=0.5, p=0.64, for Lindt t(271)=1.5, p=0.13], suggesting that the reduction of price to 0 is a powerful effect that can overcome a reduction that is five times as large on the higher-end chocolate.

In sum, the results of the current experiment demonstrate that when facing a choice between two options where one is at price 0, its relative attractiveness becomes substantially higher.

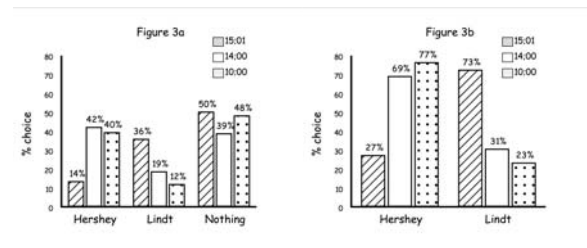


Figure 3: Results from the real purchasing experiment. Panel a including those who preferred not to get any chocolate and panel b without these participants.

Experiment 3: No Transaction Cost Experiment

One possible alternative explanation to the results presented thus far concerns the physical transaction cost that is involved when paying any amount even if it is very small for a good. The observed effect of 0 in the previous experiments could be attributed to the elimination of transaction costs in the free condition compared with the cost condition and not to the change in price per se⁵. To investigate this possibility we conducted an experiment that was similar in its general structure to Experiment 2 but where transaction cost inequality was eliminated.

Results. As can be seen in Figure 4, the results were in line with the tradeoff aversion hypothesis. In the condition where the Hershey’s was free, the demand for Hershey’s increased substantially [t(189)=4.7, p<0.001] while the demand for Lindt decreased substantially [t(206)=-3.2, p=0.001]. These results join the partial evidence from the previous experiments to suggest that the effect of the “price of 0” is most likely not due to considerations such as physical transaction costs: getting out cash, opening one’s wallet, or looking for change.

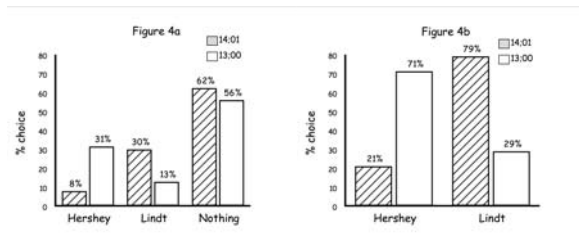


Figure 4: Results from the no transaction cost experiment. Panel a including those who preferred not to get any chocolate and panel b without these participants.

Experiment 4: Negative Price Experiment

The goal of the current experiment was to set a price that is non-zero (maintaining the financial aspect of the exchange) and at the same time has no downside. To achieve these two goals we selected a small negative price (-1¢). The prediction is that to the extent that the effect noted in the previous experiments is due to the unique nature of the price of 0, a small negative price should have a very different effect from a price of 0. On the other hand, to the extent that the effect noted in the previous experiments is due to tradeoff aversion, a small negative price should have a very similar effect to the price of 0 since they both have no downside (in

⁵ Note that the hypothetical experiment could also be interpreted in this light if one assumes that people are aware of the hassle of payment and take this into account in their hypothetical answers.

particular, eliminating the need to figure out whether the chocolate is worth its price or not).

Results. As can be seen in Figure 5, the comparison of 1&14 condition with 0&13 condition replicates previous findings. In the 0&13 condition, the demand for Hershey’s increased substantially [t(193)=3.4, p<0.001] compared with the 1&14 condition while the demand for Lindt decreased substantially [t(212)=-3.8, p<0.001].

More centrally to the current experiment, the pattern of choices in the -1¢&12 condition show that the observed effect is most likely not due to some special role of 0 but generalizes to all options that involve no downside. The pattern of data shows that when Hershey’s price dropped from 0¢ to -1¢, the demand for Hershey’s further increased [t(223)=2.5, p=0.01] while the demand for Lindt did not change significantly [t(220)=-0.04, p=0.97]. This means that a small negative price did not influence the choice like a positive price, but like the zero price, with the demands going from the cost condition to negative cost condition in the same direction as to the free condition, but slightly more so. Thus price of 0 is not a unique attractor of the demand for Hershey’s, and we can relabel the “effect of price 0” to the “effect of no cost”. The effect for which the theoretical model cannot account (switching between chocolates, and thus the drop in demand for Lindt) happens only when prices change from 1&14 to 0&13. However when prices drop from 0&13 to -1&12 the demand for Lindt does not change and the additional Hershey’s buyers are not switching from Lindt, but switching from the “neither” option.

Thus, the results of the current experiment replicated the previous findings by showing that offers that did not require out of pocket expenses were viewed more favorably than predictable from the positive price condition. The results also showed that this effect was not unique to the price of 0 and that it applied to negative prices as well.

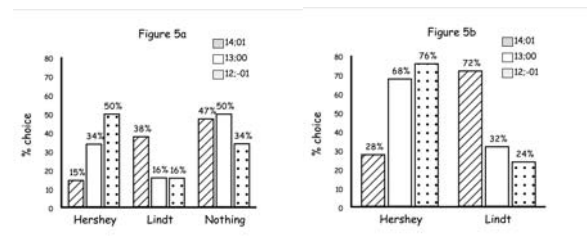


Figure 5: Results from the negative price experiment. Panel a including those who preferred not to get any chocolate and panel b without these participants.

Experiment 5: Halloween Experiment

The main goal of this experiment was to examine the "effect of no cost" outside of the domain of monetary transactions by asking respondents to trade candy for candy – under the assumption that it is simpler to map the utility of consumption of one type of chocolate into the utility of consumption of another type of chocolate. The prediction is that to the extent that the mapping explanation is correct, the effect of the “price of no cost” will not show up when trading off candy for candy. On the other hand, to the extent that the effect of the “price of no cost” will be present when trading off candy for candy, we would increase our confidence in the main hypothesis – namely that options that do not involve tradeoffs are viewed more favorably than their mere benefit cost difference would imply. Finally, the current experiment utilized experimental procedures with almost no difference in transaction costs across conditions.

Results. As can be seen in Figure 6 the results supported the tradeoff aversion hypothesis even when the tradeoffs did not involve money. In the condition where the small Snickers bar was free, the demand for it increased substantially [$t(31)=4.9$, $p<0.001$]. These results generalize the results of the "effect of no cost" in a few ways. First and foremost, they demonstrate that the attractiveness of the zero cost is not limited to monetary transactions. Second, the results hold when goods and exchange currency are commensurate – both being chocolate based candy. Third, while 1¢ prices are not very common in the marketplace, the choice of candy is more common and moreover it is particularly common in the context of getting Halloween candy and in trading them between friends and siblings later, adding ecological validity to the finding. Fourth, the results provide further support that the physical hassle involved in transactions (taking money out of one's wallet for example) cannot account for the results. Finally the results show that this effect also holds with kids.

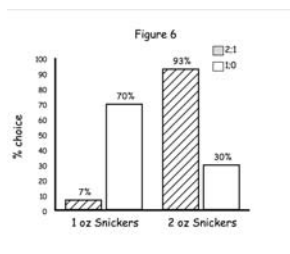


Figure 6: Results from the Halloween experiment

Experiment 6: Adult Chocolate Experiment

Since the distinction between the mapping and the tradeoff aversion theories is central to our understanding of this effect, it was important to replicate the basic structure of the experiments with adults to make sure it does not depend on the particular sample.

Results. As can be seen in Figure 7 the results replicated the Halloween experiment providing additional support to the tradeoff aversion hypothesis. In the condition where the small Snickers bar was free, the demand for it increased substantially [$t(92)=4.5$, $p<0.001$]. These results strengthen the results of the Halloween experiment showing that the no-cost effect holds in non monetary transactions, with commensurable goods, in simple standard choices, when there is no physical hassle involved in transacting, and with relatively smart young adults.

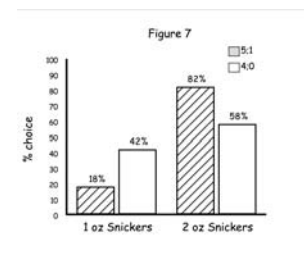


Figure 7: Results from the adult chocolate experiment

Conclusions

At a minimum, the evidence presented here illustrates a utility discontinuity at 0 price. A more bold interpretation would take these results as a perspective from which to view all transactions, and suggest that the effect of the price of 0 reflects the psychology of exchange more generally. Based on this perspective, we proposed two possible psychological theories: one based on the difficulty of mapping experiences onto money and the second based on aversion to tradeoffs. While we believe that both of these theories are likely to be valid, the current evidence points more clearly toward tradeoff aversion. If one were to take this interpretation seriously, this implies that as tradeoffs become more salient and more complex the likelihood of actions (such as purchasing) will be diminished. Moreover, this interpretation also implies that consumers, for whom almost all transactions involve costs, consistently under-buy in their day-to-day purchases, or alternatively, that occasionally when they have a chance to get stuff for free they are too eager to get something that they have no value for.

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