# Money. For nothing?

Do people pay to reduce their decision space when faced with too many options? An experimental approach.

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***Abstract***

Standard economic theory posits that having more choice is always better than having less. However, previous research shows that having too many options may lead to choice overload, lowering decision quality and even impairing it altogether. Through a set of economic experiments I examine whether subjects are willing to pay to reduce their decision space if faced with too many options. Three decision curtailing conditions are considered: i) reducing the choice set, ii) delegating the choice, iii) not choosing. Participants (N = 133) were randomly assigned to two treatments: i) large choice set, ii) small choice set. In each study subjects could pick between a series of abstract lotteries and a stochastically dominated choice curtailing option. The relative frequencies of this latter alternative is the core interest of the studies. I find a statistically significant effect of the size of the choice set on the decision to pay to forego decision rights, by randomizing the decision, *(N = 44, p = 0,045)*. Likewise, the size of the choice set significantly affects the decision to pay to opt out of the task *(N = 44, p = 0,031)*. On the contrary, the size of the set exerted no significant effect on the decision to pay to reduce it (*N = 45, p = 0,143*). This research contributes to the literature on decision-making by relating a market mechanism such as prices to counter choice overload. Moreover, these findings suggest and increased role for pricing strategies and product design, especially considering the increasing accuracy of machine learning prediction algorithms.

***Keywords:*** choice overload, experiments, paying not-to-choose, paying to-not-choose

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## 1. Introduction

– *All things in moderation, including moderation (Oscar Wilde)*

An ever growing amount of decisions rely on large choice sets from which one alternative must be favored. From simple inconsequential purchases to critical resolutions that can alter the very life on an individual or his loved ones. Increased choice is a key tenet of standard economic theory, as the optimum over a subset can never exceed the optimum over the original set (Besedeš, et. al., 2014). However, empirical evidence shows many violations of this precept (Scheibehenne, et. al., 2010 for a review). Choice overload surfaces when an increase in alternatives brings about negative consequences, it may cause individuals to take suboptimal decisions or even to not decide at all. One way of trampling choice overload is to simply reduce the set, although this has obvious concerns regarding personal freedom. Choice architecture that improves decision making while preserving freedom of choice has gained significant momentum in recent years with the literature on nudging (Thaler & Sunstein, 2009). However, most of the research on choice overload in both economics and psychology has dealt with how individuals can employ heuristics to overcome the effect of too many options and how firms can help them do it in the marketplace while ripping increased benefits.

This work adopts are rather novel approach by relating a market mechanism such as prices to counter the effect of too many options. Indeed, the core research question of this document is:

- *Are subjects willing to pay to reduce their decision space when faced with too many options?*

At first the proposal sounds counterintuitive. Indeed, if we understand that more choice is always good, no agent would decide to actively reduce the value of his expected utility. However, if utility is not a monotone increasing function of the decision space, then it is possible that subjects could actually pay to reduce it. This work addresses this question experimentally.

As three distinct angles regarding choice curtailing are considered (reducing the choice set, delegating the choice, not choosing) three distinct experimental studies are deployed. In each study subjects were randomly assigned to two treatments, one with a large choice set and one with a small one. All options in each set were abstract lotteries, except the last one. The last option allowed subjects to pay a sum and curtail their decision space by: i) reducing the choice set, ii) foregoing decision rights (randomizing the decision) or iii) not making any decision at all. Picking these options was always stochastically dominated by any of the gambles.

The results show that the size of the choice set exerts a statistically significant effect on the willingness to pay to curtail choice in both the randomization condition (pay not-to-

choose) and the exit study (pay to-not-choose). No evidence supports study 1, where subjects could pay to reduce their set to a smaller series of stochastic lotteries.

This research contributes to the current literature on choice overload by relating a market mechanism such as prices to counter the too-much-choice effect. The findings are of importance for theorists and practitioners alike. One the one hand, because they challenge some usual assumptions of standard economic theory. On the other hand, because they set the ground for an increased role of pricing strategies and product design in a wide array of industries, especially considering the ever increasing accuracy of machine learning prediction algorithms.

The remainder of the document is organized as follows. The next section reviews the pertinent literature on choice and choice overload and the chief antecedents that pertain to the main research question. Section 3 develops the research question, opening it into three distinct hypothesis (one per experimental setting). Sections 4, 5 and 6 present the experimental design, its limitations and the main results. In section 7 I discuss these results and put forth the main implications and further avenues of research. Finally, section 8 concludes.

## 2. Literature review

### *The benefits of choice*

Standard micro theory posits that having more choice is better than having less as it enhances the utility maximization process. Indeed, according to the revealed preference axioms choices indicate preferences (Mas-Collel & Whinston, 1995), so a larger set of options should allow for a better match to ones' predefined preferences. That is, having more options where to choose from increases the probability of an item optimally fitting the individual need (Dworkin, 1988). Not only a theoretical concept, research has found that individuals actually believe that a larger item set will increase the chance of finding the best fit (Kuksov & Villas-Boas, 2010; Diehl & Poynor, 2010).

As a rich line of psychological research shows, benefits of increased choice do not limit to utility maximization. For instance, in some studies even being able to make inconsequential choices increased happiness and satisfaction due to a feeling of increased control on one's fate (Cordova & Lepper, 1996; Dember, et. al., 1992). Active choice increases subjective evaluation of decision outcomes, heightens the sense of responsibility and bridges the gap between attitude and behavior (Guadango & Cialdini, 2010). In the same vein, having the capacity to choose boosts perceptions of self-determination and intrinsic motivation, which in turn increases the satisfaction with the decision outcome (Cordova & Lepper, 1996; Deci & Ryan, 2000). Moreover, literature on happiness finds a positive correlation between the freedom to choose and life satisfaction (Veenhoven, 2000).

Despite all its strengths, limitlessly expanding choice has some evident drawbacks. For instance, although larger item sets entail a higher attractiveness of options, they increase the difficulty of the choice (Iyengar & Lepper, 2000; Bollen, et. al., 2010). More importantly, picking from a larger set may drive a higher feeling of regret due to a higher number of "lost chances" (Beattie, et. al., 1994; Sarver, 2008). Also, psychological research has shown that contrary to rational choice theory, people do not always show stable, predefined preferences. Instead, usually preferences are constructed during the decision process and thus, are prone to be influenced by contextual factors (Payne, et. al., 1993).

In the next sections we discuss the choice overload hypothesis and the decision paralysis hypothesis which are central to this work. Further, we will set the ground for the discussion of whether market mechanisms (i.e. prices) may address the usual violations of regularity observed across may studies on decision making.

### *Choice overload*

Recently the concept of choice overload has gained ground in research in economics and psychology, especially after Barry Schwartz popularized the term in his 2004 book "The Paradox of Choice". Also known as the too-much-choice effect it can be defined as the negative consequences (i.e. dissatisfaction, regret, disappointment, decreased motivation, decreased consumption, etc.) which arise from an excessive increase in the number of options (Huberman, et. al., 2007; Iyengar & Lepper, 2000).

One seminal and frequently cited work in this domain is the jam study (Iyengar & Lepper, 2000). In this experiment two booths containing 6 and 24 varieties of jam where set up in an upscale grocery store. The authors found that while people preferred the larger set of jams (as they found it more attractive) they barely purchased any afterwards, overwhelmed by the extensive set. The opposite occurred with the narrow six flavor set. In addition, these authors found similar evidence in a study with chocolates, where subjects faced with too many attractive options lost motivation to choose any of them. Many other researchers found similar results in choices among gift boxes (Reutskaja & Hogarth, 2009), pens (Shah & Wolford 2007), coffee (Mogilner et. al., 2008) and even pension plans (Huberman, et. al., 2007).

Naturally, as in principle this idea contradicts standard theory in economics many studies have set to test if choice overload actually exists. A meta-study which analyzed fifty studies on the subject found no consistent evidence of choice overload. Nonetheless, a significant variance was found amongst studies, prompting the authors to investigate possible moderators of choice overload. The findings show that the preconditions under which choice overload occur are: i) information overload, ii) time constraints, iii) attractiveness of the foregone options and iv) categorization of the items. However, none of these moderators is sufficient in itself to encounter the too-much-choice effect (Scheibehenne, et. al., 2009).

A deeper review of the studies where instances of choice overload are found sheds light on some of its pernicious effects. Firstly, a larger choice set is found to bring about more regret after the choice is undertaken. Some authors suggest that it is optimal for subjects to actively limit the choice set when the ex-post valuation of the election is expected to differ from the expected value (Sarver, 2008). Likewise, choices made from extensive sets or from an extensive search of all possible sets correlate with a decrease in the experienced utility. This finding was confirmed amid many domains such as non-durable and durable consumer goods, savings plans and job seeking (Botti & Iyengar, 2006). In turn, the complexity of decisions is found to be a detriment to experienced well-being, to increase procrastination in decision making and even to cause subjects to fail to make a choice at all (Schwartz, 2004). This is mostly caused by information overload, as a larger number of choices may raise the cognitive costs of evaluating the options so much as to even impair rational decision making (Huffman & Khan, 1998). Larger item sets also induce higher expectations on the final outcome and an overestimation of the degree of preference matching (Diehl & Poynor, 2010).

The increasing availability of data allows for the emergence of even larger and more personalized choice sets, highlighting the aforementioned issues on choice overload. However, even without large choice sets another bias on decision making may arise due to the complexity and/or long-term effects of choices. In such stances individuals may choose a default option without thorough evaluation of all possible outcomes (*statu quo* bias) or even fail to make a choice at all (decision paralysis). In the next lines we will review recent findings on the latter issue as it is also central to this work.

### *Decision paralysis, heuristics and large choice sets*

Complex choices with uncertain outcomes are usually scrutinized in decision theory and many studies have found instances of non-optimal behavior in savings (Thaler & Benartzi, 2004), retirement plans (Munnel & Quimby, 2009), insurance (Krieger & Felder, 2013), financial planning (Lusardi & Mitchell, 2011), dieting (Ehmke, et. al., 2008), schooling (Moore, et. al., 2007), etcetera. When faced with this type of decisions subjects may not understand the full extent of the possible outcomes and fail to make a decision. For instance, an empirical study on 401 (k) plans shows that participation rates dropped significantly as the number of options increased (Huberman, et. al., 2007). Likewise, several studies have shown a significant effect of increased choice sets on the delay or cancellation of purchase decisions (Scheibehenne, et. al., 2010).

Additionally, when complex decisions have to be derived from a large choice set, subjects show stronger preference for simpler options and restore to an array of simplifying heuristics in order to choose. Indeed, a study on savings plans shows that as the number of possible allocations increases, the amount destined to simpler funds (money market and bonds) raises significantly. Thus, individuals are veered away from the optimum. Two randomized controlled experiments confirm these findings (Iyengar & Kamenica, 2008). Similar results are encountered in other complex, infrequent settings such as health insurance selection (Heiss, et. al., 2013) and voting (Augenblick & Nicholson, 2015).

### *Paying to reduce choices*

As was set forth previously, large choice sets may bring about many undesirable consequences. One approach that could be followed to deal with this issue is to exogenously reduce the choice set. Naturally, this can raise some ethical concerns over paternalism and the inability of some individuals to actually maximize their preference matching (Besedeš, et. al., 2014). Recently, the tradition of "libertarian paternalism" (Thaler & Sunstein, 2003) has suggested that through the adequate choice architecture, decision makers can be aided with a reduced set while all the options are still available. For example, by presenting additional options only if requested by subjects (Huberman, et. al., 2007), by setting defaults for the more complicated parts of health insurance schemes (Abaluck & Guber, 2009) or by displaying only a subset of pension plans to the less experienced investors (Agnew & Szykman, 2005). These approaches assume that only the right people will actually expand the set (i.e. the ones for which the decision

quality will improve). So, preferences over set sizes and performance under each set size need to correspond (Besedeš, et. al., 2014).

This paper builds upon these issues but considers a different approach. In particular, whether subjects faced with an increased, large choice set would be willing to forego part of their expected earnings in order to reduce the choice set. Simply put, if people would be willing to pay to be able to choose from a simpler, smaller choice set. As mentioned before, a line of research in psychology suggests that it may be optimal for people to actively limit the choice set to avoid regret (Sarver, 2008). Moreover, studies in consumer behavior find that there are a finite number of options that maximize the probability of choosing (Kuksov & Villas-Boas, 2006).

To the best of my knowledge no studies have focused on whether people would actively pay to reduce a choice set. At first the proposal sounds counterintuitive. Indeed, if we understand that more choice is always good, no agent would decide to actively reduce the value of his expected utility. However, if utility is not a monotone increasing function of the number of choices, then it is possible that subjects could actually pay to have the set reduced. Most of the previous studies on active choice limitation have focused on avoidance behavior (i.e. ex-ante reducing the possibility of ever choosing from a larger set). An analogy with an everyday choice would be dining in the restaurant with the shortest menu. However, we could argue that customers still would enjoy a full-service restaurant and decide to pay a higher price for specials or for the recommendation of the waiter to order just from a small set of dishes. Henceforth, it can be the case that people do willingly decide to pay in order to reduce their decision space. This work will intend to address this question experimentally.

### *Paying not to choose and paying to not choose*

Choosing not to choose is, paradoxically, a choice in itself. But as it separates the recipient of the outcome from the decision-maker it is also a very special type of choice. Special care should be taken to clarify the difference between choosing not to choose and not choosing at all. When one chooses not to choose one is implicitly picking someone else to choose on one's behalf and may be indeed willing to pay for it. Instead, in other occasions people may have a preference not to make any active decision at all and would say so if asked. The latter involves "not choosing" and may be explained by a wide array of phenomena such as procrastination, fear of mistake, lack of time, lack of information (Coupé & Noury, 2004), avoiding responsibility (Dwenger, et. al., 2014), avoiding regret (Thaler, 1980), retaining the value of the option (Sunstein, 2015), etcetera. In this sense, and contrary to the usual assumptions, the requirement of an active choice is a form of non-libertarian paternalism as it obliges someone who does not want to choose to do so (*ibid*).

The decision to pay to delegate choices has been widely analyzed in organizations (Gibbons & Roberts, 2013 chapters 2, 10 & 28 for a review). However, studies on whether people would pay to have others choose for them on a decision that only

affects themselves are scarce. Indeed, most studies on delegation of decision rights in individual settings focus on decisions that affect at least one more subject besides the decision maker (Fehr, et.al, 2010; Bartling & Fischbacher, 2012; Chang, et. al., 2014). However, in everyday life people usually implicitly delegate choices in family and friends and are presumably better off. Furthermore, even if still not completely feasible, one could imagine a situation where an automated planner knows exactly what one wants (Bensinger, 2014 in press) and undertakes decision-making on one's behalf. Naturally, such a situation would be theoretically desirable as it eliminates decision costs (Sunstein, 2015). This work intends to address these issues and understand if due to complexity or disinterest people would be willing to pay to have their decision rights removed.

Vast arrays of situations actually show that many relevant decisions in all domains are "taken for us" and go unnoticed because of their ubiquitousness (e.g. making air clean, finding shelter, etc.). This actually frees time to spend time on other more important matters and is of course a desired situation (Mullainathan & Shafir, 2013 chapter 2). Hence, active choosing for every single thing one does impose a high burden on decision-makers. Thus, if active choosers want to avoid certain choices, whether it is not to err, to reduce decision fatigue, because of lack of information or any other matter we can devise a situation in which they would even pay to avoid the very decision process. This would also entail an avoidance of the possible outcome, even if it would be beneficial. A relevant antecedent for this matter is a study on gambles where subjects violated stochastic dominance by choosing to randomize their decision instead of taking it themselves. An empirical analysis of university applications confirmed the findings (Dwenger, et. al., 2014). Moreover, evidence on avoidance behavior in pro-social games was found when subjects decided to exit a dictator game foregoing part of the expected earnings just not to make the decision, even when punishment was impossible (Dana, et. al., 2005). Nonetheless, to the best of my knowledge there are no further works on whether people would be willing to pay to avoid choosing at all. That will be the last issue addressed by this work.

## 3. Hypothesis development

As put forth previously, this document will enquire if individuals are willing to pay to actively reduce their decision space when facing too many options. As three distinct situations can be devised regarding choice curtailing (reducing the choice set, delegating the choice, not choosing) three distinct hypotheses will be tested.

However, all of them are inputs of the main research question.

- **Research Question → Are subjects willing to pay to reduce their decision space when faced with too many options?**

Economic theory posits that more choice enhances preference matching. Thus, an increase in the choice set can never make a rational agent worse off. However, there is overwhelming evidence that this tenet of standard economic theory many times fails to predict observed behavior (Scheibehenne, et. al., 2010). Instead, individuals tend to exhibit choice overload and decision fatigue and may find it optimal to actively reduce the set from where they can choose even if the optimal choice is surrendered in the process. The first hypothesis in this document is based on this issue and will address whether individuals are willing to pay to reduce the size of a choice set before taking a decision. A rejection of Hypothesis 1 would imply that individuals voluntarily forego expected earnings when the choice burden is enlarged. The latter which is naturally a violation of regularity is consistent with the "satisficing" behavior described in the psychology literature (Schwartz, 2000; 2004).

- **Hypothesis 1 → Subjects are not willing to pay to reduce their choice set when faced with too many options**

Decisions can be complex, uninteresting or both, as infinite anecdotal evidence on healthcare and financial planning shows. In any case subjects still have to make a decision. Moreover, even the most trivial of choices entails some sense of responsibility on the part of the decision maker. In such a setting one could imagine that subjects could favor the delegation of such decision rights onto other people. This actually happens frequently in family or friendship. However, it is not immediate that one would be willing to forego expected earnings to relinquish decision rights. The second hypothesis is defined to assess whether subjects would be willing to pay to delegate decision rights (i.e. paying not to choose). I hypothesize that the perceived complexity of the choice set is the key determinant for this kind of behavior. As a matter of fact, a rejection of Hypothesis 2 would prove this point.

- **Hypothesis 2 → Subjects are not willing to pay to forego their decision rights when faced with too many options**

Choosing to not choose is not an oxymoron but a valid option that decision makers have for many simple and complex issues. So relevant is this option that it is sometimes prosecuted (as in mandatory voting or healthcare). Many reasons reviewed previously

explain why one may decide to make no decision at all. The third hypothesis in this document aims to understand whether subjects would be willing to pay to avoid the decision process, even when the expected outcomes are all undoubtedly beneficial. As in the previous cases the *leitmotif* is that a larger, more complex choice set over a rather abstract framing may induce subjects to just veer away from the choice.

- **Hypothesis 3 → Subjects are not willing to pay to avoid making a choice when faced with too many options**

## 4. Experimental design

I study the relation between the willingness of subjects to pay to reduce their decision space and the size of the choice set. To do so three distinct experimental settings will be deployed, these coincide with the three hypotheses previously raised.

First I will present the main methodological issues that are transversal to the three studies. Afterwards, each design will be considered independently. Finally, the main limitations of the design are discussed.

### Main design features

#### *General overview*

Subjects will be approached by e-mail and social media with a link to answer a five minute online questionnaire on their views of simple community issues (cycleways and parks). Instructions will state that upon completion of the task three subjects will be randomly selected and fully paid the amount earned after the questionnaire is finished.

Once the questionnaire is completed, subjects are thanked and informed that they will be paid. Payment will consist of € 10 minus the result of a gamble. This gamble will be drawn from a set of options presented to the individual and is the only choice of interest for these experiments. One of the options in each set is an "avoiding" option in which subjects can forego a part of their earnings to: i) reduce their choice set; ii) randomize the decision or iii) not decide at all. Hence, each experiment addresses one of the aforementioned hypotheses in a one factor, between-subjects design in which each individual will be randomly assigned to one of two experimental treatments: large choice set or small choice set. Hence, as there are three hypotheses to study there will be in total six treatments.

| Study | Hypothesis | Large Set | Small Set |
|---|---|---|---|
| **1** | Subjects pay to reduce the set | $X_1$ | $X_2$ |
| **2** | Subjects pay to randomize the decision | $X_3$ | $X_4$ |
| **3** | Subjects pay to opt out of the choice | $X_5$ | $X_6$ |

$X_i$ is the proportion (%) of subjects in each treatment choosing the "avoiding" option.

After the choice is made, subjects are thanked once more and the questionnaire ends. For the randomly selected subjects their actual choice will be considered for full payment. Those who are not picked will receive no further communication.

#### *Initial questionnaire*

The use of an unrelated questionnaire that masks the true nature of the experiment is not meant as a deception mechanism, but to prevent subjects from overthinking the task. Moreover, it is a way to make a seamless transition to the choice task, in the understanding that directly presenting the task would make the design look rather

clumsy. Nonetheless, one issue that arises when preceding the focal task with an unrelated filler task is that subjects may be primed and hence their behavior in the focal task is muddled by the previous one.

Priming occurs when stimuli unrelated with the decision task (and which does not affect the monetary outcome) significantly alters subjects' behavior (Horton, et. al., 2011). Priming in decision tasks has been widely documented (e.g. Chartrand et. al., 2008 or Benjamin et. al., 2010) but in most cases of significant priming a direct link can be made between the activator and the decision. In the same vein, research in psychology shows that the moderating link between filler tasks and focal tasks is weak (Jamieson & Harkins, 2010). Since in this study the task is ostensibly unrelated and the decision task is abstract and context free I understand that priming should not be a significant confound for the experiment and hence opted for the aforementioned design.

### *Random Lottery Incentive*

One of the main benefits of economic experiments over other types of analysis is to be able to control subjects' preferences in order to understand what motivates certain behaviors. To do so subjects must be aptly incentivized. Rewarding subjects with an adequate monetary payment complies with Vernon Smith's sufficient conditions for a controlled economic experiment[1] (Smith, 1982). Hence, a small, but sufficient amount of money would allow capturing subjects' real motivation for the choices they make. However, as will be discussed in the following section, budgetary constraints do not allow for a full payment of all participants.

Against this background, a between-subjects random lottery incentive will be deployed as an alternative approach that still intends to keep control over preferences. In a between-subjects random lottery incentive a subset of three subjects are selected for full payment. Even when the total probabilities of obtaining a payoff are reduced, as subjects usually tend to overweight small probabilities the mechanism would prove equally useful to extract subjects' real preferences (Baltussen, et. al., 2011).

### *Optimal assignment of subjects to treatments*

Subjects for each of the six treatments will be approached by e-mail or social media and randomly assigned to one of six experimental conditions. The nature of the task makes self-selection to each treatment rather difficult to occur as subjects rarely can identify the nature of the task by the masking questionnaire. Nevertheless, as the questionnaire will be unmonitored (and it is clear from the beginning that it will deal with cycling and communal issues) a risk exists that subjects may self-select themselves to answer the questionnaire altogether. It must be noted that random assignment gets rid of selection

[1] The three sufficient conditions for a controlled economic experiment without interaction (as these ones) are: non-satiation (utility is a monotone increasing function of the reward); saliency (rewards are increasing in the good outcomes) and dominance (the reward structure dominates any cognitive costs). Money as a means of reward meets all these terms.

bias (Angrist & Pischke, 2009), so a series of demographics at the end of the task will assess the adequacy of the randomization.

Six different pools of participants will be allotted to each of the six treatments (between-subjects design) in order to prevent learning effects, which due to the simplicity of the design can have drastic effects over the final results. The required sample size was calculated with G*Power (Faul, et. al., 2009). The two-tailed *Fisher Exact* specification[2] was defined with an effect size ($\delta$) of 0.45. The Type I error ($\alpha$) and the power of the test ($1 - \beta$) are set to the usual values of 0.05 and 0.8, respectively. To calculate the allocation ratio I conservatively considered the expected values of the payments under a scenario in which every subject in both treatments plays the gamble (i.e. € 5.15 for both samples). Intuition points out to a higher variance in the large choice set treatment(s). In addition, previous research on choice overload also finds more dispersion (about 25% higher) in larger sets (Besedeš, et. al., 2014). Hence, following guidelines for optimal sample arrangements for dichotomous variables with binary outcomes (List, et. al., 2011) assuming a mean outcome ratio ($p_1/p_2$) of 1.25, the allocation ratio ($n_2/n_1$) is set to 0.8. This settings convey a total sample size of 45 individuals per study, with 25 allocated to treatment 1 (large choice set) and 20 to treatment 2 (small choice set). Consequently, for the three studies I will require approximately 135 subjects.

### *Abstract framing*

Real life choices seldom present the abstract, objective nature of the lotteries used in these studies. Nonetheless, adding realism to the analysis would come at the cost of an increased chance of bias in the results. Indeed, each subject may bring his own idiosyncratic preferences to the experiment and these contextual factors would then influence the observed choices.

Against this background, the choice sets considered to test all three hypotheses will consist of a series of abstract lotteries. These lotteries will be structured in a way that choices can be ranked objectively (i.e. independent of idiosyncratic preferences). Hence, we can analyze the decisions without fear of confounding with each subjects' subjective beliefs. This is an advantage of the lab over the field, because in many domains examining optimal choices requires strong assumptions over the nature of preferences (Heiss, et. al., 2013; Iyengar & Kamenica, 2008).

### *Utility maximization*

Every lottery in each treatment in all of the three studies has the same expected value: € 4.85. Hence, in all cases subjects that participate in the task have the same expected payoff: € 5.15 (comprised of the € 10 show up fee minus the gamble). Nonetheless, depending on the options chosen actual payoffs may range between € 0.05 and € 10 (€ 9.95 and € 0.00 are the highest and lowest values found in the payoff matrices, respectively).

[2] Further discussion on the Fisher Exact test in section 6

When a subjects enters an "avoiding" option she foregoes € 0.15 in expected earnings and automatically her expected payoff shrinks to € 5. Hence, in studies 1 and 2 if subjects satisfy expected utility the "avoiding" option will leave them worse off irrespective of their risk preferences (Machina, 1989). Indeed, if utility is a monotone increasing function of money and probabilities are objective, any reduction in the amount of expected reward would reduce expected utility (i.e. any of the gambles *per-se* stochastically dominates the "avoiding option"). However, the experiment's layout does not generate such straightforward conclusions if subjects satisfy other utility maximization processes (such as rank dependent utility or prospect theory). In the case of study 3, risk preferences may play a role in the decision to opt-out of the task. Indeed, as subjects will anyhow receive compensation, the utility of this show-up fee (certainty equivalent) may be higher than the expected utility of the payoff. Further discussions are presented in the next section.

## Study 1 – Paying to reduce choices

| Study | Hypothesis | Large Set | Small Set |
|---|---|---|---|
| **1** | Subjects pay to reduce the set | $X_1$ | $X_2$ |

$X_i$ is the proportion (%) of subjects in each treatment choosing the "avoiding" option.

After finishing the initial questionnaire, individuals will be thanked and presented with their payoff. In this study, participants will be offered a set of gambles and will be mandated to pick one. In each option there are six possible outcomes, and the final outcome is selected by the toss of a fair die. Final compensation will equal the € 10 show up fee minus the result of the gamble[3]. The last box in the list is not a gamble but an option to forego € 0.15 (from the expected payoff) and have the set reduced to a smaller subset of gambles. It is clear from the wording of the task that the fifteen cents are a cost for the individual and will undoubtedly reduce his expected gains (i.e. the word *"pay"* is used).

Subjects are randomized into two treatments. In the large set treatment seventeen gambles plus the option to reduce the choice set to three options are shown. In the small set treatment three gambles plus the option to reduce the set to only one gamble are presented (see figures 1 & 2 in the next page). If the size of the choice set is an actual driver of the decision to pay to reduce it, then the difference between the proportions of "avoiding" options (i.e. the $X_1$ and $X_2$) should be statistically significant.

[3] For example if the subjects picks gamble 1 and the die falls on 1 the subject receives € 10 minus € 3.55; if it falls on 2 she receives € 10 minus € 6.25 and so on and so forth

| OP |  |  |  |  |  |  |
|---|---|---|---|---|---|---|
| 1 | $3.55 | $6.25 | $2.45 | $7.15 | $4.65 | $5.05 |
| 2 | $0.05 | $0.75 | $4.45 | $5.50 | $8.65 | $9.70 |
| 3 | $1.00 | $2.20 | $6.80 | $8.50 | $5.85 | $4.75 |
| 4 | $1.00 | $7.60 | $0.75 | $6.50 | $6.40 | $6.85 |
| 5 | $8.20 | $0.00 | $2.25 | $9.75 | $0.05 | $8.85 |
| 6 | $0.50 | $3.45 | $1.55 | $9.75 | $7.35 | $6.50 |
| 7 | $2.50 | $3.45 | $9.75 | $1.85 | $9.95 | $1.60 |
| 8 | $8.70 | $3.35 | $2.50 | $8.55 | $0.05 | $5.95 |
| 9 | $2.50 | $3.35 | $4.65 | $8.35 | $7.75 | $2.50 |
| 10 | $4.35 | $5.20 | $8.75 | $8.80 | $0.75 | $1.25 |
| 11 | $2.00 | $3.75 | $3.85 | $9.25 | $7.95 | $2.30 |
| 12 | $4.60 | $4.90 | $8.75 | $8.85 | $0.75 | $1.25 |
| 13 | $4.15 | $3.85 | $8.15 | $1.05 | $2.65 | $9.25 |
| 14 | $1.75 | $8.55 | $2.85 | $2.05 | $6.95 | $6.95 |
| 15 | $9.35 | $6.45 | $2.60 | $3.35 | $0.00 | $7.35 |
| 16 | $0.75 | $9.35 | $8.75 | $7.25 | $1.25 | $1.75 |
| 17 | $1.40 | $5.55 | $6.55 | $3.95 | $4.55 | $7.10 |
| 18 | Pay $0.15 and choose from a smaller set of three options* | | | | | |

* These options include the one where you can win the most, lose the less or mostly reduce the variability of the final outcome.

Figure 1: Study 1: Treatment 1 – large choice set

| OP |  |  |  |  |  |  |
|---|---|---|---|---|---|---|
| 1 | $3.55 | $6.25 | $2.45 | $7.15 | $4.65 | $5.05 |
| 2 | $9.35 | $6.45 | $2.60 | $3.35 | $0.00 | $7.35 |
| 3 | $1.40 | $5.55 | $6.55 | $3.95 | $4.55 | $7.10 |
| 4 | Pay $0.15 and choose from a smaller set of one option* | | | | | |

* This option includes the one where you can mostly reduce the variability of the final outcome.

Figure 2: Study 1: Treatment 2 – small choice set

One sensible issue regarding this study is which options are included in the subset. One could argue that the remaining options should be randomly determined, because any hint towards their nature could affect the subjects' risk attitudes. On the other hand, subjects already skeptic towards the task may feel that the "avoiding" options is a deception device and may overly react against it.

Since I assume that subjects satisfy expected utility, risk preferences should not play a role in the decision and thus hints will be offered as to the nature of the potential set. In the large set treatment, subjects will be offered to pay € 0.15 to be able to choose from a subset of three gambles containing the one with the lowest variance, the one that leaves the highest possible payoff and the one that minimizes losses. In the small set treatment, the lowest variance option will be offered for € 0.15.

## Study 2 – Paying not to choose

| Study | Hypothesis | Large Set | Small Set |
|---|---|---|---|
| **2** | Subjects pay to randomize the decision | $X_3$ | $X_4$ |

$X_i$ is the proportion (%) of subjects in each treatment choosing the "avoiding" option.

In this study, participants will again be offered a set of gambles and required to pick one. The first options are the same as in the first study (i.e. a series of gambles with an equal, 1/6 chance of obtaining each outcome). Final compensation will equal the € 10 show up fee minus the result of the gamble.

The shift introduced is that the last box in the list presents an option to forego € 0.15 (from the expected payoff) and have the choice selected at random. Hence, when the subject picks this option she decides to forego her decision rights and accept the outcome imposed by an external decision-maker. In this design, the external party is a context free random assignment, where each gamble has an equal (1/17) probability of being selected. The appeal of this mechanism is that we can rule out confounds such as trust or esteem towards the decision-maker which normally play a role in the choice to forego decision rights[4]. Finally, it is clear from the wording of the task that the fifteen cents are a cost for the individual and will undoubtedly reduce his expected gains (i.e. the word *"pay"* is used).

Subjects are randomized into two treatments. In the large set treatment seventeen gambles plus the option to randomize the choice set are shown. In the small set treatment three gambles plus the randomization option are presented (see figures 3 & 4 in the next page). If the size of the choice set is an actual driver of the decision to pay to forego decision rights, then the difference between the proportions of "avoiding" options (i.e. the $X_3$ and $X_4$) should be statistically significant.

[4] However, regret avoidance and/or responsibility aversion may be playing a part in this decision and will be discussed later in this document.

| OP |  |  |  |  |  |  |
|---|---|---|---|---|---|---|
| 1 | $3.55 | $6.25 | $2.45 | $7.15 | $4.65 | $5.05 |
| 2 | $0.05 | $0.75 | $4.45 | $5.50 | $8.65 | $9.70 |
| 3 | $1.00 | $2.20 | $6.80 | $8.50 | $5.85 | $4.75 |
| 4 | $1.00 | $7.60 | $0.75 | $6.50 | $6.40 | $6.85 |
| 5 | $8.20 | $0.00 | $2.25 | $9.75 | $0.05 | $8.85 |
| 6 | $0.50 | $3.45 | $1.55 | $9.75 | $7.35 | $6.50 |
| 7 | $2.50 | $3.45 | $9.75 | $1.85 | $9.95 | $1.60 |
| 8 | $8.70 | $3.35 | $2.50 | $8.55 | $0.05 | $5.95 |
| 9 | $2.50 | $3.35 | $4.65 | $8.35 | $7.75 | $2.50 |
| 10 | $4.35 | $5.20 | $8.75 | $8.80 | $0.75 | $1.25 |
| 11 | $2.00 | $3.75 | $3.85 | $9.25 | $7.95 | $2.30 |
| 12 | $4.60 | $4.90 | $8.75 | $8.85 | $0.75 | $1.25 |
| 13 | $4.15 | $3.85 | $8.15 | $1.05 | $2.65 | $9.25 |
| 14 | $1.75 | $8.55 | $2.85 | $2.05 | $6.95 | $6.95 |
| 15 | $9.35 | $6.45 | $2.60 | $3.35 | $0.00 | $7.35 |
| 16 | $0.75 | $9.35 | $8.75 | $7.25 | $1.25 | $1.75 |
| 17 | $1.40 | $5.55 | $6.55 | $3.95 | $4.55 | $7.10 |
| 18 | Pay $0.15 and one option will be randomly selected for you | | | | | |

Figure 3: Study 2: Treatment 1 – large choice set

| OP |  |  |  |  |  |  |
|---|---|---|---|---|---|---|
| 1 | $3.55 | $6.25 | $2.45 | $7.15 | $4.65 | $5.05 |
| 2 | $9.35 | $6.45 | $2.60 | $3.35 | $0.00 | $7.35 |
| 3 | $1.40 | $5.55 | $6.55 | $3.95 | $4.55 | $7.10 |
| 4 | Pay $0.15 and one option will be randomly selected for you | | | | | |

Figure 4: Study 2: Treatment 2 – small choice set

## Study 3 – Paying to not choose

| Study | Hypothesis | Large Set | Small Set |
|---|---|---|---|
| **3** | Subjects pay to opt out of the choice | $X_5$ | $X_6$ |

$X_i$ is the proportion (%) of subjects in each treatment choosing the "avoiding" option.

Participants will be offered a set of gambles and required to choose one. Again, the first options are the habitual (i.e. a series of lotteries with 1/6 chance of obtaining each outcome). Final compensation will equal the € 10 show up fee minus the result of the gamble.

In this third case, the last box in the list will present an option to take € 5 and terminate the task immediately (i.e. not pick any of the gambles). Thus, when a subject chooses this option she decides to avoid making a decision altogether. As in all previous cases, the expected value of the loss for the subject that picks the final option is € 0.15 (recall that the expected value of each gamble is € 4.85). However in this case, it is not obvious

for the subject that there is a cost for choosing this option. Hence, as the last option is not framed as a loss there may be differences in the cognitive processes that drive the decision in this latter study. Nonetheless, I understand that this framing is preferable as it does not hint the actual expected value to the subject.

Again, subjects are randomized into two treatments. In the large set treatment seventeen gambles plus the option to exit the game are shown. In the small set treatment three gambles plus the opt-out box are presented (see figures 5 & 6). If the size of the choice set is an actual driver of the decision to pay to avoid making a choice, then the difference between the proportions of "avoiding" options (i.e. the $X_5$ and $X_6$) should be statistically significant.

| **OP** |  |  |  |  |  |  |
|---|---|---|---|---|---|---|
| 1 | $3.55 | $6.25 | $2.45 | $7.15 | $4.65 | $5.05 |
| 2 | $0.05 | $0.75 | $4.45 | $5.50 | $8.65 | $9.70 |
| 3 | $1.00 | $2.20 | $6.80 | $8.50 | $5.85 | $4.75 |
| 4 | $1.00 | $7.60 | $0.75 | $6.50 | $6.40 | $6.85 |
| 5 | $8.20 | $0.00 | $2.25 | $9.75 | $0.05 | $8.85 |
| 6 | $0.50 | $3.45 | $1.55 | $9.75 | $7.35 | $6.50 |
| 7 | $2.50 | $3.45 | $9.75 | $1.85 | $9.95 | $1.60 |
| 8 | $8.70 | $3.35 | $2.50 | $8.55 | $0.05 | $5.95 |
| 9 | $2.50 | $3.35 | $4.65 | $8.35 | $7.75 | $2.50 |
| 10 | $4.35 | $5.20 | $8.75 | $8.80 | $0.75 | $1.25 |
| 11 | $2.00 | $3.75 | $3.85 | $9.25 | $7.95 | $2.30 |
| 12 | $4.60 | $4.90 | $8.75 | $8.85 | $0.75 | $1.25 |
| 13 | $4.15 | $3.85 | $8.15 | $1.05 | $2.65 | $9.25 |
| 14 | $1.75 | $8.55 | $2.85 | $2.05 | $6.95 | $6.95 |
| 15 | $9.35 | $6.45 | $2.60 | $3.35 | $0.00 | $7.35 |
| 16 | $0.75 | $9.35 | $8.75 | $7.25 | $1.25 | $1.75 |
| 17 | $1.40 | $5.55 | $6.55 | $3.95 | $4.55 | $7.10 |
| 18 | Take $5 and not pick any of the gambles. | | | | | |

Figure 5: Study 3: Treatment 1 – large choice set

| **OP** |  |  |  |  |  |  |
|---|---|---|---|---|---|---|
| 1 | $3.55 | $6.25 | $2.45 | $7.15 | $4.65 | $5.05 |
| 2 | $9.35 | $6.45 | $2.60 | $3.35 | $0.00 | $7.35 |
| 3 | $1.40 | $5.55 | $6.55 | $3.95 | $4.55 | $7.10 |
| 4 | Take $5 and not pick any of the gambles. | | | | | |

Figure 6: Study 3: Treatment 2 – small choice set

## 5. Limitations

There are two distinct types of weaknesses in the experimental set up presented in the previous section. On the one hand, limitations that originate in the budgetary constraints. On the other hand, those drawbacks that arise from the design itself. Both limitations will be addressed sequentially.

### Budgetary constraint

#### *Incentives*

As discussed in the previous section, monetary incentives are chief to control subjects' preferences. Even considering that people tend to overestimate small probabilities, the random lottery incentive makes the actual attainment of the payoff quite remote. Hence, the expected value of the payoff for one particular individual shrinks to just under fifteen euro cents. This may hamper dominance, as the subjective cognitive efforts required to perform the task may not be dominated by the reward structure. The issue, however, would be easily resolved just by expanding the budget.

#### *Online distribution and subject pool*

The experiment will be carried out through an internet questionnaire. Hence, it will be unmonitored. Although this may have a silver lining as subjects may feel more anonymous than in a traditional laboratory setting, benefits are surely shadowed by the loss of control over subjects. Indeed, one of the most desirable features of the lab is to be able to remove confounding factors in order to better capture causal effects. Since, subjects will be left alone to complete the task many unrelated factors may muddle the analysis and so a greater care must be taken when interpreting results. As before, the issue would be fixed by conducting the experiment in an actual laboratory.

On a similar token, a critique can be made regarding the nature of the subject pool. Indeed, participants approached by email or social medial will presumably have certain bonds to the experimenter. Instead, the distance in the lab is larger and we can easily rule out confounding factors related to affect.

Finally, the choice task is designed with the "avoiding" option in the last box. Although this should not be an issue in a lab setting where the whole task appears in the screen, it may mistake those participants that answer the questionnaire on a mobile device. To solve this issue a reminder of the total number of options is included in the instructions, so the subjects know that they have to keep on scrolling.

## Design

### *Utility maximization*

Every gamble has the same expected value: € 4.85. Thus, if subjects objectively value probabilities, every gamble stochastically dominates the "avoiding option". However, if subjects satisfy rank dependent utility they may have different probability weighting functions and then the decision to pay may have a "rational foundation" and not necessarily reduce the subjects' utility. For instance, a pessimist may be exceedingly inclined to go for the "avoiding option". Moreover, in study 3 as the avoiding option is a certain value, risk averse individuals could anyhow prefer this option even when satisfying expected utility. Although this is not the central interest of this document (as I only attain to find if people would pay to reduce decision space) it is important when considering the implications of the results.

Similarly, if subjects satisfy cumulative prospect theory the framing of the task may induce subjects to understand options as losses (exacerbating loss aversion) from a reference point of € 10 and we could see different results from those that would arise from replicating the study but framing the gambles as gains from a reference point of € 0 (indeed, some subjects may interpret study 3 – where you can take € 5 for sure – as this latter case).

### *Saliency of the "avoiding" option*

One important issue when faced with a costly reduction of one ones choice set is whether the new, smaller set will be attractive enough to match ones preference. In study 1 the dilemma is resolved by aiding the decision-maker with the characteristics of the smaller set (to avoid a "one bitten, twice shy" effect). However, if subjects do not satisfy expected utility doing this may alter their risk attitudes and thus muddle the results. For example, if subjects feel that the hints somehow increase the chance of a better outcome and they are optimistic they will exceedingly favor the "avoiding" option.

### *Participants*

Ideally, the computerized experiments should be conducted in a traditional laboratory setting where each subject is sit at an individual terminal. Participants would then be drawn from the usual shortlists of student volunteers. Picking students for the subject pool may raise some concerns regarding the external validity of the results. However, considering the nature of the tasks at hand there is no apparent need to restore to any specific subject pool, as this type of decisions are transversal to all economic agents. In any case, a point can be made in the sense that students tend to outperform other individuals in these types of tasks (Levitt & List, 2007) and thus would be more apt to play the gambles. However, I understand that the parallelism precept holds well in this design and that the results should be reasonably generalizable.

## 6. Data and analysis

The experiment was hosted through a Qualtrics.com survey, distributed online via email and social media from June 22nd 2015 until June 29th 2015. In total 157 surveys were started and 133 surveys were completed (a completion rate of 85%). Full details, data availability and a flowchart of the survey are disclosed in the appendices.

### *Sample*

Assignment to treatments was rather balanced, and the required sample size was obtained in a reasonable time. Table 1 summarizes demographics for each treatment.

| | **Study 1 (N = 45)** | | **Study 2 (N = 44)** | | **Study 3 (N = 44)** | | **Experiment** |
|---|---|---|---|---|---|---|---|
| | Large Set | Small Set | Large Set | Small Set | Large Set | Small Set | |
| **N** | **24** | **21** | **24** | **20** | **23** | **21** | **133** |
| Male | 10 | 13 | 12 | 14 | 12 | 5 | 66 |
| Female | 14 | 8 | 12 | 6 | 11 | 16 | 67 |
| Age (mean) | 26.88 | 28.76 | 32.13 | 29.65 | 31.22 | 28.24 | 29.50 |
| Age (std. dev.) | 3.57 | 5.94 | 11.75 | 8.22 | 6.39 | 4.85 | 7.55 |

Table 1: summary of demographics per treatment

As the nature of the experiment and the task does not call for any particular segmentation of the subject pool, demographics were asked at the end of the survey only to assess the adequacy of randomization. As expected, a probit model that assesses the probability of choosing the "avoiding" option while controlling for gender, age and country of origin yields no significant results (see appendix B).

### *Analysis plan*

The relevant data to test each of the hypotheses are the distribution of choices in the payoff task. In particular, the frequency of "avoiding" options picked in each treatment. Hence, for all studies data was recoded in a binary fashion as depicted below.

| Original value | Description | New value |
|---|---|---|
| **1-17** | Gamble with expected value of €4.85 | 0 |
| **18** | "Avoiding" option in each study | 1 |

In each study we have two independent random samples: large set and small set. As seen in the table above, scores from them can fall in one of two mutually exclusive classes: gamble or "avoiding" option. A two-times-two contingency table allows visualization.

| | | Sample | | |
|---|---|---|---|---|
| | | Large Set | Small Set | *Combined* |
| **Class** | Avoiding | A | B | A + B |
| | Gamble | C | D | C + D |
| | *Total* | A + C | B + D | N |

Table 2: 2 x 2 contingency table for each study

The 2 x 2 *Fisher Exact* test is a very useful technique to analyze discrete data (as this one) when the samples are small. The test determines if the two samples differ in the proportions with which they fall into each class (Siegel & Castellan, 1988). As other tests of independence, the *Fisher Exact* assumes that all individual observations are independent. Indeed, all 133 observations are independent at the subject level.

This test calculates the probability of observing the obtained outcome and more extreme ones given that the marginal totals are fixed. The exact probability of observing a particular set of frequencies in a 2 x 2 contingency table is given by the hypergeometric distribution (*ibid.*). Hence, to apply this statistical test we need to sum the probability of the observed occurrence with the more extreme outcomes (see equation 1).

$$p = \sum_{k=observed}^{most\ extreme} \frac{\binom{A+C}{A}\binom{B+D}{B}}{\binom{N}{A+B}} = \sum_{k=observed}^{most\ extreme} \frac{(A+B)!\,(C+D)!\,(A+C)!\,(B+D)!}{N!\,A!\,B!\,C!\,D!}$$

Equation 1: Exact probability of observing a particular set of frequencies and more extreme ones in a 2 x 2 contingency table

This probability ($p$) is then used to decide whether the data allows to reject $H_0$ by comparing it against the usual significance level of $5\%(\propto = 0.05)$.

### *Results*

As depicted by Figure 7 there are differences in the behavior of participants in each of the three studies. Indeed, subjects where more prone to choose the avoiding options in the opt-out condition, irrespective of treatment. On the contrary, under the set curtailing condition subjects were more inclined to pick the gambles (and took more time to complete the experiment), probably swayed by some mistrust on the task. However, these differences are not statistically significant among treatments (see appendix B).

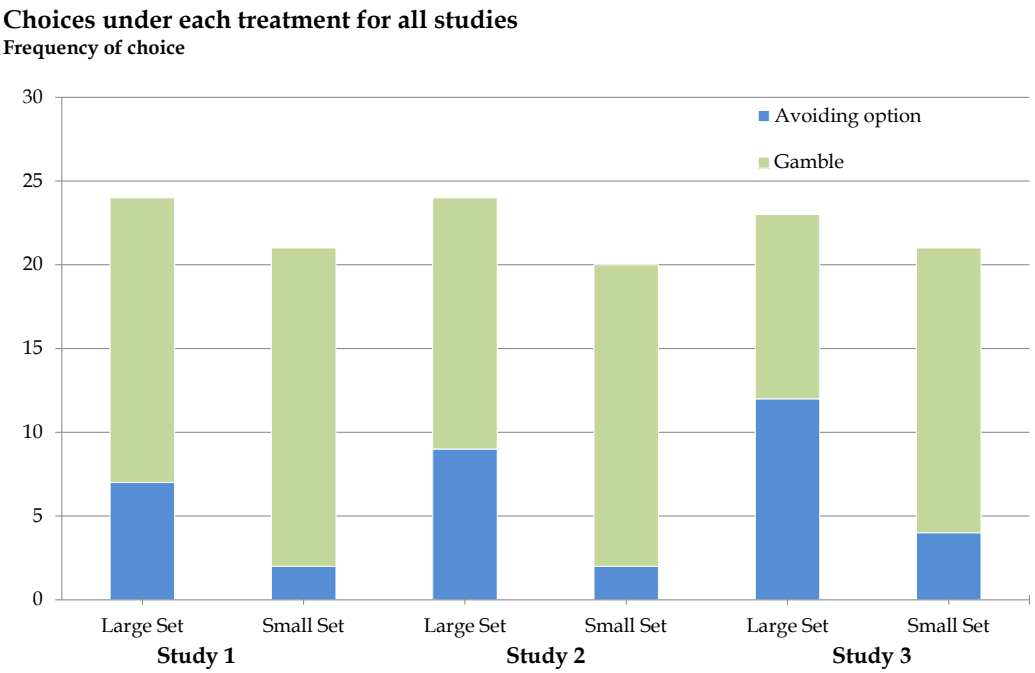


Figure 7: Frequency of gambles and "avoiding" options chosen by participants under each treatment, for all three studies

Regarding the focal point of this study, important differences where observed amongst studies in relation to the effect of the size of the choice set over the decision to pay to reduce the burden of the choice. Results are explained henceforth.

| Study | Hypothesis | Large Set | Small Set |
|---|---|---|---|
| **1** | Subjects pay to reduce the set | $X_1$ | $X_2$ |

$X_i$ is the proportion (%) of subjects in each treatment choosing the "avoiding" option.

Study 1 investigated whether subjects would be willing to pay to select from a smaller set of options. If concurrent with the intuition detailed in the previous sections the size of the set affects this decision, then the null and alternative hypothesis are defined as follows:

$$H_0: X_1 = X_2$$
$$H_1: X_1 \neq X_2$$

A two-sided *Fisher Exact* test on the occurrence of "avoiding" options cannot reject the hypothesis that the proportions in each treatment are equal at a 5% significance level ($N_{large} = 24, N_{small} = 21, p - value = 0.143$).

| | | Sample | | |
|---|---|---|---|---|
| | | Large Set | Small Set | *Combined* |
| **Class** | Avoiding | 7 | 2 | 9 |
| | Gamble | 17 | 19 | 36 |
| | *Total* | 24 | 21 | 45 |

Table 3: 2 x 2 Contingency table for study 1

- **Result 1** → there is no significant difference in the number of "avoiding" options chosen by subjects in each treatment. Thus, the size of the choice set does not exhibit a significant effect on the decision to pay to reduce it.

| Study | Hypothesis | Large Set | Small Set |
|---|---|---|---|
| **2** | Subjects pay to randomize the decision | $X_3$ | $X_4$ |

$X_i$ is the proportion (%) of subjects in each treatment choosing the "avoiding" option.

Study 2 assessed if participants would be willing to pay to forego their decision rights and randomize the payoff choice. If the size of the choice set affects this decision, then the null and alternative hypothesis are defined as follows:

$$H_0: X_3 = X_4$$
$$H_1: X_3 \neq X_4$$

A two-sided *Fisher Exact* test on the occurrence of "avoiding" options rejects the hypothesis that the proportions in each treatment are equal at a 5% significance level ($N_{large} = 24, N_{small} = 20, p - value = 0.045$).

| | | Sample | | |
|---|---|---|---|---|
| | | Large Set | Small Set | *Combined* |
| **Class** | Avoiding | 9 | 2 | 11 |
| | Gamble | 15 | 18 | 33 |
| | *Total* | 24 | 20 | 44 |

Table 4: 2 x 2 Contingency table for study 2

- **Result 2** → there is a significant difference in the number of "avoiding" options chosen by subjects in each treatment. Thus, the size of the choice set has a statistically significant effect on the decision to pay to forego decision rights (pay not-to-choose).

| Study | Hypothesis | Large Set | Small Set |
|---|---|---|---|
| **3** | Subjects pay to opt out of the choice | $X_5$ | $X_6$ |

$X_i$ is the proportion (%) of subjects in each treatment choosing the "avoiding" option.

Study 3 investigated if subjects would be willing to pay to exit the decision task and not make any choice at all. If the size of the choice set affects this decision, the null and alternative hypothesis should be defined as follows:

$$H_0: X_5 = X_6$$
$$H_1: X_5 \neq X_6$$

A two-sided *Fisher Exact* test on the occurrence of "avoiding" options rejects the hypothesis that the proportions in each treatment are equal at a 5% significance level ($N_{large} = 23, N_{small} = 21, p - value = 0.031$).

| | | **Sample** | | |
|---|---|---|---|---|
| | | Large Set | Small Set | *Combined* |
| **Class** | Avoiding | 12 | 4 | 16 |
| | Gamble | 11 | 17 | 28 |
| | *Total* | 23 | 21 | 44 |

Table 5: 2 x 2 Contingency table for study 3

- **Result 3** → there is a statistically significant difference in the number of "avoiding" options chosen by subjects in each treatment. Thus, the size of the choice set has a significant effect on the decision to pay to opt out of the decision task (pay to-not-choose).

## 7. Discussion and practical implications

The results reported before show that under some circumstances people are willing to pay to reduce their decision space when faced with too many options. Hence, evidence was found to (at least partially) support the main intended contribution of this work. In turn, in line with previous research these studies confirm the existence of the too-much-choice effect (Scheibehenne, et. al., 2010 for a review). It must be noted that there were important differences in the behavior of subjects amongst studies.

No evidence supports the rejection of the first hypothesis. It is possible that subjects swayed by some mistrust on the task understood the paying option as a deceiving mechanism and thus decided to select the gambles more frequently. In fact, subjects took considerably more time to complete this experiment signaling that greater care was exercised. Naturally, it may be the case that subjects were unwilling to face another choice (recall that after reducing the set you still have to choose). This explanation becomes more relevant because dominance may be hindered as the experiment is poorly incentivized. Moreover, the smaller set also contains abstract, context free options and if some subjects were uncomfortable choosing in that scenario they may have a will to exit the task sooner. Finally, subjects could have been confused by the wording of the hints in the avoiding option, but this is less plausible.

Hypothesis 2 and 3 were rejected, surfacing evidence that subjects would pay to both randomize a decision or opt-out of it even when there can be losses in the process. It must be noted that in this case poor incentivisation may have played an opposite role and may have exceedingly favored the "avoiding" options. Indeed, when overwhelmed by the number of options, subjects may have actually used less time to think options over than an otherwise commensurate reward would have required. In turn, the large number of avoiding options observed in study 3 should be taken with care. Even when the difference among treatments is statistically significant and supports the research question, many subjects also decided to opt-out of the choice in the small treatment. Presumably, risk aversion is playing a significant role in this decision and confounds to some extent the analysis. Indeed, as the avoiding option in study 3 was framed as a certain win, loss averse individuals may have felt overly inclined to it even when the expected value of this option is inferior. A follow-up study that frames this option as a gain from a € 0 reference point would be useful to elucidate this possible confound.

Finally, although no evidence was found for one hypothesis and, as stated, some concerns may be raised over the generalizability of results, I understand that the findings, methodology and recommendations of this document may be useful as a starting point to address further research with increased accuracy.

### *Practical Implications*

This document contributes to the literature in choice overload by relating a market mechanism as prices to counter the effect of too many options. Much research has dealt with how individuals can employ heuristics to cancel the effects of choice fatigue (Schwartz, 2004) and how firms can help them do it in the marketplace while ripping increased benefits. Nonetheless, suggestions have usually focused on promotion, customer service or point of sale design. Evidence that subjects are actually willing to pay to reduce choice overload opens a window for a more decisive role of pricing, corporate strategy or even product design in dealing with choice overload. Likewise, policy design in healthcare, schooling, insurance or voting can draw insights from such evidence and suggest different approaches to regulation regarding mandatory choices. Next I review some possible domains in which the results and logic of this document may be useful.

One of the most straightforward implications regarding the main research question is for pricing strategy. For instance, instead of merely reducing options companies could learn how average (or novice) customers buy and promote a sub-set of appealing options that already includes a price differential. Moreover, when choices are lateral but important and costly (as airline fares, hotel rates and car renting are for vacations) firms could sell decision aids (such as recommendation agents or decisions matrices) that promise to deliver an improvement in the purchase decision. If these results prove externally valid, then a market to explicitly or implicitly price these aids could exist.

As the marginal cost of reproducing online content is virtually zero, web-shops and internet based services are an ideal ground for the manifestation of choice overload[5]. I understand that a space exists for paid or freemium versions of different services that streamline the decision process for consumers, for a fee.

The choices in these studies were generic and context free. But under real-world options where people exhibit personal biases, there is a possibility for companies to understand those biases and selectively offer choice sets that are appealing enough for customers to be willing to pay a premium to have a properly reduced choice set. The operationalization can be devised among a vast array of domains, such as retirement programs, healthcare, automobiles, real estate, mobile phones and etcetera.

Psychological research shows that in many cases subjects prefer to restore to chance when the expected outcomes of a decision are dubious or the choice is too hard (Anderson, 2003). The evidence presented in study 2 supports the notion that when choice seems burdensome, people are willing to pay to leave it to chance. This is especially important when subjects do not want to take responsibility for a failure of the

[5] Netflix, a popular multimedia streaming company, once offered $1 million to whoever designed an online recommender system that reduced the time people spent "not watching" movies (Verdashko, 2006 in press).

choice (Dwenger, et. al., 2014). One could devise the applicability of this finding in everyday simple situations with many alternatives and where a failure in the decision is not critical (e.g. what to eat for lunch or which gift to give).

Moreover, a preference for randomization (even if paid) may be relevant for example if subjects value procedures as well as outcomes, as has been shown in several studies (e.g. Machina, 1989 or Bolton, et. al., 2005). Thus, there may be a case for random portfolio allocation in automated trader platforms or even in pension selection, especially when subjects are subjectively indifferent between options and dominance is hard to assess (due for example to uncertainty). Procedural design of government policies in general may also benefit from these findings, as many times service provisions are burdensome for choosers and may anyway result in inefficient allocation.

It is quite clear that goods and services are not own by us "by default" and even the most meager decision requires an active choice (e.g. buy a coffee). One obvious motive for active decision is that, if people do not disclose their preferences no one would know what they want (Sunstein, 2015). However, this may be changing. Advances in machine learning could make "paid randomization" more prevalent. In fact, as online recommender systems can increasingly understand people's preferences, services in which one pays to receive a random suggestion based on previous behavior are prone to increase. Moreover, one could devise an opportunity for an automated planner that knows exactly what one wants and undertakes decision-making on one's behalf. For example, an online grocery shop could claim to know exactly what people want and when people need it, before they themselves are aware of these desires. A system of "predictive shopping" would then send the goods and pre-charge a credit card (with the chance of opting out afterwards). Although still not completely developed it is easy to imagine such situations and, as this work finds, imagine people willing to pay for it.

This document has found violations of stochastic dominance which show that under some circumstances people would pay to reduce the decision burden in an abstract setting. Further opportunities for research include the replication of the studies in an actual laboratory setting with proper incentives, changes in the structure of the payoff matrices (especially in study 3) to see if the design is not affected by preference reversals and changes in the stakes of the game. Naturally, a great doubt is cast over the external validity of these results and other experimental or empirical approaches on real-world situations should be of great aid to elucidate this. Finally, the practical implications have majorly outlined opportunities to reduce choices using the efficiency argument that people may be better off (if not they would not have paid for it). However, choice itself might be a good thing and one could argue from a paradigm of personal freedom that any steps towards choice curtailing, even those that involve paying, are undesirable. If companies compete and lower the price of paying to not choose to the marginal cost of doing so, maybe we are forcing choices away from us and even when choice may have negative outcomes, not having choice at all might be even worse (Harford, 2009 in press).

## 8. Conclusion

Choice overload can be defined as the negative consequences of having too many options, and may cause individuals to undertake suboptimal decisions or even to fail to make a decision altogether. This document addresses the issue of choice overload and intends to understand if people would be willing to pay to actively reduce their decision space when faced with too many options.

I set forth three experimental studies that aim to test this question. In all the experiments subjects were randomly assigned to two treatments, one where a choice task had to be performed over a large, eighteen-option set and one where the same task had only four options. The last option under each treatment in every condition is the "avoiding" option and is the variable of interest. In the first experiment, this alternative allowed to pay a sum to reduce the choice set. In the second study, the "avoiding" option enabled subjects to randomize the decision. And finally, in the third condition participants could pay to exit the game and not make any decision at all. All choices were abstract lotteries and picking the "avoiding" option was always stochastically dominated by any of the gambles.

The results show that the effect of the size of the choice set on the willingness to pay to curtail the decision space differs by condition. In study 2, I found a statistically significant effect of the size of the choice set on the decision to pay to forego decision rights (pay not-to-choose). Likewise, in experiment 3 the size of the choice set significantly affects the decision to pay to opt out of the task (pay to-not-choose). On the contrary, in study 1 I found no significant effects of set size on the decision to pay to reduce it. In general, evidence was found to (at least partially) support that under some circumstances people are willing to pay to reduce their decision space. Results should be interpreted with care as the questionnaire is not properly incentivized and, as it was distributed online, full control is non-viable. Further caveats were discussed in section 5.

This research contributes to the current literature on choice overload by relating a market mechanism such as prices to counter the too-much-choice effect. These findings are important for theorists as they contradict standard economic assumptions. Moreover, the insights may be of relevance for marketing and pricing managers and regulators alike. For instance, if people show a desire to pay to reduce choices a more decisive role may exist for product design and pricing strategies, especially in financial services, hospitality and FMCG. In turn, a preference for paid randomization may be both relevant for offerings in online environments based on recommender systems and for governmental policy design regarding procedural concerns. Finally, advances in machine learning may pave the way for an emergence of automated planners and a steady increase in "predictive shopping". To the extent that people are willing to pay to have decision-making taken on their behalf, whole new industries may begin to develop. I understand that these latter domains are the most promising and interesting avenues for future research.

Practical implications mainly draw opportunities to reduce choices using an efficiency paradigm. Nevertheless, choice itself might be a good thing and one could argue that even when it may have negative consequences, not having choice at all might be worse.

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# Appendices

## A. Experimental instructions

Experimental instructions where very similar among treatments. As a matter of fact, the only different input was the choice task itself. Figure A1 depicts the flow of the survey. Exact instructions per each part of the chart are detailed henceforth.

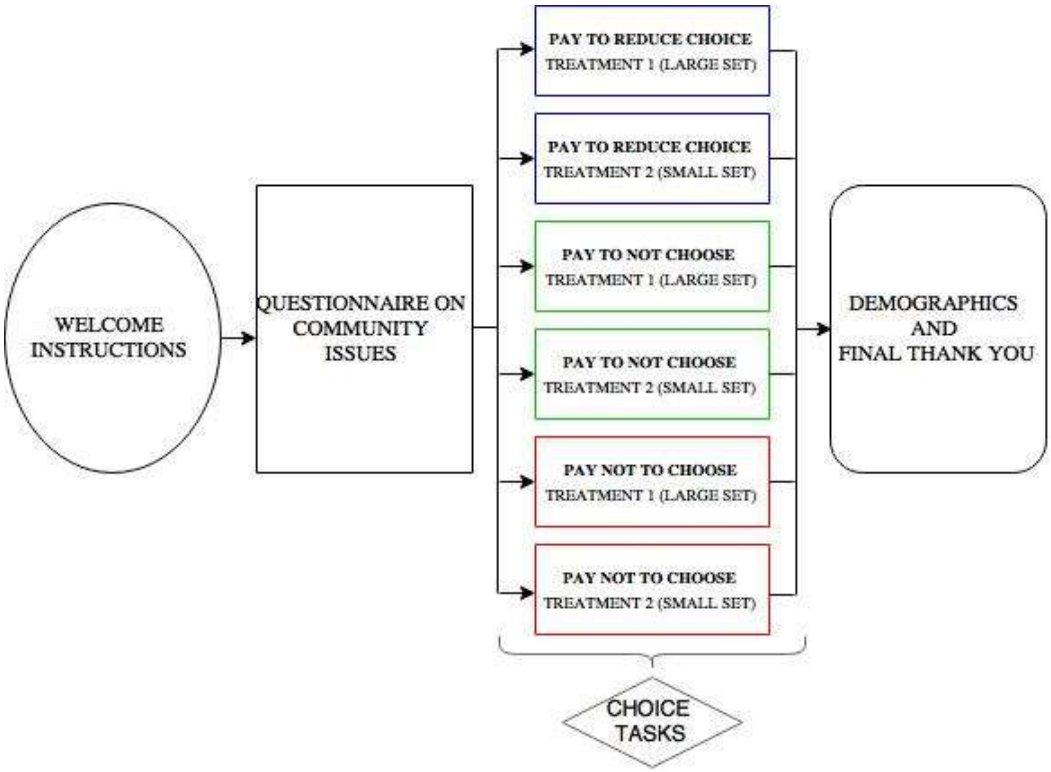


Figure A1: flow chart of the experimental design

### *Instructions*

Hello. Thank you for participating in this experiment.

We are interested in gathering your opinion on cycleways and parks in your neighborhood. The questions are short and very straightforward. Please answer to the best of your ability.

Your participation will be rewarded. Introduce your email in the box below and you will enter a draw where three winners will be paid an amount determined at the end of the questionnaire.

Thank you very much for your participation.

Please enter your email.

### *Masking questionnaire*

All questions are rated on a 5-point Likert scale (strongly disagree = 1, strongly agree = 5)

---

To what extent do you agree or disagree with the following statements.

1. My neighborhood is well suited for cycling
2. Cycleways are an integral part of the transport network in my neighborhood
3. Cycling is a good option for the daily commute
4. My neighborhood has enough parks (or other similar "green spaces")
5. Parks play an important role as community builders
6. Parks and cycleways should always be publicly funded
7. Taxes on petrol and parking fees should be used to fund cycleways and parks

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### *Choice task*

All treatments presented the same gamble as option 1, so the instructions were equal in all treatments. To observe each individual choice set please refer to section 4.

---

Thank you for participating in the experiment.

For compensation, please select one of the *XX* gambles below.

After your selection we will roll a die and, depending on how the die falls, you will receive € 10 minus the amount of money indicated in the table below. For instance, if you pick option 1 and we roll a 1 you get € 6.45 (made up of € 10 - € 3.55).

Please select the desired gamble:

---

### *Demographics and questionnaire closure*

Demographics and a final thank you concluded the questionnaire. All options where mandatory. Validation rules and drop down lists aided participants when possible.

---

Thank you very much for your time and effort.

To finalize we would like to ask just a few questions about yourself.

- What is your gender?
- How old are you?
- In which country do you reside?

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### *Follow up to the "avoiding" option in Study 1*

If subjects picked the "avoiding" option in study 1 they were redirected to a new, smaller choice set where they had to actually make the payoff decision. The following charts depict the new sets for both the large set treatment and the small set treatment.

| OP |  |  |  |  |  |  |
|---|---|---|---|---|---|---|
| 1 | $3,55 | $6,25 | $2,45 | $7,15 | $4,65 | $5,05 |
| 2 | $9,35 | $6,45 | $2,60 | $3,35 | $0,00 | $7,35 |
| 3 | $1,40 | $5,55 | $6,55 | $3,95 | $4,55 | $7,10 |

Figure A2: Study 1: Treatment 1 – follow-up choice set

| OP |  |  |  |  |  |  |
|---|---|---|---|---|---|---|
| 1 | $3,55 | $6,25 | $2,45 | $7,15 | $4,65 | $5,05 |

Figure A3: Study 1: Treatment 2 – follow-up choice set

## B. Additional data analysis

First, the general behavior of subjects in each study is considered. Simple plotting reveals that participants were more inclined to choose the "avoiding" option in the opt-out condition (study 3), irrespective of treatment. However, differences in the frequency of these options are not statistically significant.

Indeed, a two-sided *Chi-Square* test on the occurrence of "avoiding" options fails to reject the hypothesis that the proportions in each of the three studies are equal at a 5% significance level ($N_{study1} = 45, N_{study2} = 44, N_{study3} = 44, p - value = 0.206$).

| | | **Sample** | | | |
|---|---|---|---|---|---|
| | | Study 1 | Study 2 | Study 3 | *Combined* |
| **Class** | Avoiding | 9 | 11 | 16 | 36 |
| | Gamble | 36 | 33 | 28 | 97 |
| | *Total* | 45 | 44 | 44 | 133 |

Table B1: 2 x 3 contingency table for the differences among choices

- **Result B1** → the occurrence of "avoiding" options does not differ significantly between studies.

Secondly, anecdotal evidence and plotting of preliminary results suggested that subjects were taking longer to complete the surveys in the first condition (i.e. set reduction). As all experimental settings were of exactly the same length, one could hypothesize that subjects swayed by some mistrust on the task could think twice before deciding and finally opt for not paying (even when there first intention could have been opposite).

I find no significant evidence of this effect. As a matter of fact, a *one-way ANOVA* test on the differences in mean response time by study fails to reject the hypothesis that the means in each of the three studies are equal at a 5% significance level ($N_{study1} = 45, N_{study2} = 44, N_{study3} = 44, F = 2.54, p - value = 0.082$). Two precisions must be made. Firstly, even when averages are not significantly different, variances do differ greatly providing certain support for the intuition presented beforehand. Secondly, the ANOVA test assumes normality of the dependent variable (i.e. time), which in this case is not necessarily observed.

| | | **Response Time (in seconds)** | | |
|---|---|---|---|---|
| | | Mean | St. Dev. | Freq. |
| **Class** | Study 1 | 571 | 1,311 | 45 |
| | Study 2 | 323 | 413 | 44 |
| | Study 3 | 193 | 157 | 44 |
| | *Total* | 364 | 1,468 | 133 |

Table B2: descriptive statistics of time by condition

- **Result B2** → the response time of the survey does not differ significantly between conditions.

Finally, I test for any possible effect of the demographics on the probability of picking an "avoiding" option. As the task is transversal and abstract in nature, only few demographics were asked as a way of assessing the nature of the randomization but not because of concerns with the subject pool or because interactions were of interest.

Due to the amount of respondents form Uruguay, the ratio variable country was recoded as a dummy where 1 indicated "of Uruguayan origin" and 0 otherwise. Age and gender (male = 1) where used in the habitual way. The specified probit model is:

$$\Pr(choice_i = 1) = \beta_0 + \beta_1 * Age_i + \beta_2 * Gender_i + \beta_3 * Country_i + \varepsilon_i$$

As expected, the model yields no significant effects $N = 133$, $McFadden - R^2 = 0.0059$ Response time and condition as covariates as well as a logit specification were also considered and again yielded no results.

| **Probit model for the choice of avoiding option** | | | |
|---|---|---|---|
| | Coef. | St. Dev. | p - value |
| Age | 0.125 | 0.147 | 0.394 |
| Gender | 0.113 | 0.235 | 0.629 |
| Country | -0.053 | 0.251 | 0.831 |
| Pseudo-$R^2$ | 0.0059 | | |

Table B3: choice model on the probability of choosing the "avoiding" option

- **Result B3** → age, gender and country of residence have no significant effect on the probability of picking the "avoiding" option in these experiments.

## C. Data availability

Spreadsheets with raw data (as delivered by Qualtrics.com) and spreadsheets with processed data, charts and main results are all available for replication at the following link: *https://www.dropbox.com/sh/qp9sj9ggammdcw8/AACBu76X5iy24UWDMax6twgJa?dl=0*

A further pdf copy of this document accompanies.

## D. Winners e-mail notification

Three winners were randomly selected for payment on the 5th July, 2015. The total payoff of these winners was € 16.3 (mean € 5.4, standard deviation € 2.2). They were notified by e-mail and settled by PayPal. The notification e-mail follows.

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Congratulations!!

You made an experiment on the *XX*th of June and have been randomly selected for payment. Your total earnings amount to *€ XX*. To receive your payment please reply to this email and we will disclose further instructions.

Thank you very much.

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