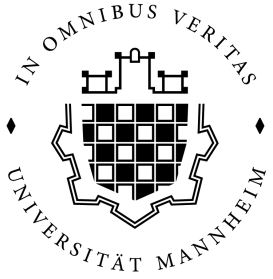


# Essays on Choice Under Uncertainty and Framing Effects in Marketing

Inauguraldissertation zur Erlangung des akademischen Grades eines Doktors der Wirtschaftswissenschaften der Universität Mannheim

vorgelegt an der Fakultät für Betriebswirtschaftslehre der Universität Mannheim

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*"As far as the laws of mathematics refer to reality, they are not certain; and as far as they are certain, they do not refer to reality."*

**— Albert Einstein**

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# Chapter 1. Introduction

Traditional economic theory postulates that consumers make choices in order to maximize their benefits. In this sense they are presumed to be rational and to choose following their (known) preferences. For instance, when choosing a digital camera, if battery life is the most important attribute, then consumers will prefer the device that promises the longest lasting battery, subject to a budget constraint. In this decision problem, if consumers know their preferences there is little or no uncertainty about which option to choose. However, many aspects of real life are intrinsically uncertain and we make many decisions in condition of unawareness of our real preferences. For example, how can we know what version we might like the most when we are not familiar with a specific product or when we have to plan for future consumptions?

What research has finally accomplished to agree on with Behavioral Economics is indeed that, in some cases, consumers are irrational and take suboptimal decisions that do not necessarily maximize their benefits. In this direction, a consistent amount of academic literature (Huber, Payne, and Puto 1982; Huber and Puto 1983; Simonson 1989; Simonson and Tversky 1992; Tversky and Simonson 1993) has shown that, in case of uncertainty, consumers' preference between options is context-dependent and alternatives in a given choice-set are evaluated according to the choice set framing. For instance, when a consumer has no clear predilection for one of (three) available options differing in terms of values on two different attributes (such as battery life and memory of a digital camera), loss aversion tends to favor the middle one because it leads fewer disadvantages in relation to the other two and, since disadvantages loom larger than advantages (Kahneman and Tversky 1984; Tversky and Kahneman 1991), the intermediate option has a higher probability of being chosen than an extreme one. This

phenomenon is known as “extremeness aversion” and, when acting on both product attributes, can generate the so-called compromise effect (Simonson 1989). The compromise effect denotes the phenomenon by which an alternative gains shares when it is positioned in the middle of a three-item choice set. As such, a choice set can be framed in order to stimulate choices of a specific option, a strategy that is frequently used by companies to display product arrays, for instance on e-commerce offer pages (see for instance Netflix’s “compromise” offer page in Figure 1).

(Insert Figure 1 about here)

Next to the choice-set framing (the order/ context in which options in a choice set are arranged), another way of influencing consumers’ choice in case of preferences uncertainty is promotion framing (the different wording/ content of an offer). Differences in the way choice outcomes are framed can change people’s decisions in several domains (Levin et al.1998). A broad literature has investigated framing effects in the context of pricing showing, for instance, that nonmonetary promotions (e.g., bonus time offers) must have a significantly higher value than monetary promotions (e.g., price discounts offers) to be noticed by and influence consumers (Campbell and Diamond 1990).

In this thesis I investigate the long-term consequences of context and framing effects. In particular, I focus on decision-making instances characterized by uncertainty of present and future tastes and needs (intertemporal choices). Previous literature proved that people dislike uncertainty (Gneezy et al. 2006; Simonsohn 2009; Newman and Mochon 2012) and I suggest that such uncertainty might lead to the adoption of inconsistent behaviours. For instance, people might show opposite preferences for equally valued but differently framed promotions (chapter two) or might increase choices of items that can complement and enhance a first average choice (chapter three). Accordingly, the two scientific essays

embedded in this dissertation represent an attempt to integrate choice under uncertainty (in present and future states) and framing/ context effects.

The first essay, co-authored with Daniel Bartels, and Florian Stahl, is entitled "Time Preferences for Subscriptions: The Impact of Framing Benefits as Price Discounts or Bonus Time" and investigates the impact of promotion framing on choice for subscriptions extensions. When consumers make choices about subscriptions durations, they make choices about consumption and a range of payments over time. As such the choice for a subscription is an intertemporal choice often characterized by uncertainty of future preferences and including a certain dimension of risk (as longer subscriptions require more commitment to a single company). For instance, consumers choosing among subscriptions often have a choice between shorter contracts at higher prices (more flexible) and longer contracts at lower prices (less flexible). Since the unit cost often declines with longer contracts, consumers are confronted with a trade-off between length and price (per time unit) but may be reluctant to sign up for subscriptions due to the uncertainty of their future wants and needs. To encourage subscription purchases, companies often promote subscriptions by offering consumers longer subscriptions with price discounts (e.g., "save 25% off the monthly price when you sign up for a year") or time bonuses (e.g., "pay for 9 months and get 3 months free"). This first essay examines whether people's assessments of subscription promotions depend on how these promotions are framed. In short, we find that consumers prefer when subscription extensions are promoted by price discounts framing (sign up for 6 months and save 25%) for shorter durations, and that they prefer when subscription extensions are promoted by a bonus time framing (sign up for 24 months and get 3 months free of charge) for longer durations. This preference reversal replicates in all conducted (field- and lab-) experiments and is moderated by people's levels of financial literacy, as financially literate respondents are less susceptible

to these framing effects. Our moderation analysis further suggests that a potential cause for the greater preference for bonus time promotions for longer contract extensions derives from people's perception of future time slack. The belief of having more time available in the future than in the present (compared to monetary resources) increases the likelihood of a preference for bonus time over price discounts promotions with longer contracts.

Prior research on time preferences has not addressed how different ways of framing a contract extension can affect people's preferences for contract lengths. With this project, we contribute to the literature on temporal discounting and on framing effects by uncovering a new reversal of preferences with an important managerial implication: shorter subscription extensions should be promoted by offering price discounts, and longer subscription extensions should be promoted by offering bonus time.

The second essay, co-authored with Elisa Montaguti, Florian Stahl, and Itamar Simonson is entitled "The Compromise Effect in Post-Purchase Consumption Behaviour" and investigates the consequences of a compromise choice on post-choice behavior to depart from decision-making and to make a step towards understanding overtime usage of compromise products. More broadly, we observe post-choice reactions to decisions made under preferences uncertainty (such as in the case of a compromise choice). In one field experiment and three lab experiments we find that the choice of a compromise product (compared to the choice of the same product in a dual set) triggers the subsequent choice of more complementary items. In particular, respondents choosing a compromise alternative tend to select (at later consumption stages as well as in a subsequent choice task) high quality complements and to invest more money on such items. Also, when given the chance of upgrading their compromise product (e.g. an average camera with good memory but short battery life), they do so enhancing the attribute they gave up when selecting the middle

option (increasing the battery life in this case). We consistently find that consumers experience a compromise choice as particularly difficult and this higher difficulty mediates the effect above mentioned. We also find that the increased choice of complementary items is related to the effortful thinking process induced by the compromise context by controlling for the asymmetric dominance (attraction) effect. This other context effect is characterized by relatively unconscious and effortless thinking and indeed does not lead to an increment in respondents' choices of complements.

With this project, we provide evidence that the compromise framing not only increases choices of a target product but also could increase subsequent purchases of complementary (high quality) products. Such finding should be considered in product array manipulations and retail management.

In both essays the experimental settings are contracts and subscriptions, which allow to manipulate the choice context and to observe consumption behavior overtime. The implications of this thesis are therefore directly applicable in contractual (digital) contexts. Due to the digitalization contract-based business models are increasing and products and services that were formerly sold by units or event are now offered by subscriptions. Contract-based business models and developments in technologies have created a data-rich environment that allow companies and researchers to develop a better understanding of consumers choice and consumption behavior and as a consequence, especially in digital contexts, a new understanding of customers' lifecycle. In several industries are contractual relationships at the core of business models including digital services (e.g. Spotify, Netflix, Dropbox), software (e.g. SAS, Spss, Microsoft Office 365) as well as e- commerce platforms (e.g. Amazon Prime, Ebay, Alibaba). Contractual relationships in all industries offer the ability to observe both purchase decisions and consumption behaviour overtime. Such data

can give a better perspective and knowledge of customers' tastes, preferences, and habits and can potentially increase satisfaction, retention and ultimately customer value management.

In the offline world, the study of usage behaviour is sometimes challenging because of the impossibility of tracking individuals' post-purchase consumption. Consider for instance the publishing industry. Before the emergence of digital newspapers, publishers could only track sales data. Now, not only it is possible to observe online purchases in real time but also, with the use of log data, publishers can track consumption of their online content (e.g. date/ time of every access, clickstream data and so on). The Newspaper Association of America (NAA) estimated that 75% of newspapers in the USA use a digital subscription model (2015 *NAA Circulation Facts, Figures & Logic*) suggesting the primary importance of contracts in this field. We collaborate with an Italian news publisher to conduct an online controlled experiment for the first essay of this thesis.

In summary, beyond advancing theories of consumers' decision-making, my dissertation holds practical implications. First of all, we suggest how to optimally frame promotions to advertise subscriptions extensions according to different lengths. Secondly, we provide evidence that the compromise framing of choice sets can increase purchases of complementary (high quality) products related to the first (average) choice.

The following pages of this thesis are organized as follows. Chapters 2 and 3 present scientific working papers about the above-introduced essays while Chapter 4 provides a general conclusion that summarizes and discusses the insights and implications of my doctoral thesis.

# Chapter 2. Time Preferences for Subscriptions: The Impact of Framing Benefits as Price Discounts or Bonus Time

## 2.1 Introduction

Many of the financial choices that consumers make are intertemporal, as most products and services entail costs and benefits distributed over time. For instance, consumers choosing among subscriptions often have a choice between shorter contracts at higher prices (more flexible) and longer contracts at lower prices (less flexible). Since the unit cost often declines with longer contracts, consumers are confronted with a trade-off between length and price (per time unit). Companies offer subscriptions because they receive a predictable and constant revenue stream from subscribed customers for the duration of the contract. However, consumers may be reluctant to sign up for subscriptions due to the uncertainty of future wants and needs. To encourage subscription purchases, companies often promote subscriptions by offering consumers longer subscriptions with price discounts (e.g., "save 25% off the monthly price when you sign up for a year") or time bonuses (e.g., "pay for 9 months and get 3 months free").

We investigate how the framing of benefits of contract extensions as either price discounts or time bonuses affects consumers' preferences for longer, rather than shorter, subscriptions. Although both types of promotions aim to increase the demand for longer subscription contracts, our studies suggest customers treat these two benefits' frames differently. Across all six studies, we find evidence for a preference reversal: For shorter subscription durations, consumers prefer when extensions are promoted by price discounts and for longer subscription durations, consumers prefer when extensions are promoted by a

bonus time. This preference reversal is robust in all (lab- and field-) studies and replicates when manipulating factors that can affect temporal discounting (e.g., patience).

Prior research has studied the effects of framing on time preferences (e.g. Campbell and Diamond 1990; Soman 2001; Hardesty and Bearden 2003), but to the best of our knowledge, this research is the first to investigate the influence of framing contract extensions on subscription preferences. This research has important managerial implications, because these two types of promotions are omnipresent in the context of subscriptions (used by magazines, gyms, radio stations, sports season tickets, insurance etc.), and subscription business models are increasing in popularity. According to the OECD Digital Economy Outlook 2017, fixed broadband subscriptions increased 4% while mobile broadband subscriptions increased by more than 9% from 2015 to 2016. Therefore, companies have the potential to realize significant financial gains by optimally promoting subscriptions.

In the following sections, we review the literature on time discounting and framing effects, and present the results of six experimental studies in which we examine how framing contract extensions as price discounts or time bonuses influences consumers' subscription preferences. We conclude with the managerial implications of our findings for marketing practice and propose some suggestions for future research.

## 2.2 Related Literature and Theoretical Background

### 2.2.1 Temporal Discounting

Consumers' choices of subscriptions extensions depend on how much they value future consumption compared to current consumption and on the uncertainty about their future needs (Della Vigna and Malmendier 2006). The literature on temporal discounting examines how people make trade-offs between outcomes that are distributed over time (Frederick,

Loewenstein, and O'Donoghue 2002; Read 2004; Urminsky and Zauberman 2016). Many studies have found that people do not consistently discount the value of future outcomes (Attema et al. 2010). Instead, the stylized fact is that discount rates decline as time increases (Ainslie and Haslam 1992, 1975; Thaler 1981). People seem more sensitive to outcomes that happen sooner than later (Loewenstein and Prelec 1992), and most papers report that people become more impatient to receive outcomes as they approach (e.g., Dasgupta and Maskin 2005; but cf. Dai and Fishbach 2013). Hyperbolic (Myerson and Green 1995; Rachlin 2006) and quasi-hyperbolic models (Laibson 1997; Zauberman 2003; c.f. Read 2001) can accommodate this pattern of diminishing impatience.

Temporal discounting studies (see Frederick et al. 2002 for a review) often examine time preferences by asking people to make choices about the timing of simple outcomes (usually smaller-sooner (SS) vs. larger-later (LL) monetary rewards, such as the option of receiving $100 today or $115 in a year). However, people regularly make choices about products or services offered in a contractual context (e.g., subscriptions). We contribute to this literature by studying subscription preferences, which involve costs and benefits that are distributed over time. Studying these choices represents a departure from the simple discounting tasks used in previous studies—tasks that have attracted criticism for their lack of naturalism elsewhere (Bartels and Urminsky 2015; Read 2004; Rick and Loewenstein 2008).

Previous literature suggests that people have preferences for where benefits are placed in a fixed period of time (e.g., people sometimes prefer larger benefits later and smaller benefits sooner; Chapman 2000; Loewenstein and Sicherman 1991; McClure et al. 2004; Loewenstein and Prelec 1993). Since subscriptions, and most contracts, involve costs and benefits that are spread over time, we control for the effect of benefit placement on the choice of subscriptions by positioning promotions at the beginning and the end of subscriptions. In addition, individuals' levels of impatience (as measured in temporal discounting studies) are likely to

be correlated with their time preferences for subscriptions, and therefore, may have an impact on choice. Consumers who generally discount the future more (i.e., are more impatient) should ask for more compensation to sign contract extensions. We measure the extent to which people's preferences for SS and LL monetary rewards align with their preferences for contract extensions in price discount and bonus time terms.

Ultimately, the choice of a subscription contract is a risky choice, as future consumption needs are inherently uncertain (the longer the contract, the longer the commitment to a single company). Previous research has investigated the relationship between risk tolerance and time preferences, finding that more risk-tolerant people tend to discount the future less than risk-averse people (Anderhub et al. 2001; Andersen et al. 2008; Booij and van Praag 2009; Eckel et al. 2005; Epper et al. 2011; Halevy 2008; Lammers and van Wijnbergen 2008). We contribute to this literature by addressing how impatience and risk tolerance impact the choice of subscriptions' extensions.

### 2.2.2 Framing Effects

Differences in the way choice outcomes are framed can change people's decisions in domains ranging from consumer preference to decision-making under risk (Levin et al.1998). Various studies have also investigated the effects of framing in the context of pricing (Diamond and Campbell 1989 or Krishna et al 2002 for a meta-analysis of 20 published articles examining the effects of price framing) but have not investigated the framing of prices and promotions in contractual settings.

Most relevant for the current studies, researchers have studied the differences between price discount promotions and bonus promotions, finding a larger effect of price discounts ("buy now and get 33% off the retail price") relative to bonus packs ("buy 3 and get a bonus pack for free") for large promotions, especially when discounts were presented as

percentages (Hardesty and Bearden 2003). They find that nonmonetary promotions (e.g., bonus time) must have a significantly higher value than monetary promotions (e.g., price discounts) to be noticed by and influence consumers (Campbell and Diamond 1990). Others have shown that price discounts have larger effects than bonus promotions for perishable goods (Smith and Sinah 2000), unhealthy "vice" foods (Mishra and Mishra 2011), and for unfamiliar and infrequently purchased goods (Chen et al. 2012; Ong et al. 1997).

We depart from such investigations insofar as our focus is on how people are differentially motivated by time bonuses ("buy three months, get one free") compared to price discounts ("buy 4 months at a 33% discount") which, to the best of our knowledge, has been studied only in the context of memberships to tourist attractions (Byun and Jang 2015). These researchers found that bonus time promotions generate more positive attitudes and purchase intentions towards new memberships than price discounts, but they did not consider how these patterns differ for different contract durations (e.g., 1, 6, 12, or 24 months).

## 2.3 Overview of the Studies

In the following sections, we present the results of six studies (one field experiment with millions of respondents and five follow-up laboratory experiments that collect data from more than 1,500 respondents) that investigate the impact of framing on consumers' time preferences and purchasing decisions of longer subscriptions' extensions. We vary the characteristics of the design over the studies to test various explanations for the systematic crossover of subscriptions' extensions preferences we observe (for an overview of all the studies, see Table 1).

(Insert Table 1 about here)

### 2.3.1 Study 1: A Large Scale Field Experiment

Study 1 examines the effect of framing the benefits of a subscription on consumers' time preferences in a popular area: the publishing industry. The Newspaper Association of America (NAA) recently estimated that 75% of newspapers in the United States use a digital-subscription model (2015 *NAA Circulation Facts*, *Figures and Logic*), suggesting the primary importance of (short-term or long-term) contracts in this field.

#### *Study 1a*

We conducted a controlled field experiment (Kohavi et al. 2009) in collaboration with a major Italian news publisher that offers digital subscriptions to their paid content section on the newspaper's website. This newspaper ranks first among Italian newspapers for online readers and third for online and offline readers (report 2015/II source Audipress.it). Therefore, we assume our sample of respondents is representative of the Italian readership population.

*Respondents and design*. Table 2 shows the between-subjects 2 (contract length: 2-month vs. 6-month) x 2 (promotion: price discount vs. bonus time) experimental design. We considered a one-week subscription as a reference base and tested the two longer subscriptions that the company regularly advertises using the actual prices they charge for these subscriptions. Each condition (in the form of a different digital landing page) reached about 2.5 million impressions in the six-week experimental period. Respondents were randomly assigned to one of the four digital landing pages (see Figure 2 for an example).

(Insert Figure 2 about here)

*Results and discussion*. A total of 303 website visitors purchased a subscription under one of the four conditions. Table 2 shows the number of purchases as well as the related purchase probabilities for each condition, which are all within the range of conversion rates typical of

online news websites. Respondents are more likely to buy a two-month subscription when the six-month contract promotion is framed as a price discount, but they are more likely to buy a six-month subscription when the six-month contract promotion is framed as a time bonus. In addition, we predicted the likelihood of a purchase using a logistic regression with three predictors: (i) framing (0 = bonus time, 1 = price discount); (ii) contract length (0 = 2 months, 1 = 6 months); and (iii) the interaction of these two factors. This analysis reveals a significant effect of contract length, a marginally significant effect of framing, and a significant interaction of frame-by-contract length, confirming the reversal of contract preferences (see Table 2).

(Insert Table 2 about here)

In summary, the results of the field experiment show that price discount promotions are more likely to stimulate purchases of short contracts and bonus time promotions are more likely to stimulate purchases of longer contracts, a pattern that would have been difficult to predict a priori. This finding may have been influenced by two methodological characteristics. First, for the price discount framing, the description of the promotion (62.5% off) remains the same whether it is a long or short subscription (2- vs. 6- month). However, for the bonus time promotion, the key figure increases (from 5 to 15 weeks) as the contract length increases. The second difference is that the price discount framing uses percentages while the bonus time framing uses absolute numbers, which also could explain the differences we observed between the price discount and time bonus conditions.

***Study 1b***

To check whether either of these differences caused the preference reversal, we conducted an additional study (Study 1b) that mimics the design of the field experiment in a survey based (online) setting.

*Respondents and design.* We asked 244 Amazon Mechanical Turk respondents (Americans with median yearly income between $30.000 and $40.000 and $M_{age}$ = 35) to choose between a 1-week base subscription to an internet service provider for $4.99 or an alternative offer of two versus six months, as shown in Table 3. The two and six-month subscriptions benefit from a price discount or a bonus time promotion. In this study, the savings in the price discount conditions are expressed in absolute (and increasing) figures. Differently from Study 1a, this study employs a within-subjects design: each respondent made four choices between a basic subscription and two alternative offers (two and six-month), one from each condition (price discount and bonus time), in randomized order.

*Results and discussion*. As shown in Table 3, for the two-month subscription, a higher percentage of respondents chose the long contract when the promotion was framed as price discount (88.5% vs. 59% in the bonus time frame, $t = 7.18$, $p < .001$). In contrast, for the 6-month subscription, the pattern is reversed: A higher percentage of respondents chose the 6-month contract when the promotion was framed as bonus time (77.9% vs. 48.4% in the price discount frame, $t = -6.33$, $p < .001$; see Table 3). We predicted the likelihood of a purchase using a logistic regression with six predictors: (i) framing (0 = bonus time, 1 = price discount); (ii) contract length (0 = 2 months, 1 = 6 months); (iii) the interaction of these two factors; (iv) age (continuous); (v) previous experience with purchase of an internet subscription (0 = no, 1 = yes); income (7 categories ranging from $0 to $70.000 treated as continuous). This analysis reveals a significant effect of contract duration and framing on the likelihood of purchasing, and a significant interaction of frame-by-contract duration. Age, previous experience and income had no significant impact on the choice of a non-basic subscription.

(Insert Table 3 about here)

Although Study 1b imitates many aspects of the field study, the experimental design was different (within- vs. between- subjects) and respondents were forced to select one of the subscription options (being forced to make a choice, compared to having an explicit or implicit "no choice" option can give rise to different selection processes; Dhar 1997; Parker and Schrift 2011; Schrift and Parker 2014). One possible limitation of Study 1a and 1b is that we did not explicitly state that the bonus time would be received at the beginning or the end of the subscriptions. Placing the bonus time at the beginning or end of the period could change preferences, and therefore, we explicitly state when this bonus is being paid out in Study 2.

### 2.3.2 Study 2: A Controlled Lab Experiment

To more thoroughly examine people's time preferences for subscriptions and how framing promotions influences these preferences, we asked respondents about their preferences for eight different contract extensions (of 3, 6, 9, 12, 15, 18, 21 and 24 months) in a controlled lab experiment.

We placed the bonus time at the beginning (in Study 2a) versus the end of the contract (in Study 2b) to assess whether the placement would affect people's preferences for shorter or longer contracts. In addition, at the beginning of the experiment, we told respondents that the total subscription fee is paid at the beginning of the subscription. The choice probabilities between the two framing conditions of Study 2a might differ as contracts in the bonus-time condition do not charge fees until later in the contract (when the bonus time ended). This could lead respondents to pay less attention to the monthly cost of the service taking effect later in the contract. Alternatively, respondents in Study 2b could respond more positively to bonus time, because the contracts offered place the benefit (consuming the service free of

charge) at the end of the subscription, and sometimes people prefer to postpone benefits when they choose among sequences of outcomes (Loewenstein and Prelec 1993). Either of these reasons could explain why preferences for subscriptions offering price discounts or bonus time (placed at the beginning vs. the end) would be different.

### *Method*

*Respondents and design*. A total of 167 Swiss students took part in one of two online experiments (in exchange for course credit) that examined preferences for internet-access subscriptions. To avoid using a service that is potentially subject to heterogeneity in its valuation across consumers, we chose Internet access as a test domain because everyone in our sample considered it to be a necessity. The experiment consisted of a choice task in which we asked respondents to indicate, for all contract durations, which of two contractual options they would have preferred: One option included a price discount promotion, and the other included a time bonus promotion. A third option allowed respondents to indicate that they did not like either contract option and preferred to stay with the base 1-month contract at $50 (see Figure 3).

(Insert Figure 3 about here)

*Results.* Figure 4 reports the choice probabilities for each option at each subscription length. The likelihood of choosing contracts offering bonus time is much lower for shorter contracts and much higher for longer contracts. This result emerged when the bonus time was placed at the beginning (Study 2a) or the end (Study 2b) of the contract. When contracts were shorter, respondents preferred contracts offering price discounts (as evidenced by the decreasing size of the circles reflecting the choice probabilities) but preferred to receive time bonuses for long contracts (> 15 months). The binomial tests compare these probabilities in the two frames for each contract length considered (with p-values showing whether there is a significant difference between each pair of probabilities). The results from these tests indicate

that for contracts lasting 15 months or more, respondents switched from preferring contracts offering price discounts to contracts offering bonus time. Therefore, this study reveals the same qualitative preference reversal as Study 1: a stronger discounting in the bonus time framing (requiring more bonus time for longer contracts) than in the price discount framing. This pattern underlines the importance of taking into account both framing and duration of the contract when offering contract extensions.

(Insert Figure 4 about here)

***Discussion***

In Study 2 we found that the positioning of the bonus time (at the beginning vs. the end of the subscription) did not matter (see also, Frederick and Loewenstein, 2008). Across both studies, people preferred price discount promotions for shorter contracts and bonus-time promotions for longer contracts.

An open question is whether people's preferences for these promotions can be influenced by the size of the numbers used to describe the offers. For example, in the bonus-time condition, respondents made decisions about units described by smaller numbers (e.g., 1, 2, 12, or more months of bonus time) than when they made decisions about price discounts (e.g., 20, 30, 40, or more euros or dollars per month in subscription charges). Our finding that bonus time promotions are discounted to a greater extent could be driven by a magnitude effect (see, e.g., Kirby 1997). Similarly, one could reasonably wonder whether the preference inversion happens for an absolute amount of time (e.g., 11 months) or for a certain magnitude, regardless of the unit. For example, what would happen if the subscriptions were per week rather than per month? Would the preference still reverse at 11 weeks, or at 44 weeks (11 months)? We addressed these questions in Study 3.

### 2.3.3 Study 3: A Test for Possible Magnitude Effects

The objective of Study 3 was to test for two types of possible magnitude effects. In the previous study, the basic contract that served as a common reference point for all trials was a one-month, $50 subscription. In studies 3a and 3b, we changed the cost of reference point subscription to $10. Similar to Study 2, we add bonus time at the beginning of the contract in Study 3a and at the end of the contract in Study 3b. Previous research on the psychophysics of numerical perceptions suggests that the magnitude of rewards can influence time preferences (Doyle 2013; Killeen 2009). The objective of Studies 3a and 3b was to test whether our findings would hold when the magnitude of the basic fee was smaller.

If the more pronounced discounting we observed in our previous bonus time conditions was influenced by the magnitude of the units describing the outcomes, then reducing the size of these units for the price discount condition might lead to greater discounting in the price discount condition. This may eliminate (or exaggerate) the differences we observed between time frames (weeks vs. months). So, if the reduction in the base subscription rate to $10 per month leads to a main effect or to an attenuated preference reversal, these findings may shed some light on the factors causing the preference reversal. In addition, in Study 3c, we investigate whether the reversal happens for an absolute amount of time or for a certain magnitude, regardless of the unit, by framing the bonus time condition in weeks (instead of months) to show similar magnitude values between the two framings.

#### *Method*

*Respondents and design.* A total of 167 Swiss students took part in Studies 3a and 3b, and Study 3c was presented to 235 Amazon's Mechanical Turk's respondents. Respondents in Studies 3a and 3b received a choice task that reflected Study 2, with the exception that they were considering lower dollar values. Respondents in Study 3c received a choice task

consisting of eight choices between two subscriptions (one with a price discount and the other with bonus time expressed in weeks instead of months) and the 1-week base subscription (for $5 per week).

*Results*. Figure 5 reports the choice tasks results for Study 3. Regardless of the size of the basic contract price ($10 vs. $50) or of the bonus time frame (weeks vs. months), respondents again preferred the price discount promotions for short contracts, but they preferred bonus time promotions for the long contracts. The results of the choice task are in line with the findings presented earlier: Respondents are more likely to choose short subscriptions when offered a price discount than bonus time. In particular, the binomial tests for Study 3c indicate that, after a 24-weeks contract duration (equivalent to 6 months), respondents switched from contracts offering price discounts to contracts offering bonus time.

(Insert Figure 5 about here)

***Discussion***

In Study 3, we examined whether magnitude effects could have produced the pattern of preferences observed previously. Our results suggest that magnitude differences cannot explain our findings. One potential limitation of Studies 2 and 3 is that all respondents were presented with the same contracts, which allowed for heterogeneity in preferences and could affect how people were discounting these outcomes (Hutchinson, Kamakura and Lynch 2000). For example, respondents who did not highly value Internet access may have perceived all subscription prices as being too expensive in previous studies. Someone who thinks that $50 per month is too much to pay could ask for large price discounts and/or more bonus time compared to someone who perceives the price as reasonable (the opposite is true for someone who believes $50 per month is relatively cheap).

In Study 4, we test the possibility that heterogeneity of preferences for Internet access and price perception offer a partial explanation of our effects and whether this preference reversal is affected by heterogeneity in valuation.

### 2.3.4 Study 4: an Adaptive Experiment and a Different Product Category

Study 4 consists of two experiments using base rates tailored to each participant to assess whether respondents perception of monthly subscription fees as excessively high or low (ceiling or floor effects rather than the magnitude effect addressed by Study 3) affected our results. In order to adjust the base rates, we asked each respondent three questions to determine his or her valuation of the one-month base contract. The questions for Study 4a are as follows:

1. What is the maximum that you would personally be willing to pay (in $) for one month of Internet access?
2. How many months of Internet access would you expect in return for signing a contract valued at $150?
3. How much would you be willing to pay for three months of Internet access (in $)?

We took the average implied monthly willingness to pay (WTP) from these three questions and used this value as the one-month base subscription fee. Study 4b was identical to Study 4a, except that instead of asking respondents about internet access, we asked about people's preferences for mobile phone plans offering unlimited voice and data.

#### *Method*

*Respondents and design.* A total of 134 Swiss students completed Study 4 which consisted of a choice of subscriptions for each of our eight contract durations that reflected Study 2b and 3b (since the placement of bonus time did not influence our results in Studies 2 and 3, the

bonus time was added at the end in Study 4), with the exception that the price we used for the basic subscription was tailor-made for each respondent, according to their WTP.

*Results.* We observed the same preference reversal found in previous studies (see Figure 6). Participants preferred contracts offering price discounts for shorter contracts, but preferred contracts offering time bonuses for longer contracts (~18 months).

(Insert Figure 6 about here)

***Discussion***

The same qualitative pattern of results is obtained in both of Study 4's tests, where the choice experiments are customized to each respondent's WTP for a specific service. This finding suggests choosing unexpectedly high or low subscription rates has not produced previous results, and that the patterns observed so far are not driven by people's different preferences for a specific service.

An open question is whether this preference reversal results from people having more experience (and therefore a better frame of reference) with price discounts than time bonuses. Previous research has shown that time preferences are influenced by frame of reference—people have more experience with interest rates than trade-offs without interest rates, and thus a better frame of reference (Read et al, 2013). In Study 5, we reconsider the potential impact of framing the monetary promotions in absolute terms compared to relative terms (an issue that we have partially considered in Study 1b) by including an "instant-rebate" experimental condition.

### 2.3.5 Study 5: Price Discounts, Bonus Time and Instant Rebates

Previous research has shown that for high-cost products, consumers perceive an absolute price reduction as greater than the corresponding relative price reduction (Chen, Monroe, and

Lou 1998). Therefore, in Study 5, we test whether the preference reversal we find also exists when we framed the price discount in absolute terms (as an instant-rebate to receive on the overall subscription). If the absolute value of the instant rebate is perceived to be greater than the corresponding relative value of the price discount, consumers should prefer promotions to be expressed in absolute terms (such as in the form of an instant rebate), but would otherwise prefer promotions to be expressed in relative terms. In particular, for long-term more expensive contracts, the large instant rebate on the lump sum could be perceived as more favorable than the comparatively lower reduction in the monthly fee, even if the final cost is the same for both options. On the basis of this reasoning, we expect consumers to prefer the instant rebate to a reduction in monthly rates for long-term contracts, with the opposite being true for short-term contracts.

***Method***

*Respondents and design.* Study 5 was completed by 181 Amazon's Mechanical Turk respondents and consisted of a within-subjects questionnaire with three experimental conditions: price discount, bonus time, and instant rebate. Since the survey was conducted online, we assumed that all respondents were familiar with internet services. As in previous experiments, the task consisted of a series of 16 choice trials in which respondents had to choose between a basic contract for one month at $50 and two equally valued, but longer-term, alternatives. In eight questions, we framed these two alternatives as a price discount and a time bonus (as in Figure 3), while in the other eight questions, we framed the alternatives as an instant rebate and a time bonus, as illustrated in Figure 7.

(Insert Figure 7 about here)

*Results*. Figure 8 reports the choice probabilities and the results of two binomial tests comparing price discounts to time bonuses and instant rebates to time bonuses. For short contracts, respondents preferred contracts with price discounts or instant rebates over

contracts with time bonuses. For longer contracts, they preferred time bonuses. Therefore, we once again find the same pattern of results. Even when the monetary promotion is framed in absolute terms (e.g. as an instant rebate), respondents were more likely to choose shorter contracts.

(Insert Figure 8 about here)

***Discussion***

The same qualitative pattern of results is obtained in Study 5, suggesting that the results of our previous studies are robust and are not a reflection of how we framed our price discount offers. Therefore, companies should offer promotions on their subscription services framed in monetary terms for shorter periods and should offer non-monetary promotions thereafter. Next, we examined several factors that we would otherwise expect to moderate people's time preferences in an attempt to better understand this preference reversal.

### 2.3.6 Study 6: a Comparison of Potential Moderators to Help Identify the Underlying Mental Process

In Study 6, we investigate how the preference reversal observed in all previous studies might be moderated by respondents' risk tolerance, their (pure) time preferences (for money), their financial literacy and their perception of future time and money slack.

Study 6a also tests whether preference reversals can be mitigated by providing people with additional information on the equivalence of alternatives in the choice experiment. The full-information condition—which reveals the equivalence of bonus-time and price-discount frames—is intended to help us identify people's "pure" time preferences for subscriptions, regardless of the framing of the promotion. Presenting this information should make the equivalence clear to all respondents (thereby reducing any moderating influence of financial

literacy), which allows us to verify the extent to which the preference reversal is driven by financial literacy. This manipulation is partly inspired by the work of other scholars who have discovered that reminding people of information already available to them affects their financial decisions (e.g., reminding people of the opportunity costs of their choices reduces discretionary purchases; Frederick et al. 2009).

In Study 6b, we asked respondents to calculate the fee for each subscription (the one offering price discount and the one offering bonus time) for each of the eight contract lengths. With this approach, we can verify whether respondents correctly interpret the bonus time framing and we can address the possibility that the preference reversal results from confusion about the instructions.

In Study 6c, we investigate the perceived availability of monetary and temporal resources at the time of the decision and in the future (for each contract duration). For this study, we built on Zauberman and Lynch (2005) who found that people expect more "slack gain", or gains in spare time and spare money, in the future than in the present. They also found that people expect more free time than available money in the future. Therefore, respondents may prefer bonus time promotions over price discounts on long subscriptions, because they may expect to have more time to use their subscription in a more distant future.

*Risk tolerance.* Consumers often make choices about more certain outcomes in the present and less certain outcomes in the future (Ahlbrecht and Weber 1997). Choosing between subscriptions of different lengths leads to some uncertainty. From the consumer's perspective, the longer contracts are riskier, because the longer the contract, the more likely it is that a better subscription can be offered and/or that one's preferences change. This risk reduces the relative value of the later periods of the service and leads consumers to require some kind of compensation for accepting the uncertainty inherent in longer contracts. Halevy

(2008) argues that one cause of hyperbolic discounting behavior lies in the uncertainty of future prospects as opposed to the certainty of the present, which suggests that people perceive decisions with outcomes in the distant future to be risker. In line with this view, Epper, Fehr-Duda, and Bruhin (2011) suggest that the degree of decreasing discount rates is closely linked to individual risk-taking behavior. Several authors find that the most risk-averse people have higher discount rates because they require more compensation for the uncertainty inherent in future outcomes (Anderhub et al. 2001; Eckel, Johnson, and Montmarquette 2005; Lammers and van Wijnbergen 2008). This suggests that a more risk-averse consumer will show higher discounting in his or her subscription preferences than a more risk-tolerant consumer.

Although several researchers have addressed the relationship between risk aversion and time preferences (Anderhub et al. 2001; Booij and van Praag 2009; Eckel et al. 2005; Lammers and van Wijnbergen 2008), to the best of our knowledge, the relationship between risk aversion and time preferences for subscriptions has not yet been studied. In addition, previous accounts of framing effects would not explain the preference reversal we find without making ancillary assumptions. People's risk tolerances may differentially affect their preferences for subscriptions that offer bonus time or price discounts. We speculate that people might have less difficulty translating their risk tolerances into their subscription valuations within the price-discount frame. If the valuation of contracts that offer time bonuses were more difficult than the valuation of contracts that offer a price discount, we would expect risk aversion to be a better predictor of subscription preferences in the price-discount condition.

*Time preference (patience).* Similarly, consumers who generally discount the future more should also require more compensation to sign longer contracts. In this study, we

measure the extent to which people's preferences for smaller-sooner and larger-later monetary rewards (traditional measurement of pure time preferences) align with their preferences for extending contracts in bonus-time and price-discount conditions. People with greater risk tolerance and greater patience should require a smaller discount or a shorter bonus time to commit to longer contracts.

*Financial literacy.* A neoclassical account of intertemporal choice would assume that people would consult their beliefs about future states of the world, assign values to those states, discount those values by a constant rate, and use this process to make optimal plans for the future (Frederick et al. 2002). The ability to make intertemporal choices involving finances, such as choices between subscriptions, presupposes at least a rudimentary understanding of mathematics and finance. Recent research has found individual differences in financial knowledge relate to different patterns of preferences and behaviors (Lusardi and Mitchell 2011). In particular, consumers with less financial and mathematical resources are more likely to suffer negative economic outcomes (Braunstein and Welch 2002; Chen and Volpe 1998; Jappelli and Padula 2011; Lusardi and Mitchell 2011) and are more sensitive to framing effects (Peters et al. 2006).

Therefore, in Study 6a, we expect to observe smaller differences in the valuation of two promotions offering identical monetary terms (e.g., "buy 9 months, get 3 free" vs. "get 25% off") for consumers with high financial literacy compared to consumers with low financial literacy, because the former may more easily see the equivalence of the two framings. Financial literacy could in turn moderate the relationship between risk tolerance and subscription preferences in the more difficult to assess bonus-time condition. Following the same logic, financial literacy may moderate the relationship between time preferences for money and subscription preferences in the bonus-time condition.

In addition, if what causes the preference reversal is the difficulty of assessing the value of a bonus time—in aligning one's risk tolerance and time preference with preferences for bonus time—the preference reversal should be attenuated under full disclosure conditions. Study 6a's full-information condition shows the equivalence of the promotions, thus mitigating any need for calculation or translation, and removing the advantage enjoyed by those who are more financially literate. However, Study 6b requires participants to perform this calculation, so we expect to find a preference reversal only among those who are less financially literate.

*Resource slack*. In Study 6c we measure individuals' perceived future availability of time and money to address the possibility that the preference of bonus time promotions for long contracts is related to individuals' tendency to overestimate their availability of time in the distant future. Zauberman and Lynch (2005) found that people consistently perceive the same investment to be more costly when closer, rather than farer, in time and showed that this bias towards the present is greater for investments of time than of money. Therefore, a strong belief of having more available time in the distant future could be a candidate explanation for the preference of bonus time (compared to price discounts) promotions for longer contract extensions.

***Method***

*Respondents and design*. We recruited 377 (for Study 6a), 250 (for Study 6b) and 213 (for Study 6c) Amazon's Mechanical Turk respondents to complete a survey.

*Study 6a*. Study 6a's choice task was similar to the one used in Study 2b (reported in Figure 2) for half the sample (partial information condition). For the other half (full-information condition) it was made explicit that both promotions had the same monetary value and that people were choosing among contracts of the same value (see Figure 7). The

*risk tolerance* of each respondent was calculated based on his or her choices between six gambles (a measure defined by Chetan et al. 2010), where the higher the value of the bet chosen, the greater the risk tolerance. An indicator of *time preferences for lump sums* was calculated as the share of LL (larger later) compared to SS (smaller sooner) monetary rewards chosen by respondents among 14 pairs (Bartels and Li, in progress), where the higher the number of LL outcomes chosen, the more patient the respondent. Finally, the individual level of *financial literacy* was calculated by averaging the number of correct answers on a series of 13 questions in the areas of finance and mathematics (a measure developed by Fernandes, Lynch, and Netemeyer 2014). This scale is strongly correlated with "numeracy", or people's general acumen for working with numbers in a more general sense.

*Study 6b*. Study 6b consisted of a choice task similar to that of previous studies, but also asked respondents, before choosing the preferred option, to calculate the total fee of the subscriptions with each promotion, as shown in Figure 9.

(Insert Figure 9 about here)

*Study 6c*. Study 6c faced respondents with three tasks, a task to measure respondents' perception of time slack for each contract duration, a task to similarly measure their perception of money slack (see Figure 10) and a choice task similar to that of previous studies to measure preferences for price discount and bonus time on different contract durations.

(Insert Figure 10 about here)

***Results***

*Study 6a*. To understand the impact of individuals' risk tolerance and time preferences (for lump sums) on the likelihood of choosing a long or short subscription depending on the benefit framing, we have conducted a multinomial logistic regression. The dependent variable was the choice between (1) price discount, (2) bonus time or (0) staying with

baseline. We used contract duration, risk tolerance and time preferences for lump sums as predictor variables.

We again find the same preference reversal (see Table 4). In fact, the longer the duration of the contract in question, the lower the likelihood of choosing a longer contract with a promotion framed as a price discount (relative to staying with the base 1-month contract). On the other hand, the longer the duration of the contract being considered, the more likely it is to choose a longer contract with a promotion framed as bonus time (relative to staying with the base 1-month contract). As expected, greater risk tolerance has a significant and positive impact on the likelihood of choosing a longer contract for both promotions. Moreover, the general level of respondents' patience (measured as time preferences for lump sums) is marginally linked to the probability of choosing a longer contract with a promotion framed as a price discount (relative to staying with the base 1-month contract). Therefore, the more patient the respondent is, the more likely she is to choose a price discount (relative to choosing the shorter base contract).

To investigate whether a respondent's level of financial literacy affects time preferences and contributes to the preference reversal, we have conducted the same (robust) multinomial logistic regression for respondents below and above the median financial literacy level (Median=0.769 in a range between 0 and 1). If people who are more financially literate are able to better see the differences between these promotions and translate their risk tolerance and patience into subscription preferences, then highly financially literate respondents should discount subscription benefits similarly across frames (and should not show any preference reversal). As expected, contract length had a negative impact on the choice of a price discount promotion and a positive impact on the choice of a bonus time promotion for respondents with low financial literacy. However, contract length did not influence choice of bonus time promotion for respondents above the median on financial

literacy, which suggests that those respondents do not value the two promotions differently and therefore do not show any reversal of preference. Furthermore, the level of patience of these respondents does not impact the choice of bonus time.

(Insert Table 4 about here)

In Figure 11, we report choice probabilities and binomial tests for respondents below and above the median level of financial literacy. The preference reversal is discernible for respondents with a low level of literacy (in the left-hand panel) but almost disappears for respondents with high financial literacy (in the right-hand panel, the inversion visible for contracts lasting 24-month could be due to respondents with a level of financial literacy very close to the median), confirming the results of the regression analyses. In Study 6a, we asked respondents to choose between contracts that offered price discounts and contracts that offered bonus time for eight different contract lengths (3, 6, 9, 12, 15, 18, 21 and 24 months). However, for half the respondents, the total subscription fee for each choice option is shown in brackets to clearly indicate that the final contracts prices are identical. This allows all respondents—not only those with a high level of financial literacy—to translate their time preferences into decisions on the extension of subscriptions.

Figure 11 summarizes the choice probabilities and the binomial tests for sub-samples with and without full information. We observe the standard preference reversal when respondents were presented with partial information (i.e., no information was provided on the equivalence of the offers). When we provide respondents with full information (on the equivalence of the offers), the preference reversal disappears, as respondents show a relatively constant preference for the contracts framed as price discounts.

*Study 6b.* In Study 6b, we assess whether respondents have correctly interpreted the manipulation of bonus time. As shown in Figure 11, when respondents are able to calculate

the right amount and see that both options cost an equivalent amount, they prefer, for all time periods, the "price discount" option (although with a decreasing probability, a larger share prefers the "bonus time" frame for 21 or 24 months durations). This result is consistent with the findings of Study 6a, in which we provide (full) information to respondents on the total cost of the contract in both frames instead of asking them to calculate costs. The results also reveal that when respondents are unable to calculate the right amount (as they make a mistake in the calculation), the preference reversal emerges. That means that the results of Study 6a's choice task do not depend on misunderstanding of the bonus time frame.

(Insert Figure 11 about here)

*Study 6c.* This study also consisted of a choice task, similar to previous experiments, and we used responses to this task to create a variable indicating the "preference reversal". This indicator variable would be equal to -1 if the respondent did not choose the bonus time, but chose the price discount, 0 if the respondent chose to stay with the short contract, not choosing the price discount or the bonus time or 1 if the respondents did not choose the price discount, but chose the bonus time. For each respondent, we have calculated the correlation between the preference reversal and the contract length finding an average value (of all the individual correlations) of .440, which suggests that choices of bonus time increase with contract length.

As shown in Table 5, we correlated the dummy for choice of price discount and bonus time with contract length. These two correlations point in opposite directions, suggesting once again that choices of bonus time (price discount) increase (decrease) when the contract length increases. A Fisher-test confirms that the two correlations are significantly different from each other, which suggests a preference reversal. The correlations between time slack and money slack with the duration of the contract are positive, suggesting that respondents

feel that they have more resources available (in terms of time and money) in the distant future, compared to the present, a result in line with findings from Zauberman and Lynch (2005). We have also taken these correlations (indicating the relationship between the duration of the contract and time and money slack) and we have regressed them on the correlations between the duration of the contract and the choice of the price discount, the duration of the contract and the choice of a bonus time and the duration of the contract and the indicator of a preference reversal.

As shown in Table 5, a stronger correlation between the duration of the contract and time slack weakens the correlation between contract duration and choice of price discount. This means that the more respondents believe that they have more time available in the future, compared to the present (positive correlation between contract duration and time slack), the less likely they would be to choose the option that offers a price discount for longer contracts. Also, a stronger correlation between contract duration and time slack strengthens the correlation between contract duration and choice of bonus time, which implies that the more the respondents believe that they have more time available in the future, compared to the present (positive correlation between contract duration and time slack), the more likely they would be to choose the option that offers bonus time for longer contracts.

In other words, a stronger correlation between contract duration and time slack strengthens the correlation between contract duration and the preference reversal. That is, the more respondents believe that they have more time available in the future, the more they prefer to choose bonus time. There were, however, no strong relationships between preferences in this task and people's perception of future money slack. It therefore seems that the belief of having more time available in the future (compared to the present) increases the choice of time benefits compared to monetary benefits. However, there seems not to be an

impact of the perception of monetary resources available on the probability of choosing a contract with price discount or bonus time.

(Insert Table 5 about here)

***Discussion***

Study 6 reveals that the preference reversal we have found in previous studies disappears when the value equivalence between promotions is illuminated (by providing complete information or asking respondents to calculate the total fee). In addition, the robustness of the findings obtained through different approaches to clarify equivalence (providing full information vs. asking to calculate the equivalence) suggests that the preferences observed are robust. This finding indicates that if people are more aware of the equality of the total costs resulting from the two offers, they will prefer price discounts to bonus time, a result in line with previous findings in the framing literature (Chen et al. 2012; Hardesty and Bearden 2003; Mishra and Mishra 2011; Ong et al. 1997; Smith and Sinah 2000).

Study 6 confirms the relationship between risk tolerance and time preference found in previous research, as more risk-tolerant people tend to discount the future less than risk-averse people (Anderhub et al. 2001; Andersen et al. 2008; Booij and van Praag 2009; Eckel et al. 2005; Epper et al. 2011; Halevy 2008; Lammers and van Wijnbergen 2008). Risk tolerance and time preference relate to subscription preferences in the way we would predict, because people with greater risk tolerance and greater patience require a smaller discount or a shorter bonus time before they are willing to sign up for longer contracts. However, the translation of risk tolerance and patience into preferences for subscriptions extensions is easier to perform for promotions framed as price discounts, and only the most financially literate people can comfortably perform this translation for promotions framed as time bonuses.

To summarize, people with greater financial literacy can more easily translate their risk tolerance and time preferences into subscription preferences. Therefore, those who are less financially literate show the preference reversal observed across all our studies. This result complements the work of Jappelli and Padula (2011) and Lusardi and Mitchell (2011) who find that people with less financial knowledge or mathematical skills may be more inclined to make suboptimal decisions because they are less able to exploit service information when making their choices. Our results are also broadly consistent with other studies that find larger framing effects for people with lower numeracy (Peters et al. 2006). Furthermore, this study helps to clarify why people prefer bonus time for longer subscriptions. The belief of having more time available in the future seems to increase the choice of time benefits over monetary benefits.

## 2.4 Discussion

The main objective of this paper is to explore consumers' time preferences in contexts where people make choices about contract durations (e.g. subscriptions), which involve costs and benefits that are distributed over time (as opposed to the bursts of utility provided by lump sums of money). We find that consumers' time preferences for contract extensions differ depending on whether extensions' promotions are framed as a price discount or as bonus time. We find that consumers prefer price discounts promotions in contract extensions up to about 11 months (although the timing of this shift varies from 6 months to 14 months in our experiments) and prefer bonus time promotions thereafter.

The pattern of preferring price discounts for shorter contracts' extensions and bonus time for longer contracts' extensions is replicated in all studies, despite varying several parameters such as: the time at which free months are offered (the beginning vs. the end of

the subscription), the size of the base subscription rate (the magnitude effect of the monthly fee of $10 vs. $50, or the customization of this value through adaptive surveys) the time unit (weeks vs. months), the type of service offered (Internet vs. mobile phone), and whether the monetary promotion is framed as a discount or a rebate (monetary promotion in relative vs. absolute terms).

Some could argue that a potential explanation of the preference for monetary benefits in the short run and for temporal benefits in the long run would be related to construal level theory (Liberman and Trope, 1998; Trope and Liberman, 2003). According to this theory, in the distant future, people focus on abstract attributes related to an object/ event (in our case the attribute of "time" included in an extended contract) while in the immediate future they focus on concrete and feasible attributes of the same object/ event (such as the costs included in an extended contract). However, on our reading of construal level theory, it would not predict differences in discounting between time and money when both are gains or both are losses without some ancillary assumptions. Since in our paper both money and time are presented as rewards/ benefits (in the form of discounts on longer subscriptions) and we find a strong difference in time versus money discounting, we think our results are not easily explained by construal level theory.

In fact, our result that time is discounted more than money is in line with Zaubermann and Lynch (2005) and also with Soman (1998) who found that money gain promotions requiring time/effort to redeem became more attractive if money gain and time expenses were both delayed, rather than immediate. Our results suggest that consumer' time preferences for subscriptions are influenced by individual's risk tolerance and differ according to a person's financial literacy. In fact, respondents with better financial abilities do not show a reversal of preference. In Study 6a, providing equivalency information to all consumers led to the elimination of the preference reversal and to stable preferences for longer subscription

contracts framed with a price discount. In addition, the effects we observe do not differ between samples of respondents in our studies (i.e., the U.S. English-speakers express the same preferences as the Swiss German-speakers).

The current results complement previous results regarding people's preferences for promotions, as previous papers have found that monetary promotions, such as price discounts, are easier to comprehend than nonmonetary promotions, such as bonus time (Campbell and Diamond 1990; Klein and Oglethorpe 1987). Therefore, the likelihood of misunderstanding and skepticism is higher for nonmonetary promotions than for price discounts, because the required level of information processing is higher (Hardesty and Bearden 2003). However, we assessed and did not find support for miscomprehension as a possible explanation of the reversal in our analyses of Study 6b.

This paper provides new insights by finding that intertemporal choices for subscriptions are strongly influenced by the framing of the subscription's promotion. Our studies reveal a robust pattern of preference reversal and suggest that people's valuation of bonus time is more labile than their valuation of price discounts. This difference is suggested by (i) the moderation analyses in Study 6, where we find people with higher financial literacy better align their risk tolerance and time preference (measured by other tasks) with their subscription preferences when evaluating bonus time (while financial literacy plays a minor role in the potentially easier-to-value price discounts); and (ii) the fact that the only way we were able to extinguish the preference reversal was to provide complete information presenting the equivalence of the frames in the choice task (thus reducing the possible need for calculations or a reliance on financial literacy).

In summary, this paper finds that people's preferences for price discounts seem to be more or less a reflection of what they truly value, insofar as these preferences are more immune to further information than bonus time promotions (while presenting additional

information makes bonus time preferences seem more similar to their preferences for price discounts). To this point, Study 6c suggests that a potential cause for the greater preference for bonus time promotions for longer contract extensions derives from people's perception of future time slack. The belief that having more time available in the future than in the present (compared to monetary resources) increases the likelihood of a preference for bonus time than price discounts promotions with longer contracts.

## 2.5 Guidelines for Future Research and Conclusions

Although the findings of this paper are relevant to a company's decision to offer subscriptions extensions with price discounts or bonus time promotions for specific contract durations, our examination only considers short-term demand. Although consumers' preferences for discounts as opposed to bonus time are relatively invariant, we cannot predict what happens when the chosen contract expires (long-term demand). Research has shown that price discounts can lower reference prices, and therefore, repeated price discounts might adjust consumers' perceptions of a service's value downward (Diamond and Campbell 1989; Hardie, Johnson, and Fader 1993). Although price discounts may induce consumers to sign short-term contracts more than bonus time, they may also reduce consumers' reservation prices, and thus diminish the firm's profitability, in the long run. We believe this will be an important topic for future research.

Our investigation offers the first evidence of a preference reversal between two common types of promotions for subscriptions' extensions: price discounts and bonus time. All of our experiments have found that people favor price discounts over bonus time for shorter contracts, and favor bonus time over price discounts for longer contracts. We report further evidence of our claim in the web appendix accompanying this manuscript. In section A we describe and report the results of matching tasks used to obtain individuals' time

preferences for subscriptions and to calculate their discount rates for studies 2, 3, 4, 5 and 6a. In section B we consider issues of possible measurement variance, and we test whether eliciting time preferences through a choice task instead of a matching task reveals different patterns. This additional control once again yields results consistent with our main finding: for short-term contracts, people prefer price discounts, for long-term contracts, they prefer offers of bonus time. In Section B we also summarize additional preliminary studies conducted but not reported in the manuscript.

Given the robustness of our findings, we propose the straightforward managerial implication that companies should offer short-term contracts' extensions with price discounts (up to about 11 months) and long-term contract's extensions with bonus time. This implication is the practical contribution of these studies, but it must be taken with caution, especially if the customer base is highly financially literate. Future research should analyze the long-term effects of these promotional prescriptions by examining whether price discounts become less attractive over time because they lower consumer reference prices. We hope this paper will encourage work in these and related directions.

# Chapter 3. The Compromise Effect in Post-Purchase Consumption Behavior

## 3.1 Introduction

The notion that decision-making under uncertainty is influenced by the choice context has received a lot of attention (Huber, Payne, and Puto 1982; Huber and Puto 1983; Simonson 1989; Simonson and Tversky 1992; Tversky and Simonson 1993). It represents an important revision of the traditional economic theory of rationality stating that the probability of choosing an item should not increase following the addition of another item to the choice set. Yet, the above-mentioned studies, among others, have demonstrated that under some conditions, the addition of a third alternative into a choice set of two can significantly increase the share of one of the original alternatives, thus violating rationality and regularity axioms (Luce 1959) (See Figure 1 for an example of a "compromise" offer page of a well know streaming entertainment provider**)**. Although past research has largely investigated this phenomenon, very little is known about the impact of context effects on the post-purchase phase.

In the present research we contribute to the literature about the well-known compromise effect (Simonson 1989) shifting the focus from the decision-making phase to the post-choice phase. In particular, we will look at the consequences of the selection of a compromise alternative on individuals' post-purchase consumption behavior. To preview our findings, the choice of a compromise product is experienced as difficult and uncertain and triggers the subsequent choice of complementary items. It also leads respondents to upgrade their initial (compromise) product, when given the possibility, somehow uncovering a sense

of dissatisfaction related to that choice. These findings may be of use to marketers using the compromise (3-item) choice set as a promotion strategy as when choosing the middle option, customers might better receive the proposition of complementary items.

The next sections of the paper will review the existing literature and theoretical background. Afterwards we provide the theoretical foundations of our expectations about choice behavior subsequent to the compromise. The fourth section will detail our findings from a diverse set of studies in multiple domains and, the final section, will integrate such findings for our understanding of consumer decision making and for addressing their implications for business and marketing practice.

## 3.2 Related Literature and Theoretical Background

The compromise effect, namely the increase in share of choices of an option when it is placed in the middle of a three-item choice set, has been widely investigated by consumer and decision researchers over the past three decades (e.g., Simonson 1989, Simonson and Tversky 1992; Drolet, Simonson and Tversky 2000; Kivetz, Netzer, and Srinivasan, 2004; Drolet, Luce and Simonson 2009) and different explanations have been proposed for its occurrence. In particular, a compromise choice is driven by an active and conscious consideration and comparison of the product attributes and the preference for or against such average alternative is often explicitly justified by the alternative's position within the choice-set under consideration (e.g., Simonson 1989; Dhar and Simonson 2003). The compromise alterative can serve as a decision simplifier as the middle option is a safe choice, easy to justify in front of others and less subjected to criticisms (Huber and Puto 1983; Simonson 1989; Dhar and Simonson 2003). It can be the outcome of a "matching" process whereby the choice is the result of a comparison between an ordered set of products in the market and the

position occupied by consumers in a hypothetical order of tastes (Wernerfelt 1995; Prelec, Wernerfelt and Zettelmeyer 1997; Kamenica 2008). This comparison process can lead to unstable preferences when the perceived product ranks changes due to product array manipulations (e.g. in the case of a compromise choice-set, Burson 2007) or when people choose the middle option erroneously believing to be average among others in the population (Gershoff and Burson 2011). Most recently, Simonson, Seela and Sood (2017) demonstrate that compromising can be an inherent trait, an individual tendency to avoid extremes.

In short, the scientific literature agrees that the primary driver of compromising is preference uncertainty. When a consumer has no clear preference for one of (three) available options, loss aversion tends to favor the middle one because it leads fewer disadvantages in relation to the other two. Since disadvantages loom larger than advantages (Kahneman and Tversky 1984; Tversky and Kahneman 1991), the intermediate option has a higher probability of being chosen than an extreme one (a phenomenon also known as "extremeness aversion" that, when acting on both product attributes, can generate the compromise effect).

On the contrary, when a consumer is certain about his/ her preferences, the compromise choice is unlikely and would leave the consumer worse off. Consider the following example: Mary is looking for a new apartment and is considering option A (located in the city center, close to her work place), option C (located in the countryside, in a nice and peaceful environment) and option B (mid-way among options A and C). Choosing option B would clearly be a suboptimal decision as Mary would be far from the place she likes, most leisurely option, as well as from her working place, most convenient. Therefore, a compromise option is minimizing losses in the sole case of preference uncertainty. Also, the choice of the middle option in a three-item set (A, B and C) will make the extreme ones become a reference point (either A or C).

We speculate that, the initial uncertainty related to a compromise choice might

disperse after consumption/ experience of the product/ service overtime and, as consumers figure out they made a suboptimal decision, they might take corrective actions in subsequent steps. In this paper we find evidence of an increased tendency to choose complementary items and to upgrade the compromise product chosen in the first place to achieve the best version that was available in the original three-item choice set (now acting as a reference point).

Although the compromise effect has been studied from various perspectives, still unclear is the consumption behavior of compromise products, which is the main focus of this paper. Some studies have considered the long-term effects of a compromise decision in situations of repeated choices and have demonstrated that the compromise effect is unstable over repeated decisions (Yoon and Simonson 2008) possibly because when people choose repeatedly in a specific context they tend to learn a context-specific choice heuristic which leads to less consistent preferences across different contexts (Amir and Levav 2008).

Interestingly, Drolet (2002) demonstrates that the compromise effect weakens over repeated choices because consumers tend to vary their use of decision rules independently of option and set characteristics. The author contests the assumption that the decision process is stable over time: as options selected tend to vary, also decision rules applied to select preferred options are susceptible to a variety seeking behavior. When consumers have to face contiguous choices they tend to change the decisional rule that they apply: in the first choice task consumers tend to apply the decision heuristics illustrated by Simonson (1989), but along subsequent decisions they tend to vary the heuristic applied. Along this line, our finding that a compromise choice is followed by the choice of additional complementary items, might be explained by a change in decisional rules: to compensate for being indecisive (i.e., choosing compromise), consumers might tend to make other choices (i.e., being decisive).

However, our findings depart from those of Drolet's (2002) and of the other referenced authors, as we do not investigate repeated choice, rather the choice of one compromise product and then its consumption. To the best of our knowledge, only Yoon and Simonson (2008) took a step in this direction. They investigate the actual experience with an object, a pen selected in an asymmetric dominance choice set, making respondents scribbling the target pen on a piece of paper. They find that participants who used the pen after selecting it from the set in which it was dominating, rated its overall quality higher and were more satisfied with it. Interestingly for our case, they also demonstrate that when the role of the context is salient and transparent (such as in the case of a compromise effect), the resulting option preference is weaker and is associated with lower confidence, a finding in line with our experiments results. The authors suggest in their case the following decision process trace: (1) less stable preferences, (2) lower choice confidence and (3) preference attributed to option attractiveness in that context (enhanced compromise effect). As our experiments reveal, the compromise choice is a low confidence choice that we know is driven by preferences uncertainty. Therefore, we speculate it leads to low choice satisfaction and, as a consequence, to low consumption satisfaction. However, our investigation departs from that of Yoon and Simonson (2008) because we observe overtime consumption of a contractual-based product (Study 1), which differs from the one-time usage and rating of a pen, and we consider the choice of additional items that complements the first choice of a compromise option (Studies 2 and 3).

In addition, if a compromise choice leads to low consumption satisfaction, it also might trigger a feeling of psychological regret. As a consequence consumers might adopt strategies to diminish such regret and compensate such dissatisfaction (for instance by buying additional products). A similar behavior in the marketing literature has been addressed as sunk-cost effect (Thaler 1980; Arkes and Blumer 1985), which is defined as an increased

tendency to continue a commitment once an investment has been made. This effect arises when the investment done triggers a feeling of psychological regret when not accomplishing the investment (e.g. using a product we have already bought). To avoid wasting an unsuccessful sunk investment, and rather than simply regret the past, people may do irrational things to make their past choices look better either because they have a taste for consistency (Eyster 2002) or because they want to reduce the cognitive dissonance (Festinger 1964) brought by this past behavior and, for instance, tend to invest even more in an unsuccessful project. Because people tend to choose the compromise option when they are unsure about their preferences the effect on post-purchase consumption might be similar to that of a sunk-cost effect. In other words, if that is the case, we expect a compromise choice to trigger some form of increased consumption. To preview our results, respondents in our studies react to compromise choices by making complementary purchases that enhance their compromise purchase. Since we find evidence of this effect both in the field as well as in the lab we propose that people compensate a compromise (suboptimal) choice with an increased consumption of complementary products (to be potentially explained by a sunk-cost effect).

## 3.3 Overview of the Studies

In the following sections, we present the results of four studies (one field experiment and three follow-up laboratory experiments) that investigate the consequences of the selection of a compromise alternative on the subsequent post-choice behavior. We vary the characteristics of the design over the studies to test the robustness and various explanations for the systematic effect we observe. In Study 1 we explore the relevance of our research questions with an offline field experiment and a subscription-based product. In Study 2 we try to replicate the setting of the field study in a survey-based online experiment to purify the

treatment and test the robustness of our main finding at the same time ensuring internal validity. In brief, these studies show that, at first, consumers choose a compromise alternative, not maximizing their benefits, and then they choose additional complementary items and upgrades that improve the first option. These results suggest a sort of compensatory mechanism that we try to disentangle in studies 3 and 4. In Study 3, we test whether the increased choice of complements is driven by the complexity involved in a compromise decision controlling for the asymmetric dominance (attraction) effect. This other context effect triggers a relatively effortless choice, not requiring particularly difficult and conscious thinking. We therefore expect not to find the same increase in complements chosen after the choice of an asymmetrically dominating option. In Study 4, we test whether the compromise choice can trigger feelings of control loss (and consequently sadness). This could explain the increased subsequent purchase of complements as a shopping therapy that restores personal control.

### 3.3.1 Study 1: a Field Experiment

To investigate our research questions, we need to observe purchase decisions as well as consumption behaviors. To this point, contractual-based services (e.g. gym memberships, newspaper subscriptions, Internet and phone flat rates or leasing agreements) represent a useful experimental environment. In such case, a customer uses some product/ service for a predetermined time period and companies (as well as researchers) are able to track, next to the purchase decisions, customers' consumption behavior over that time (e.g. entries to the gym or accesses to digital articles).

### *Experimental Design*

Study 1 examines the impact of the compromise effect on post-purchase consumption in a contractual setting. We conducted a field experiment at the cafeteria of a major university in Germany that regularly offers three different menus (menu 1, menu 2 and vegetarian menu) for an average (stable) price as well as other complementary items (such as salads, pasta, drinks and desserts) for variable prices. We developed three pre-paid cards combining the three available menus to offer the possibility to consume five meals in a period of four weeks at a discounted price. We varied the pre-paid cards along two attributes: price and flexibility of consumption, as described in Table 6 and Figure 12.

(Insert Table 6 about here)

(Insert Figure 12 about here)

This price/ flexibility configuration was developed according to the results of historical purchase data analysis. This data is generated through the university ID cards (a unique card assigned by the university to students and staff members), which are personal, electronic and can be used to pay for meals at the canteen counters by both students and staff members. Since we planned to run our field experiment in spring 2016 we have analyzed individual level usage data from Monday 13th April 2015 to Friday 8th April 2015 (19 opening days, 4 weeks). On average, a subject visited the canteen 7-8 times in the four weeks analyzed; therefore, we have decided to include a total of 5 menus in the promotional pre-paid cards (instead of more). With regard to the pricing of the cards we used the average prices of the menus (menu 1 and menu 3 for 2.90€ and menu 2 for 3.50€), summed it up over 5 consumption episodes and then decreased it to provide the highest discount with the least flexible card. To further analyze whether this cards configuration could serve our purpose and trigger a compromise effect, we pre-tested it with a questionnaire on 153 first semester's students (88 females and 65 males, aged between 18 and 25) during a Bachelor's marketing

class. Test of the difference of two proportions confirms that the share of choices of card Premium was higher than that of card Basic ($\#_P$ = .43 vs. $\#_B$ = .35 Z=-1.99, P>|Z| = .046) and of card Gold ($\#_P$ = .43 vs. $\#_G$ = .22 Z=-5.25, P>|Z| = .000) confirming that the 3-item choice-set triggered a compromise effect (we report in appendix –section C– a detailed description of the historic data analyses and of the pre test).

***Field Data Collection, Analyses and Results***

We conducted the field experiment in Spring 2016 by selling pre-paid cards at the entrance of the Cafeteria in two different days at lunchtime to separately collect treatment and control groups. The control group was faced with a 2-item choice-set (pre-paid cards Basic and Premium) while the treatment group saw a 3-item choice set (where card Gold was added as the most expensive/ most flexible option) with option B in the middle, as compromise alternative.

A total of 238 people purchased one of the pre-paid cards. Table 7 summarizes purchase decisions and shows an 18% increase in share of purchases of card Premium in the treatment group, relative to the control group, with a share when compromise of 31% relative to a share when non compromise of 13% (t = 3.44; $p$ = .001). With the purchase of the pre-paid cards, respondents released their name, their personal ID card number and their email address and they were told that they would have received an online survey to complete in return for the chance of winning a 100€ worth Amazon voucher.

(Insert Table 7 about here)

*Purchase decision evaluation*. We sent all participants an online survey asking them to recall their purchase decision and to indicate the card they purchased that morning (we presented either the 2-items choice set to respondents in control group or the 3-items choice set to respondents in treatment group). Then, respondents had to rate their satisfaction, confidence and sense of justifiability about their choice (on 7-points Likert scales adapted

from Heitmann et al. 2007 who showed that decision satisfaction leads to consumption satisfaction) and the difficulty, stressfulness and sense of confusedness related to it (1-item).

The response rate for this survey was 90% (207 respondents out of 238, 71 females, 126 males, 87% aged between 18 and 25 either students or staff members). We compared averages on all scales between respondents who chose the card Premium in treatment (compromise choice) and in control groups (non-compromise choice). Consistent with expectations, choice confidence (1-item) was lower for respondents who chose the compromise card ($M_T$= 5.55 vs. $M_C$= 6.15, t=1.73, $p < .1$). T-tests results do not reveal statistically significant differences on the other scales but considering the small sample size (14 responses in control vs. 34 responses in treatment) it is worth mentioning that results follow the expected direction and are consistent with previous literature on the compromise effect. Precisely, respondents who chose card Premium in treatment group reported lower satisfaction (average of 7 items scale adapted from Heitmann et al. 2007; $M_T$=4.68 vs. $M_C$=5.21, t=1.52 NS), higher sense of justifiability (average of 3 items scale adapted from Heitmann et al. 2007; $M_T$=5.19 vs. $M_C$=4.90, t=-0.78 NS), higher difficulty ($M_T$=2.76 vs. $M_C$=2.69, t=-0.13 NS), higher stressfulness ($M_T$=2.97 vs. $M_C$= 2.77, t=-0.38 NS) and higher confusedness (MT=2.88 vs. MC=2.61, t=-0.52 NS) related to the choice than respondents who chose the same card in control group.

We have also asked respondents whether they were vegetarians. This could influence analyses because the vegetarian menu was not included in the pre-paid card Basic. All 11 declared[1] vegetarians in our sample purchased a pre-paid card Premium (7 in treatment group and 4 in control group). Dropping vegetarians from the analyses of purchase decisions do not change the main result, the compromise effect is still significant (a 17% increase in share of purchases of card Premium in the treatment group, relative to the control group, with a share

[1] Because of University regulation, we could not ask people whether they were vegetarian or not during the pre-paid cards sale (purchase decision), nor we did record their gender. We collected this information with the survey.

when compromise of 27% relative to a share when non compromise of 10%; t = 3.29, $p <$ .001). Therefore, we do not drop vegetarians' responses from further analyses.

*Consumption data analysis.* We have collected electronic transactions of the pre-paid cards as well as of the official university ID cards of each respondent in our sample for a time span of 4 weeks (between April 4$^{th}$ 2016 and May 13$^{th}$ 2016). We merged these two data sources to compare respondents' consumption behavior of the pre-paid cards with their additional purchases paid with the ID card (not included in the promotion bundle).

To analyze usage of the pre-paid cards we counted the total number of menus paid with those cards during the 4 weeks of the experiment. The great majority of respondents (77%) purchased a total of 5 menus thus consuming the entire card they owned. In particular, we are interested in understanding whether the same card (Premium) is consumed differently depending on the purchase context (compromise vs. non-compromise choice-set framing). Remember that the card Premium includes 5 meals to choose between menu 1 and vegetarian. We therefore compared the total number of menus (menu 1 + vegetarian) consumed by these two groups but did not find a significant difference on this aggregate measure ($M_T$=4.89 vs. $M_C$=4.80, t=-0.68 NS). This result does not change when dropping the 11 vegetarian respondents ($M_T$=4.86 vs. $M_C$=4.73, t=-0.68 NS). However, respondents who purchased Premium in treatment consumed significantly more menus 1 than respondents who purchased Premium in control ($M_T$=1.97 vs. $M_C$=1.06, t=-.80, p<. 05). Consistently they consumed slightly less vegetarian menus ($M_T$=2.91 vs. $M_C$=3.73, t=1.86, $p < .1$), thus not entirely using the flexibility they paid for as much as respondents in control. These results do not change when dropping the 11 vegetarian respondents (menu1: $M_T$=2.43 vs. $M_C$=1.45, t=-2.19, $p < .05$ and menu 3: $M_T$=2.43 vs. $M_C$=3.27, t=1.94, $p < .1$).

Therefore, non-vegetarian respondents in the treatment condition did not use the higher flexibility included in their card (the possibility to choose between the non-vegetarian

and the vegetarian menu) as they chose the non-vegetarian menu much more frequently than respondents in control. They probably did not correctly estimate their flexibility needs/ tastes for their future consumption episodes when thy selected the pre-paid card and they ended up worse off than if they would have purchased the cheapest and least flexible option (pre-paid card Basic). This may signal a diversification bias, as respondents sought variety when selecting a card including several meals for future consumption (Simonson 1990; Read and Loewenstein 1995) that they did not use when the time of consumption arrived. However, since only respondents in treatment show this low variety seeking in consumption, this bias cannot explain the result. There must be something in the compromise choice context that not only influenced the purchase decision, but also the post-purchase overtime consumption behavior.

Further, we do not observe a statistical difference between the total number of menus consumed by respondents who declared to be vegetarians and respondents who declared not (M= 5.00 vs. M=4.63, with t=-1.38 NS) thus evidencing that vegetarians' behavior did not influence our data. In addition, we checked whether there was a different behavioral pattern between genders and we did not find a significant difference between the total number of menus consumed by males and females ($M_M$=4.66 vs. $M_F$=4.63, t=-0.24, NS). We also compared timing of menus consumption to see whether the two groups used the pre-paid cards differently in terms of time. Figure 13 plots the overtime cumulative purchases of menus 1 and vegetarian performed by respondents in treatment (B) and control group (A) not showing any particularly different trend.

(Insert Figure 13 about here)

*ID cards consumption*. To study post-purchase behavior we have also analyzed what individuals in our sample purchased in addition to the pre-paid card with their personal ID cards. These are extra purchases, not included in the promotional pre-paid card, of products

that complement the three menus included in the pre-paid cards (in total 245 additional food and beverage items such as cold drinks, desserts, warm beverages and side dishes). We compared purchases performed during the 4 weeks prior to the experiment (before the respondents purchased a pre-paid card) with the 4 weeks of the experiment. In Figure 12 we report the average spending (in €) in complementary (food) products of respondents who purchased the pre-paid card Premium before (dark grey bar) and during (light grey bar) the experiment. The left hand side of Figure 14 shows no difference in purchases of complementary products by Premium card owners in control condition (precisely, a non-significant 8% decrease: $M_B$=48.13 vs. $M_D$=44.22, t=-0.49 NS). On the contrary, the right hand side shows a statistically significant 35% increase in purchases of complementary products by Premium card owners in treatment condition ($M_B$=37.17 vs. $M_D$=50.07, t=2.69 $p < .05$). Also, respondents in control condition did not purchase more items than respondents in treatment condition before the experiment ($M_B$=48.13 vs. $M_B$=37.17 with t=-1.73 NS), therefore self selection can not explain this difference and we speculate that something inherent to the compromise choice can have triggered the purchase of complementary items.

(Insert Figure 14 about here)

In summary, the field experiment suggests that respondents who purchased the pre-paid card Premium in a compromise choice context are less confident about their choice, do not optimally use the flexibility included in the pre-paid card they paid for and purchase additional complementary items not included in that card. On the contrary, respondents who purchased the same card in a dual choice-set (where no context framing influenced the purchase decision) do not show this behavior. We control for the robustness of this effect and for potential explanations for it with the experiments that we report in the next pages of this manuscript.

### 3.3.2 Study 2: a Controlled Lab Experiment

The main objectives of study 2 are to test whether the results of the field experiment replicate in a more controlled setting and to purify the treatment to better understand the post-purchase consumption of a compromise product. To this end we asked respondents to make a series of choices about two product categories (a laptop and a digital camera) in a controlled (survey-based) lab experiment.

***Respondents and Design***

We submitted the survey to 383 Amazon Mechanical Turk participants (a platform validated by Paolacci et al. 2010) in exchange for a $1 payment (we deleted 23 incomplete responses ending up with a sample of 360). The experiment consisted of 4 consecutive choice tasks. In a 3 (control: AB and compromise: A'AB and ABB') x 2 (product categories) between-subjects design we asked respondents to choose a basic version of a laptop and of a digital camera (all respondents saw both product categories in a randomized order). Table 8 shows the levels of the two attributes we used to describe each product to form a core set of two options (A and B) each turning into a compromise alternative when matched with an additional extreme option (A' or B'). After this first choice, we asked respondents to rate satisfaction, confidence, difficulty and stressfulness of this decision on a 5-point scale (1-item). The objective of the second choice task was to put respondents in a situation equivalent to the field experiment whereby participants purchased complementary food-items with their personal ID cards. We developed a list of ten items that Amazon.com shows as suggested products when searching for a laptop and for a digital camera. This allows us to provide participants the choice among realistic items with realistic prices that could complement the purchase of a laptop or a camera (See Table 9). This task asked respondents to choose one or more of these complementary items with the possibility to continue the

experiment without choosing any (no-choice option). In a third set of questions, we asked them if they would have liked to upgrade their basic version of laptop and camera extending one or both product attributes (e.g. "extend HD of your laptop by 1 TB", "Extend RAM of your laptop by 8 GB") or if they would have preferred to stay with the basic model chosen. The last question asked whether they would have liked to purchase a 2-year premium support warranty (for $9.99). The choice of such warranty might signal uncertainty and low confidence in the product chosen, which we expect to be lower for compromise products.

(Insert Table 8 about here)

(Insert Table 9 about here)

***Results and Discussion***

As shown in Table 10 we found a statistically significant increase in share of purchases for laptops A and B and for camera A (for camera B the increase in share of choices approaches significance), consistent with a compromise effect.

(Insert Table 10 about here)

We asked respondents to evaluate their first choice. Respondents who compromised with laptop B revealed lower confidence in their choice ($M_T$= 3.92 vs. $M_C$= 4.28, t=2.25, $p$ < .05) and higher difficulty to choose ($M_T$= 2.34vs. $M_C$= 1.88, t=-2.63, $p$ < .05) than respondents in control group. Choice satisfaction is also slightly lower for compromisers of option B ($M_T$= 4.14 vs. $M_C$= 4.34, t=1.71, $p$ < .1), compared to control respondents. Similarly, respondents who compromised with camera A revealed slightly higher difficulty to choose ($M_T$= 2.33 vs. $M_C$= 1.95, t=-1.61, $p$= .110). We do not find statistically significant differences on the other measures.

We analyzed the second choice task by comparing the number of items chosen from the list of complements (and their total price). T-test results, reported in Table 11, show that respondents who compromised in the 1st choice task selected a significantly higher number of

complementary products than respondents who chose the same items in control (non-compromise). We have also computed the total hypothetical price of these purchases and found significantly more expensive baskets for respondents who compromised. These results are stronger for those options whose compromise effect in choice task 1 was stronger (laptop B and camera A) and reveal a very similar behavior to that we have observed in the field experiment. Therefore, the choice of a compromise option triggered the purchase of additional complementary items in this experiment too.

(Insert Table 11 about here)

We asked respondents to evaluate this second choice (of complementary items) and those who compromised with laptop B revealed lower confidence in their choice for complements ($M_T$= 4.30 vs. $M_C$= 4.51, t=1.86, $p < .1$) and higher stress related to this choice ($M_T$= 1.76 vs. $M_C$= 1.46, t=-1.98, $p < .05$) than respondents in control. Choice satisfaction is also lower for compromisers of option B ($M_T$= 4.14 vs. $M_C$= 4.34, t=1.71, $p < .1$), compared to control respondents. Respondents who compromised with camera A revealed higher difficulty to choose among these items ($M_T$= 2.11 vs. $M_C$= 1.67, t=-2.05, $p < .05$) than respondents in control. We do not find statistically significant differences on the other measures.

With choice task 3 we investigated whether respondents would upgrade their basic products, if given the opportunity. Since respondents who compromised in this (and the previous) study reported low confidence in their choice and they considered it very difficult, we expect to see more upgrades among them, as a sort of compensation for their compromise choice. Indeed, respondents who compromised in the 1$^{st}$ choice with laptop B upgrade significantly more the memory (RAM) of their basic laptop ($M_T$= .91 vs. $M_C$= .62, t=2.30, $p < .05$) than respondents in control. The choice for a laptop in the compromise choice set required respondents to make a trade-off between two attributes (RAM and HD size) and the

RAM size was indeed the attribute they gave up when choosing the middle option in order to have a higher HD size. Since option B' yielded 32GB in memory (compared to 16GB included in option B), those who chose B but were exposed to B' (compromise set), want now to compensate and increase this exact attribute (memory). Similarly, respondents who compromised with camera A, in this third task are significantly more likely to upgrade the battery life of their basic camera ($M_T$= .53 vs. $M_C$= .15, t=3.86, $p < .001$) than respondents in control group. Since option A' yielded 64 hours of battery life (compared to 32 hours included in option A), those who chose A but were exposed to A', want now to improve this attribute. Respondents in control condition were not exposed to more RAM or battery life, this can potentially explain why they do not upgrade their first choices.

The last task of this experiment asked respondents whether they would have liked to purchase a 2-year premium support warranty (for $ 9.99) for their basic camera/ laptop. In line with our expectations, respondents who compromised with laptop B and camera A (for which the compromise effect was stronger in choice 1) were significantly more likely to choose this warranty than respondents who chose the same options in control (laptop B: $M_T$= .90 vs. $M_C$= .65, t=2.44, $p < .05$; camera A: $M_T$= .62 vs. $M_C$= .39, t=2.08, $p < .05$).

In summary, Study 2 suggests that the choice of a compromise laptop (B) or camera (A): (1) is a low confidence and highly difficult choice, (2) can lead to the choice of additional/ complementary products, (3) can result in a more stressful and difficult choice of such complementary products, (4) can lead to the decision of upgrading the basic product along the attribute that was sacrificed in the first decision (RAM for laptop B and battery life for camera A) and (5) can increase the choice of warranties to insure such product. The first three points are in line with results of the field experiment and, together with the last two, suggest that respondents are somehow trying to correct their first suboptimal (compromise) choice purchasing complementary items, upgrades and warranties. This suggests that a

compensatory mechanism might be involved in this process as renouncing on an attribute in the first choice (compromising) leads respondents to ask for it at a later stage (with upgrades of those exact attributes).

### 3.3.3 Study 3: the Search for a Mediator in Choice Difficulty

Prior research has demonstrated that, when choosing a middle option, consumers explicitly refer to that selection as a compromise between conflicting preferences, thus reflecting a choice task requiring effortful reasoning (Pocheptsova, Amir, Dhar and Baumeister 2009) and where people deliberatively recognize the impact of the context on their preferences (Simonson 1989; Dhar and Simonson 2003; Novemsky et al. 2007).

In Study 3 we test whether the increased choice of complementary items is somehow related to the effortful thinking process typical of the compromise effect by controlling for the asymmetric dominance (attraction) effect. This other context effect postulates that adding an asymmetrically dominated third option to a binary choice increases the likelihood of choosing the asymmetrically dominating option. In this case, context recognition does not take place and the choice of the target option is a direct consequence of relatively effortless and intuitive processing (Pocheptsova, Amir, Dhar and Baumeister 2009). Therefore we expect the consequences of the attraction effect on post-purchase behavior to be different from that of the compromise effect (i.e. respondents in attraction effect condition should not choose more complementary items than respondents in control).

#### *Respondents and Design*

We submitted the survey to 331 bachelor students at the University of Mannheim in exchange for course credit. In a 3 (control, compromise, attraction) x 3 (product categories) between-subjects experimental design we asked respondents to choose a basic version of a

laptop (price vs. memory), of a coffeemaker (with product attributes developed by Prelec, Wernerfelt and Zettlemeyer, 1997) and of a portable grill (with product attributes developed by Dahr, Nowlis and Sherman, 2000), as shown in Table 12. Similarly to Study 2, options A and B represent the core (control) choice-set. However, in this study, we only add the extreme alternative on the lower level because, since option A' yields lower quality than option A, the shares of its higher quality counterpart (option A) are more likely to increase than with the addition of a higher quality extreme option (as we find in our previous study and as demonstrated by Heath and Chatterjee 1995). Therefore, we change A' attributes' levels in order to build a compromise choice-set ($A'_C$, A, B) and an asymmetric dominance choice set ($A'_A$, A, B) (see Table 12). The order of product categories was counterbalanced across participants

Study 3 consisted of 2 choice tasks. The first choice task asked to choose a basic product (from the choice context assigned, either control, compromise or attraction) followed by the rating of satisfaction, confidence and difficulty of this choice (on a 5-point scale). The second choice task faced respondents with a list of complementary items (10 for laptop, 8 for coffeemaker and 9 for portable grill) similarly to Study 2. However, in this study, we organized items as pairs of similar (substitutes) objects of different quality and price (e.g. basic grill cover for €14.99 vs. premium grill cover for €19.99), as shown in Table 13. This set up should show whether not only compromisers tend to choose more complements on average, but also if they tend to spend more for functionally equivalent items. If that was the case, we speculate the compromising might lead respondents to compensate their initial prudent choice with subsequent self-indulgent choices as to signal a sort of licensing or balancing effect.

Furthermore, since recent findings show that compromising can be a habit influenced by personality traits such as maximizing-satisficing tendencies (Simonson, Seela, Sood 2017)

we used 3 items of the reduced (6-items) maximizing-satisficing scale (Nenkov et al. 2008; Schwartz et al. 2002) as filler tasks between the 3 blocks of questions related to each product category.

(Insert Table 12 about here)

(Insert Table 13 about here)

***Results and Discussion***

Choice task 1 results show a significant attraction effect for laptop and a significant compromise effect for coffeemaker and portable grill, as reported in Table 14.

(Insert Table 14 about here)

We asked respondents to evaluate this first choice. Respondents who compromised with coffeemaker revealed lower confidence in their choice ($M_T$= 3.43 vs. $M_C$= 3.76, t=1.90, $p < .01$) and higher difficulty to choose ($M_T$= 2.56 vs. $M_C$= 2.20, t=-21.89, $p < .01$) than respondents in control. Respondents who compromised with portable grill revealed slightly lower satisfaction about their choice ($M_T$= 3.62 vs. $M_C$= 3.86, t=1.65, $p$= .100) and higher difficulty to choose ($M_T$= 2.97 vs. $M_C$= 2.55, t=-2.35, $p < .05$) than respondents in control. These results are in line with those of Study 1 and Study 2. According with our expectations, the evaluation of an asymmetric dominance choice reveals opposite results. After a significant attraction effect (laptop), respondents who chose the asymmetrically dominated alternative revealed higher satisfaction ($M_T$= 3.76 vs. $M_C$= 3.44, t=-2.08, $p < .05$) and higher confidence ($M_T$= 3.54 vs. $M_C$= 3.20, t=-1.88, $p < .01$) in their choice than respondents who chose the same option in control condition.

We analyzed the second choice task comparing the number of items chosen from the list of complements (and their total price). T-test results (reported in Table 15) show that respondents who compromised in the 1st choice task with a coffeemaker did not select a significantly higher number of complementary products but their choices were significantly

more expensive than those of respondents who chose the same items in control condition (2-item choice context). This seems explained by the fact that compromisers selected the most expensive items from the list. Indeed, as shown in Table 16, comparing the two coffee capsules packs available (described in Table 13) we see a preference reversal: those who compromised (and know they did not get the best coffeemaker available) chose the most expensive capsules pack. Comparing the two cleaning items, capsule dispensers and travel bottles available we see a similar preference reversal. Therefore, it seems respondents who compromised prefer those items that cost more and provide higher quality (e.g. the biggest coffee capsules pack, the high quality dispenser, travel bottle and cleaning kit) sort of balancing between their prudent first choice and their second splurge choice. In the coffee capsules case, there is a clear and significant preference reversal: respondents in control (who chose the target coffeemaker in a dual choice-set) chose significantly more the small pack. On the contrary, respondents in treatment (who chose the target coffeemaker in a compromise choice-set) choose significantly more the big pack.

Similarly, respondents who compromised in the 1st choice task with a portable grill select a higher number of complementary products and their choices were also significantly more expensive than those of respondents who chose the same items in control condition (Table 15). In Table 16, we see a similar pattern of preference reversal for low quality versus high quality complements. Comparing the two grill covers available we see that respondents who compromised (and are aware that they did not choose the highest quality portable grill) chose the premium quality grill cover and the biggest charcoal pack (the other items available in the list of complements for portable grills are non comparable in this sense). It seems respondents who compromised with a portable grill similarly prefer those items that cost more and provide higher quality (e.g. the high quality grill cover, the bigger box of charcoal), but this result is not as strong as for the coffeemaker.

(Insert Table 15 about here)

(Insert Table 16 about here)

In summary, Study 3 finds that respondents choosing a compromise option (coffeemaker and portable grill), are less confident and slightly less satisfied about their first choice and they find this choice more difficult compared to respondents choosing the same options in control condition. These respondents chose significantly more items from the list of complements, spent more money on those items and, when choosing between substitutes, they chose the most expensive one, compared to respondents who chose the same option in control condition. This signals a balancing behavior between the first and the second choice. On the contrary, respondents who chose the asymmetrically dominating option (laptop) are more satisfied and confident about their first choice than respondents who chose the same option in control. Interestingly, they do not compensate their first choice with an increased choice of complements, thus suggesting that the major effect we document in this paper is specific to the compromise choice context and thus relate to a conscious and effortful decision process.

Accordingly, we again find that the compromise choice is experienced as a difficult choice (as opposed to the asymmetrically dominating choice, which is not experienced as difficult), and this high difficulty could influence the selection of complementary items. Therefore, we conducted a Sobel test to understand if this high difficulty mediates the effect of the compromise choice on the subsequent choice of complementary items. The mediation effect of choice difficulty is statistically significant ($p < 0.1$) with approximately 23% of the total effect (of choice of compromise on number of items selected form the list) being mediated (Sobel test: coeff. = 0.09; Z=1.67; P= .096). Similarly, choice difficulty mediates the influence of the compromise effect on the monetary amount spent on these items. However, we only find this mediation effect for portable grills (and not for the coffeemaker,

which also triggered a compromise effect). Therefore, we find partial support for our expectation.

The maximizing-satisficing scale (Nenkov et al. 2008; Schwartz et al. 2002) we submitted as filler task includes 2 items that measure individuals' high standards, 2 items that measure general decision difficulty and 2 that measure alternative search tendencies. We only find significant differences between groups when comparing individuals' high standards: Respondents who compromised with a coffeemaker have, in general (as a personality trait), significantly higher standards than respondents in control ($M_T$= 3.73 vs. $M_C$= 3.3, t= -2.21, p= .029). We do not find significant differences on the other traits nor in the joint trait (average of the 6 items), therefore, our findings are not in line with most recent Simonson et al. (2017) results. At least in this study, compromising is difficult because of the choice-set framing, not because of individuals' characteristics.

### 3.3.4 Study 4: Ruling out Restoration of Personal Control as an Explanation

In all previous studies we found that the compromise choice is a low confidence and particularly difficult choice. These results align with previous literature suggesting that the compromise choice is mainly driven by preferences uncertainty. Therefore, one could argue that, when choosing a compromise product, people might feel a lack of control on the environment; maybe a feeling of helplessness and ultimately of saddens. Sadness can arise from feelings of loss and helplessness (Lazarus 1991; Keltner et al. 1993) and evoke the implicit goal of changing one's circumstances. On the contrary, a sense of control and autonomy would allow people to implement or reveal their individual preferences (when they choose in a neutral, two-item choice set).

Rick, Pereira and Burson (2014) demonstrate that shopping works to alleviate this feeling of sadness and helplessness by restoring a sense of control (aka retail therapy). Also, Lerner, Small and Loewenstein (2004) show that, when feeling sad, people are willing to pay up to 30% more money for a product, relative to those in a neutral mood. Therefore, in Study 4 we test whether people choosing a compromise option feel sadder and not in control of the environment than people choosing the same option in a dual set. If that was the case, we could explain why respondents buy more complements (shop more) and why they choose the most expensive items (or upgrade their basic choices to achieve the best option available in the 1st choice task) with a restoration of personal control motivation.

***Respondents and Design***

We have submitted to 99 M'Turk participants (45 in control and 54 in treatment, between-subjects) a short questionnaire aimed at understanding whether a compromise choice-set is more likely to generate feelings of sadness and lack of control than a two-item choice set. First of all participants indicated the extent to which they were currently experiencing some emotions by moving a slider along a 12mm line anchored by the labels "not at all" and "very much." The task worded: "Please indicate the extent to which you are currently feeling (in randomized order): Sad, Happy, Depressed, Self-Confident, in control over the current situation (Note that this does not involve control over other people, just control over your environment)".

Afterwards we showed respondents a choice set (either control or compromise framing) about a portable grill using the same attributes used in Study 3's choice task 1 (see Table 12). We asked them to choose one option and then we measured the same emotions again with the same items to generate residual scores for each emotion by subtracting participants' baseline scores from their final score. This commonly used method controls for

broad individual differences in the tendency to experience and express emotions (cf. Kermer et al. 2006; Oveis et al. 2009; Rogosa and Willett 1983; Wilson et al. 2000).

***Results and Discussion***

Choice task results revealed a significant increase in share of choices of option A when compromise (from 36% to 59%, t=2.22; p < .05), consistent with a compromise effect. However, residual sadness scores (computed as the difference between the measure after the choice and the measure before the choice) were lower among respondents who compromised (choosing option A in the 3-item choice set) than among respondents who did not (choosing option A in the 2-item choice set) ($M$ = -2.09, $SD$ = .88 vs. $M$ = .56, $SD$ = 1.16; $t(36) = 1.86$, $p < .1$). In other words, choosing a compromise option decreased individuals' sadness and significantly increased feelings of control over the environment as residual scores were significantly higher among respondents who compromised (and chose A in 3-item choice set) than among respondents who did not (and chose A in 2-item choice set) ($M$ = 5.09, $SD$ = 2.46 vs. $M$ =-3.25, $SD$ = 2.07; $t(36) = -2.45$, $p < .05$). These two results and the absence of significant differences on the other emotions scores suggest that our main result is independent from a loss of personal control over the environment.

In the next section of this manuscript we will provide a general discussion of our main findings and propose other potential explanations of the main effect that we suggest for future research.

## 3.4 Discussion

To the best of our knowledge, this manuscript is the first attempt of studying the influence of the compromise effect on post-purchase behavior. The main finding we document in all experiments is that the choice of a compromise option triggers the subsequent choice of

complementary items, especially of expensive items and of upgrades that can enhance the first (compromise) product. We also consistently find that consumers experience a compromise choice as particularly difficult and this higher difficulty (weakly) mediates the effect above mentioned. We tested if this behavior depends on the difficulty typical of choice tasks framed as compromise sets controlling for the attraction effect frame. The asymmetric dominance context, as opposed to the compromise context, is related to an intuitive and mostly effortless decision process. As we find no evidence of such compensatory behavior after the choice of an asymmetrically dominating option and we do not find that compromising is an individual trait in our sample (Study 3), we conclude that something inherent to the compromise context and its related decisional process motivates the increase in choices of complementary items and of upgrades. This manuscript sheds some preliminary light on the consequences of a compromise choice on post-choice behavior showing that the difficulty of this choice can lead to specific behaviors. However, the present manuscript does not rule out several potential alternative explanations. Therefore, in the next section we outline possible explanations that future research should study in order to provide a robust and valid explanation of the process behind our main effect.

## 3.5 Guidelines for Future Research and Conclusions

The finding that a compromise choice set increases the sense of control one has over the environment (Study 4) and is consistently reported to be a difficult choice task, could relate to a sort of resource depletion (e.g., Muraven and Baumeister 2000). According to this account, the extent to which the first choice depletes a person's limited self-control resources might make it more difficult to subsequently resist a tempting option. Some authors (Pocheptsova, Amir, Dhar and Baumeister 2009) demonstrate that the depletion of executive

resources by an unrelated task decreases the tendency to choose a compromise option. This shows that the compromise effect is rooted in effortful processing (or "executive control"), such as engaging in trade-off comparisons among the alternatives, which requires mental resources. We speculate that, if a person finds a task difficult and requiring more control, thus using mental resources, he or she might tend to make effortless (easy) choices at a later stage, for instance by choosing more complementary items (or more expensive options) not being able to enforce self-regulation.

Along the same line, the increased choice of complements following a compromise choice could relate to a licensing effect (Khan and Dahr 2006), whereby a prior suboptimal choice (that of a compromise option in this case) frees the subsequent choice of more (self-indulgent) options (expensive/ high quality complements in this case). If that is the case, the preferences for an indulgent option should diminish if the licensing task is attributed to external motivation. Future research should investigate this direction.

In contrast, Dhar and Simonson (1999) show that, in sequential choices within the same consumption episode (e.g. a meal), the first selection may form a reference point for the second, and therefore the first choice (of a compromise option in our case) could trigger a balancing (goal-congruent) behavior as people might compensate a compromise (average) choice with an increased purchase of complementary products (of high quality/ price). Note that we consider the two sequential choice tasks of our lab experiments as different consumption episodes even if they happen in temporal proximity (such difference is much clearer in the field experiment, whereby respondents chose the pre-paid card in one episode and then purchased the complements on separate days). The authors suggest that, with respect to situations involving a tradeoff between two active goals (e.g. best price vs. best quality), when one goal requires self-control to achieve (e.g., choosing the average/ safest compromise alternative) and the other is tempting and requires self-control to avoid (e.g., choosing more/

expensive items), a neglect of the first goal (e.g. choosing the highest quality/ most expensive option) is likely to generate feelings of regret while a neglect of the second goal (e.g. not choosing complementary products or choosing the cheapest ones) leads to unfulfilling experiences. In line with this is the notion of category budgets (Heath and Soll 1996) which suggests that balancing is preferred when two items are in the same general category (e.g., food items) but belong to different events (purchase of pre-paid card and subsequent purchase of complementary foods). We suggest future research should investigate whether a compromise choice is related to feelings of regret and whether the splurge of choosing more complementary items can be attributed to a balancing behavior.

A similar possible explanation could be researched in mental budgeting (i.e., individuals acting as though under a budget constraint). Participants may have experienced a kind of income effect; having "spent" less for the compromise option than participants in the control condition, when presented with the list of complementary items, these participants may have had higher unspent "income" to use for those secondary items. However, since price was not an attribute included in the choice for a portable grill and our main effect holds for this product category, an income effect cannot be a viable explanatory option.

Finally, as reported earlier in this manuscript, Drolet (2002) shows that consumers tend to vary their use of decision rules over repeated, continuous, choices. Along the same line, we speculate that, in a first choice task consumers might be indecisive and thus apply the compromise decision heuristics, but along subsequent decisions they tend to vary the heuristic applied, thus making other decisive choices to compensate the initial one. We suggest that future research should measure respondents' general decisiveness with the 6-item scale developed by Roets and Van Hiel (2007) and the indecisiveness induced by the context-driven mindset (related to the choice just made) with a short scale investigating the

strength of preference for the chosen option. We should afterwards investigate inherent rule variability tendencies as a possible explanation of our main effect.

In conclusion, this manuscript documents a robust consequence of the compromise effect on post-purchase consumption behavior. We consistently find that the choice of a compromise option triggers the subsequent choice of complementary (expensive) items, and that respondents choosing a compromise option, if given the possibility, would like to enhance that first (average) product upgrading the attributes they traded in the first choice for (for instance) a lower price. We test some preliminary explanations for this effect (e.g. choice difficulty) and we outline several potential explanations that should be taken into account in future research.

Also, beyond advancing theories of decision-making, these results have practical implications. Indeed, we provide evidence that the compromise framing not only increases choices of a target product but also could increase subsequent purchases of complementary (high quality) products. Such finding should be considered in product array manipulations, in retail management and in layout strategies (e.g. the product array displayed in the offer page of online marketplaces.

# Chapter 4. Conclusion

This thesis investigates the long-term consequences of promotions and choice-sets framing effects in decision-making situations characterized by uncertainty of present and future preferences.

To integrate this broad objective, the first essay explores the effects of framing promotions as price discount or bonus time on choice for contracts durations. Choosing the duration of a contract to sign requires making a tradeoff between how much we value the contract in the present and how much we think we will value it in the future. It is therefore a choice characterized by some degree of uncertainty about future needs. We find that intertemporal choices for subscriptions are strongly influenced by the framing of the subscription's promotion and we reveal a robust pattern of preference reversal. All of our experiments find that people favor price discounts over bonus time for shorter contracts, and favor bonus time over price discounts for longer contracts. Our investigation offers the first evidence of a preference reversal between two common types of promotions for subscriptions' extensions: price discounts and bonus time. In summary, this essay finds that people's preferences for price discounts seem to be more or less a reflection of what they truly value, insofar as these preferences are more immune to further information than bonus time promotions (while presenting additional information makes bonus time preferences seem more similar to their preferences for price discounts). To this point, we suggest that a potential cause for the greater preference for bonus time promotions for longer contract extensions derives from people's perception of future time slack. The belief that we have more time available in the future than in the present (compared to monetary resources) increases our likelihood to prefer bonus time over price discounts promotions for longer contracts.

With the objective of studying the long-term consequences of the compromise effect (a context influencing uncertain choices), the second essay explores the post-purchase consumption of a compromise product. The main finding we document is that the choice of a compromise option triggers the subsequent choice of complementary items, especially of expensive items and of upgrades that can enhance the first (average) product. We also consistently find that consumers experience a compromise choice as particularly difficult and this higher difficulty, induced by the compromise context, mediates the effect above mentioned. An intuitive and mostly effortless decision process characterizes the asymmetric dominance context, as opposed to the compromise one. As we find no evidence of such compensatory behavior (i.e. choosing an average product and at a later stage improving it with upgrades or complements) after the choice of an asymmetrically dominating option, we conclude that something inherent to the compromise context and its related decisional process motivates it. To the best of our knowledge, this project is the first attempt of studying the consequences of a compromise choice on post-choice behavior and sheds some preliminary light on a compensatory behavior.

In conclusion, the robust empirical evidence presented in this dissertation suggests that companies should offer short-term contracts' extensions with price discounts and long-term contract's extensions with bonus time. This implication is the practical contribution of the first essay, but must be taken with caution, especially if the customer base is highly financially literate. Also, our investigation does not predict what happens when the chosen contract expires (long-term demand). Future research should analyze the long-term effects of these promotional prescriptions by examining whether price discounts become less attractive over time because they lower consumer reference prices. Furthermore, we document a robust consequence of the compromise effect on post-purchase consumption behavior. Though we

do not entirely provide an explanation of the psychological mechanism behind it (which we recommend for future research), this finding must be carefully considered by marketing managers willing to optimize choice-sets configuration that build loyal and valuable customers. We suggest that the framing of an offer page with a compromise context not only increases choices of a target product but also could increase subsequent purchases of complementary products and upgrades.

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# Tables

**Table 1: Overview of Studies in "Time Preferences for Subscriptions"**

| Sample/ Base Rate | Experiment | Objective |
|---|---|---|
| ***Study 1***<br>**Exp. 1a:** Online controlled experiment (N≈9 M impressions).<br>**Exp. 1b**: online survey (N=244).<br>Fixed base rate (1 week subs. for €4.99). | **Exp. 1a:** 2x2 (2 months vs. 6 months/ price discount vs. bonus time) online controlled experiment.<br>**Exp. 1b:** survey replica of the field experiment with absolute numbers for the price discount framing (instead of percentages). | **Exp. 1a**: External validity and relevance.<br>**Exp. 1b**: Test for percentage/ absolute number effect of price discount. |
| ***Study 2***<br>Two online surveys (N=167).<br>Fixed base rate (1 month subs. for $50). | **Exp. 2a**: Free months at the beginning of the subscription period.<br>**Exp. 2b**: Free months at the end of the subscription period. | Test for preference for improving sequences. |
| ***Study 3***<br>**Exp. 3a** and **3b**: Two online surveys (N=167) with fixed base rate (1 month subs. for $10)<br>**Exp. 3c:** online survey (N=235) with fixed base rate (1 week subs. for $5). | **Exp. 3a**: free months at the beginning of the subscription period.<br>**Exp. 3b**: free months at the end of the subscription period.<br>**Exp. 3c**: bonus time promotion expressed in weeks (instead of months). | **Exp. 3a** and **3b:** Test for magnitude effect of reference subscription price.<br>**Exp. 3c**: Test for magnitude effect of amount of (bonus) time. |
| ***Study 4***<br>Two adaptive online surveys (N=134) with base rate for 1-month subs. individually tailored. | **Exp. 4a**: Internet service subscriptions.<br>**Exp. 4b**: Cell-phone subscriptions. | Test for different service category (generalizability) and for heterogeneity in service valuation. |
| ***Study 5***<br>Online survey (N= 181) with fixed base rate (1 month subs. for $50). | Monetary promotion expressed as *instant rebate* on the overall subscription fee. | Test for framing effect of the monetary promotion. |
| ***Study 6***<br>Three Online surveys (N=840) with fixed base rate (1 month subs. for $50). | **Exp. 6a:** risk aversion, financial literacy, pure time preferences for choices of lump sums and *full information* condition.<br>**Exp. 6b:** calculation of the total cost of the subscriptions under the 2 framings.<br>**Exp6c**: measurement of money slack and time slack. | **Exp. 6a:** Test for moderation of financial literacy, impact of risk tolerance and impatience.<br>Test for revealed (full) information.<br>**Exp. 6b:** Test for miscomprehension of the bonus time manipulation.<br>**Exp. 6c**: Test for resource slack. |

## Table 2: Experimental Design and Results of Study 1a

| **Experimental Design** | | |
|---|---|---|
| | **Price Discount** | **Bonus Time** |
| **Short Subscription** (2 months) | • *Subscribe for 1 week for € 4.99!*<br>• *Subscribe for **2 months** for € 14.99 and save 62.5% on the weekly price!* | • *Subscribe for 1 week for € 4.99!*<br>• *Subscribe for **2 months** for € 14.99 and receive 5 weeks for free!* |
| **Long Subscription** (6 months) | • *Subscribe for 1 week for €4.99!*<br>• *Subscribe for **6 months** for € 44.99 and save 62.5% on the weekly price!* | • *Subscribe for 1 week for € 4.99!*<br>• *Subscribe for **6 months** for € 44.99 and receive 15 weeks for free!* |

| **Purchases of Subscriptions** | | | | |
|---|---|---|---|---|
| | **Price Discount** | | **Bonus Time** | |
| | **# Purchased** | **Purchase Probability** | **# Purchased** | **Purchase Probability** |
| **Short Subs.** | 63 | .0000256 | 46 | .0000186 |
| **Long Subs.** | 88 | .0000345 | 106 | .0000422 |

| **Logistic Regression Results** | | | |
|---|---|---|---|
| | **Coefficients** | **Z** | **P>\|Z\|** |
| **Subscription Length** (0 = 2 month, 1 = 6 month) | .821 | 4.60 | .000 |
| **Framing** (0 = bonus time, 1 = price discount) | .321 | 1.66 | .099 |
| **Interaction** (Subs. Length *Framing) | -.524 | -2.15 | .032 |
| Constant | -10.893 | -73.07 | .000 |

## Table 3: Experimental Design and Results of Study 1b

| **Experimental Design** | | |
|---|---|---|
| | **Price Discount** | **Bonus Time** |
| **Short Subs.** (2 months) | • *Base subscription: Contract duration of 1 week at $4.99 per week (terminable each week).*<br>• *Alternative offer: Contract duration of 2 months for $14.99, with a saving of* ***$25.00****.* | • *Base subscription: Contract duration of 1 week at $4.99 per week (terminable each week).*<br>• *Alternative offers: Contract duration of 2 months for $14.99, with* ***5 weeks*** *of service for free.* |
| **Long Subs.** (6 months) | • *Base subscription: Contract duration of 1 week at $4.99 per week (terminable each week).*<br>• *Alternative offer: Contract duration of 6 months for $44.99, with a saving of* ***$75.00.*** | • *Base subscription: Contract duration of 1 week at $4.99 per week (terminable each week).*<br>• *Alternative offer: Contract duration of 6 months for $44.99, with* ***15 weeks*** *of service for free.* |

| **Choices of Subscriptions**<br>(Significant difference between the two framings: *** p < .001) | | | | |
|---|---|---|---|---|
| | **Short Subscription** | | **Long Subscription** | |
| | **# 2-month subs.** | **# 1-week** | **# 6-month subs.** | **# 1-week** |
| **Bonus Time** | 194 | 50 | **217*** ** | 27 |
| **Price Discount** | **230*** ** | 14 | 181 | 63 |

| **Logistic Regression Results** | | | |
|---|---|---|---|
| | **Coefficients** | **Z** | **P>\|Z\|** |
| **Subscription Length** (0 = 2 month, 1 = 6 month) | .732 | 2.85 | .005 |
| **Framing** (0 = bonus time, 1 = price discount) | 1.449 | 4.55 | .000 |
| **Interaction** (Subs. Length *Framing) | -2.484 | -6.12 | .000 |
| **Age** (Cont.) | .017 | 1.76 | .079 |
| **Experience** with Internet service (0 = No, 1 = Yes) | .234 | .89 | .372 |
| **Income** (7 categories from $0 to $70000 treated ad continuous) | .001 | .03 | .979 |
| Constant | .626 | 1.55 | .122 |

**Table 4: Multinomial Logistic Regressions Results (0=1-month baseline; 1=choice of price discount; 2= choice of bonus time) in Study 6a**

| | Overall Model | Coefficients | Z | P>\|Z\| |
|---|---|---|---|---|
| **0** | (Base outcome) | | | |
| **1** | **Subscription Length** (3, 6, 9, 12, 15, 18, 21, 24 months) | -.160 | -10.12 | .000 |
| | **Risk Tolerance** | .300 | 3.51 | .000 |
| | **Patience** | .079 | 1.68 | .093 |
| | Constant | 2.487 | 5.77 | .000 |
| **2** | **Subscription Length** (3, 6, 9, 12, 15, 18, 21, 24 months) | .026 | 1.71 | .088 |
| | **Risk Tolerance** | .286 | 3.54 | .000 |
| | **Patience** | .073 | 1.57 | .117 |
| | Constant | .114 | .25 | .800 |
| | **Median Split: Low Financial Literacy** | **Coefficients** | **Z** | **P>\|Z\|** |
| **0** | (Base outcome) | | | |
| **1** | **Contract Length** (3, 6, 9, 12, 15, 18, 21, 24 months) | -.144 | -7.56 | .000 |
| | **Risk Tolerance** | .264 | 2.61 | .009 |
| | **Patience** | .086 | 1.63 | .103 |
| | Constant | 2.237 | 4.41 | .000 |
| **2** | **Contract Length** (3, 6, 9, 12, 15, 18, 21, 24 months) | .048 | 2.62 | .009 |
| | **Risk Tolerance** | .263 | 2.83 | .005 |
| | **Patience** | .082 | 1.63 | .104 |
| | Constant | -.257 | -.49 | .626 |
| | **Median Split: High Financial Literacy** | **Coefficients** | **Z** | **P>\|Z\|** |
| **0** | (Base outcome) | | | |
| **1** | **Contract Length** (3, 6, 9, 12, 15, 18, 21, 24 months) | -.188 | -7.29 | .000 |
| | **Risk Tolerance** | .422 | 2.61 | .009 |
| | **Patience** | .066 | .69 | .490 |
| | Constant | 2.896 | 3.51 | .000 |
| **2** | **Contract Length** (3, 6, 9, 12, 15, 18, 21, 24 months) | -.013 | -.53 | .593 |
| | **Risk Tolerance** | .362 | 2.25 | .025 |
| | **Patience** | .054 | .58 | .563 |
| | Constant | .748 | .87 | .383 |

## Table 5: Correlations and Regression Results of Study 6c

| **Analyses of Correlations (averages among subjects)** | | |
|---|---|---|
| | **Contract Length** | **Fisher Test for the significance of the difference between two correlation coefficient** |
| **Choice of Price Discount** | ρ = -.504 (*p* = .001) | z = -9.84 (*p* = .000) |
| **Choice of Bonus Time** | ρ = .385 (*p* = .000) | |
| **Time Slack** | ρ = .422 (*p* = .000) | z = .10 (*p* = .460) |
| **Money Slack** | ρ = .414 (*p* = .000) | |
| **Preference Reversal** | ρ = .440 (*p* = .000) | |

| **Regression Results** | | |
|---|---|---|
| **Dependent Variable** | **Independent Variables** | |
| | **ρ (Contract Length, Time Slack)** | **ρ (Contract Length, Money Slack)** |
| **ρ (Contract Length, Choice of PD)** | β = -.126 (t = -2.11; p = .036) | $\beta_{FL}$ = -.056 (t = -1.16; p = .248) |
| **ρ (Contract Length, Choice of BT)** | β= .175 (t = 2.52.; p = .013) | $\beta_{FL}$ = .021 (t = 0.37; p = .709) |
| **ρ (Contract Length, Preference Reversal)** | β = .160 (t = 2.35.; p = .020) | $\beta_{FL}$ = .023 (t = 0.41; p = .681) |

**Table 6: Overview of the Pre-paid cards (Study 1)**

| Pre-paid Card | Price | Flexibility |
|---|---|---|
| Basic | 6 € | Low: 5 times Menu 1 |
| Premium | 11 € | Medium: 5 times Menu 1 or Veg |
| Gold | 16 € | High: 5 times Menu 1 or Veg or Menu 2 |

**Table 7: Purchase Decision Results (Study 1)**

| | Basic | Premium | Gold | Total |
|---|---|---|---|---|
| **Control** | 102 | 15 | NA | 117 |
| **Treatment** | 77 | 35[2] | 9 | 121 |

**Table 8: Product Attributes used in Choice Task 1 (Study 2)**

| Laptop | Hard Drive Size | Memory (RAM) |
|---|---|---|
| Option A' | 3000GB (3TB) | 4GB |
| Option A | 2000GB (2TB) | 8GB |
| Option B | 1000GB (1TB) | 16GB |
| Option B' | 500GB | 32GB |
| **Digital Camera** | **Memory** | **Battery Life** |
| Option A' | 4GB | 64 hours |
| Option A | 8GB | 32 hours |
| Option B | 16GB | 16 hours |
| Option B' | 32GB | 8 hours |

[2] In absolute values, the difference in the number of Premium cards purchased between control group and treatment group is statistically significant with t = 3.126 and p-value = 0.002.

**Table 9: List of Complementary Items for Choice Task 2 (Study 2)**

| Complements for Laptop | Complements for Digital Camera |
|---|---|
| Speakers ($14.99) | Monopod/ Basic stand ($14.99) |
| Headphones ($13.99) | Extra lens cover ($9.99) |
| Keyboard ($19.99) | Case ($9.99) |
| Black cloth mouse pad ($5.99) | Neck Strap ($9.99) |
| External CD/DVD player ($19.99) | Additional batteries ($18.49) |
| Mouse ($9.99) | Additional zoom lens ($19.99) |
| Insurance policy for free return within 9 months ($9.99) | 32GB memory card ($11.99) |
| Neoprene padding case ($5.99) | Batteries charger ($14.99) |
| Microsoft Office ($14.99) | Cleaning kit ($9.99) |
| Antivirus 12-months sub. ($11.99) | Special effects filters set ($14.99) |

**Table 10: Results Choice Task 1 (Study 2)**

| Laptop | Control | Treat_1 | Treat_2 | T-Value | P-Value |
|---|---|---|---|---|---|
| Option A’ | | | 8 | | |
| Option A | 35 (29%) | 11 | 48 (43%) | 2.19 | .030 |
| Option B | 85 (71%) | 79 (88%) | 64 | 3.14 | .002 |
| Option B’ | | 30 | | | |
| **Digital Camera** | **Control** | **Treat_1** | **Treat_2** | **T-Value** | **P-Value** |
| Option A’ | | | 11 | | |
| Option A | 43 (36%) | 23 | 64 (59%) | 3.56 | .000 |
| Option B | 77 (64%) | 70 (75%) | 45 | 1.77 | .078 |
| Option B’ | | 27 | | | |

**Table 11: Results Choice Task 2 (Study 2)**

| Average Number of Complementary Items | | | | |
|---|---|---|---|---|
| **Laptop** | **Control** | **Treatment** | **T-Value** | **P-Value** |
| A | 2.69 | 3.31 | -1.42 | NS |
| B | 2.40 | 2.96 | -1.99 | .048 |
| **Camera** | **Control** | **Treatment** | **T-Value** | **P-Value** |
| A | 1.98 | 2.89 | -2.94 | .004 |
| B | 2.88 | 3.11 | -.68 | NS |
| **Average Price for Complementary Items** | | | | |
| **Laptop** | **Control** | **Treatment** | **T-Value** | **P-Value** |
| A | 34.69 | 41.87 | -1.21 | NS |
| B | 29.08 | 37.54 | -2.31 | .022 |
| **Camera** | **Control** | **Treatment** | **T-Value** | **P-Value** |
| A | 20.72 | 32.81 | -3.28 | .001 |
| B | 32.97 | 35.60 | -.62 | NS |

**Table 12: Product Attributes used in Choice Task 1 (Study 3)**

| **Laptop** | **Price** | **Memory (RAM)** |
|---|---|---|
| Option A'$_C$ | 400€ | 4GB |
| Option A'$_A$ | 650€ | 6GB |
| Option A | 700€ | 8GB |
| Option B | 1000€ | 16GB |
| **Coffeemaker** | **Price** | **Quality Rating (1-10)** |
| Option A'$_C$ | 40€ | 5 |
| Option A'$_A$ | 60€ | 5 |
| Option A | 70€ | 7 |
| Option B | 100€ | 9 |

| **BBQ** | **Weight (Kg)** | **Cooking Area (sq. m.)** | **Ease of Use Rating** | **Durability Rating** |
|---|---|---|---|---|
| Option A'$_C$ | 3 | .20 | 80/100 | 94/100 |
| Option A'$_A$ | 5 | .20 | 80/100 | 89/100 |
| Option A | 5 | .25 | 86/100 | 89/100 |
| Option B | 7 | .30 | 92/100 | 84/100 |

**Table 13: Complementary Items for Choice Task 2 (Study 3)**

| Laptop | Coffeemaker | Portable Grill[3] |
|---|---|---|
| 1. RAM extension by 4GB (€11.99) | 1. Coffee capsules (10-capsules pack) (€4.99) | 1. Premium grill cover in vinyl material, water and heat resistant (€19.99) |
| 2. RAM extension by 8GB (€19.99) | 2. Coffee capsules (50-capsules pack) (€10.99) | 2. Basic grill cover in Polyester (€14.99) |
| 3. Grey plastic case (€5.99) | 3. Plastic Box (to store your coffee capsules) (€8.99) | 3. Charcoal briquettes (5kg) (€4.99) |
| 4. Customized case in your favourite colour in water resistant neoprene (€8.00) | 4. Stainless steel capsules dispenser (€10.99) | 4. Charcoal briquettes (10 kg) (€6.49) |
| 5. USB mouse (€9.99) | 5. Travel bottle in plastic (€4.99) | 5. Grill cleaning brush (€4.99) |
| 6. Wireless optical mouse with LED colour changing lights (€14.99) | 6. Thermo travel bottle in stainless steel (€6.99) | 6. Grill cleaning brush + cleaning solution (€7.99) |
| 7. Black cloth mouse pad (€2.99) | 7. Cleaning kit (organic all natural solution and brushes) (€3.99) | 7. Wood handle fork and claw set (€12.99) |
| 8. Mouse pad in your favourite colour with wrist rest support (€5.99) | 8. General cleaning solution (€1.99) | 8. Cooking area extension of 0,05 sq. m. (€14.99) |
| 9. Basic headset (€13.99) | | 9. An alternative frame in heat resistant plastic material that makes your BBQ 2kg lighter (€14.99) |
| 10. Premium headset with noise reduction, enhanced comfort and clear audio (€19.99) | | |

[3] Items 8 and 9 are extensions of the attributes "weight" and "cooking area" , similar to Study 2' choice of upgrades.

**Table 14: Results Choice Task 1 (Study 3)**

| Laptop | Control | Compromise | Attraction | T-Value | P-Value |
|---|---|---|---|---|---|
| Option A | 56% | 66% | | 1.50 | NS |
| Option A | 56% | | 79% | 2.12 | .035 |
| **Coffeemaker** | **Control** | **Compromise** | **Attraction** | **T-Value** | **P-Value** |
| Option A | 49% | 77% | | 4.44 | .000 |
| Option A | 49% | | 54% | .74 | NS |
| **BBQ** | **Control** | **Compromise** | **Attraction** | **T-Value** | **P-Value** |
| Option A | 68% | 81% | | 2.32 | .000 |
| Option A | 68% | | 68% | .12 | NS |

**Table 15: Results Choice Task 2 (Study 3)**

| Average Number of Complementary Items | | | | |
|---|---|---|---|---|
| **Laptop** | **Control** | **Attraction** | **T-Value** | **P-Value** |
| Σ Products | 1.69 | 1.71 | -.09 | NS |
| $ Spent | 22.86 | 22.41 | .17 | NS |
| **Coffeemaker** | **Control** | **Compromise** | **T-Value** | **P-Value** |
| Σ Products | 2.24 | 2.48 | -1.20 | NS |
| $ Spent | 14.47 | 17.10 | -1.93 | .056 |
| **BBQ** | **Control** | **Compromise** | **T-Value** | **P-Value** |
| Σ Products | 2.17 | 2.60 | -1.96 | .052 |
| $ Spent | 22.02 | 27.25 | -2.00 | .047 |

**Table 16: Results Choice Task 2 - Low Quality vs. High Quality (Study 3)**

| **Coffeemaker** | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Low Quality** | | | | **High Quality** | | | |
| **Capsules 10-pack** | **Control** | **Compromise** | **Total** | **Capsules 50-pack** | **Control** | **Compromise** | **Total** |
| Choice | 11 | 4 | 15 | Choice | 36 | 56 | 94 |
| No Choice | 44 | 67 | 111 | No Choice | 19 | 15 | 34 |
| **Total** | **55** | **71** | **126** | **Total** | **55** | **71** | **126** |
| $Chi^2(1)$ =6.10 (Pr. 0.014) | | | | $Chi^2(1)$ =2.83 (Pr. 0.092) | | | |
| **Cleaning Solution** | **Control** | **Compromise** | **Total** | **Cleaning Kit** | **Control** | **Compromise** | **Total** |
| Choice | 28 | 25 | 52 | Choice | 15 | 49 | 64 |
| No Choice | 27 | 46 | 73 | No Choice | 40 | 22 | 62 |
| **Total** | **55** | **71** | **126** | **Total** | **55** | **71** | **126** |
| $Chi^2(1)$ =21.60 (Pr. 0.000) | | | | $Chi^2(1)$ =21.60 (Pr. 0.000) | | | |
| **Portable Grill** | | | | | | | |
| **Low Quality** | | | | **High Quality** | | | |
| **Basic Grill Cover** | **Control** | **Compromise** | **Total** | **Premium Grill Cover** | **Control** | **Compromise** | **Total** |
| Choice | 13 | 12 | 26 | Choice | 23 | 32 | 55 |
| No Choice | 64 | 60 | 123 | No Choice | 54 | 40 | 94 |
| **Total** | **77** | **72** | **149** | **Total** | **77** | **72** | **149** |
| $Chi^2(1)$ =.001 (Pr. 0.972) | | | | $Chi^2(1)$ =3.65 (Pr. 0.056) | | | |
| **Charcoal (5 kg)** | **Control** | **Compromise** | **Total** | **Charcoal (10 kg)** | **Control** | **Compromise** | **Total** |
| Choice | 17 | 9 | 26 | Choice | 40 | 48 | 88 |
| No Choice | 60 | 63 | 123 | No Choice | 37 | 24 | 61 |
| **Total** | **77** | **72** | **149** | **Total** | **77** | **72** | **149** |
| $Chi^2(1)$ =2.37 (Pr. 0.124) | | | | $Chi^2(1)$ =3.34 (Pr. 0.068) | | | |

# Figures

**Figure 1: Netflix's "compromise" offer page**

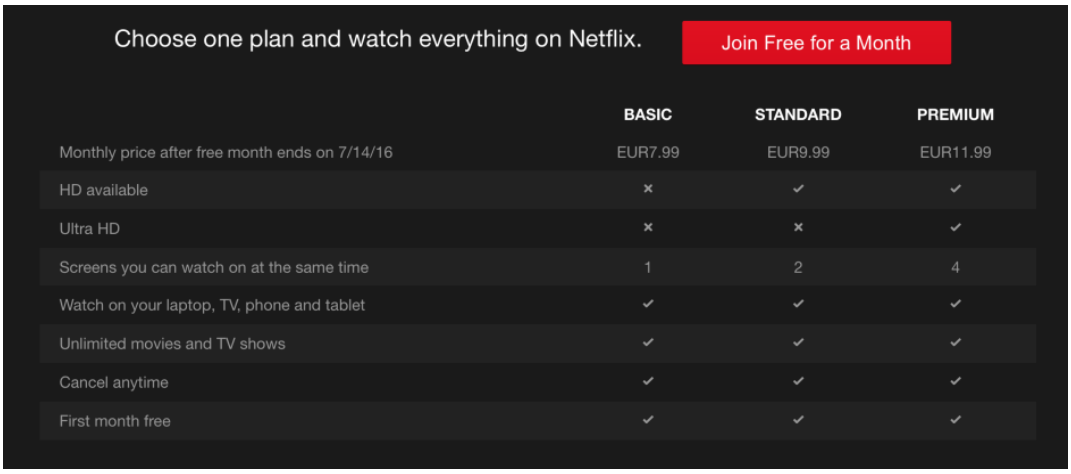



**Figure 2: Example of a Landing Page for the "Short Subscription with Bonus Time" Condition (Study 1a)**

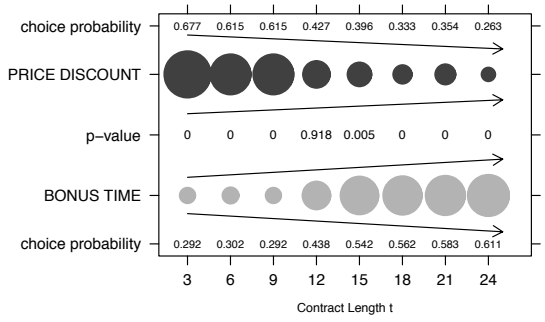
## Figure 3: Example of Choice Task in Study 2

| Study 2b |
| --- |
| **Base subscription of the Internet provider (terminable at any time):**<br>Contract duration of **1 month: $ 50**<br><br>**Alternative offers of the Internet provider:**<br>With the $50 per month subscription in mind, I would choose:<br><br>• Alternative Offer 1: A **12-month** contract for **$33.33** per month.<br>• Alternative Offer 2: A **12-month** contract for $50 per month, where the **last 4 of the 12 months of service are free**. *<br>• I would **not choose either offer**. I would prefer to stay with the base 1-month contract at $50 per month. |

* We think that the statement "where the last 4 of the 12 months of service are free" clearly conveys that the bonus time added at the beginning or at the end is intended as time included in the subscription and not time that is "additional" or to be received extra.

## Figure 4: Binomial Tests for Price-Discount and Bonus-Time Conditions

Study 2a (Bonus time at end of contract)




Study 2b (Bonus time at beginning of contract)

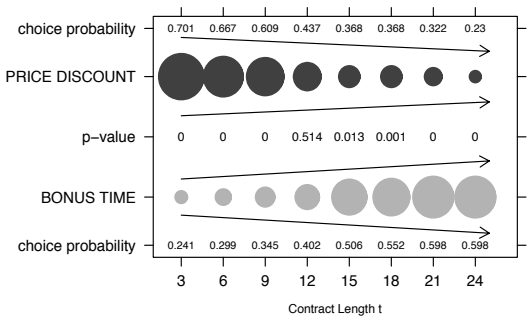
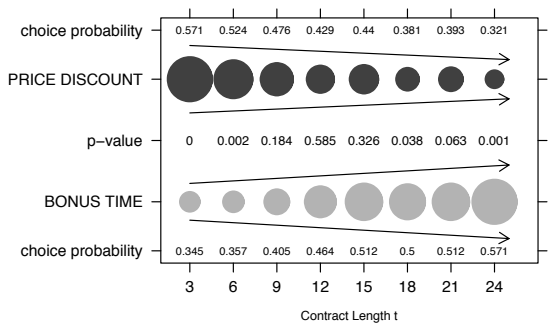
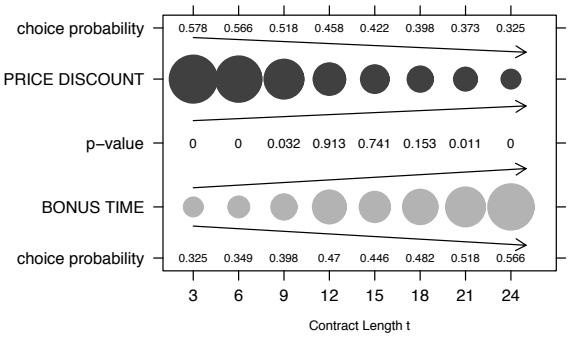


**Figure 5: Binomial Tests for the Price-Discount and Bonus-Time Condition (Study 3)**

Study 3a




Study 3b




Study 3c

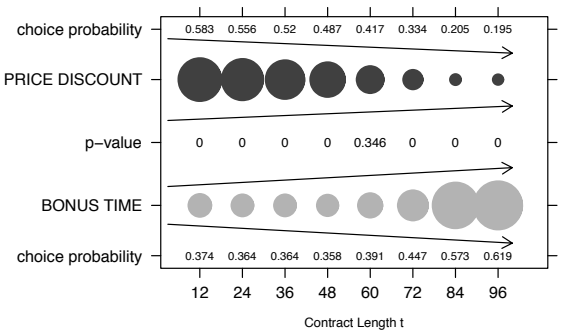
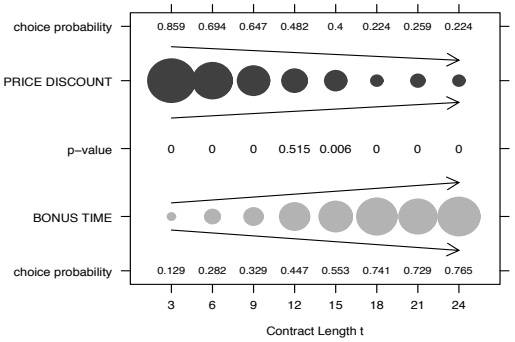
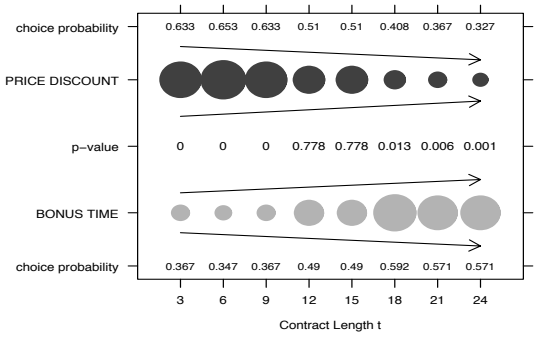


**Figure 6: Binomial Tests for the Price-Discount and Bonus-Time Condition (Study 4)**

Study 4a (Internet access)



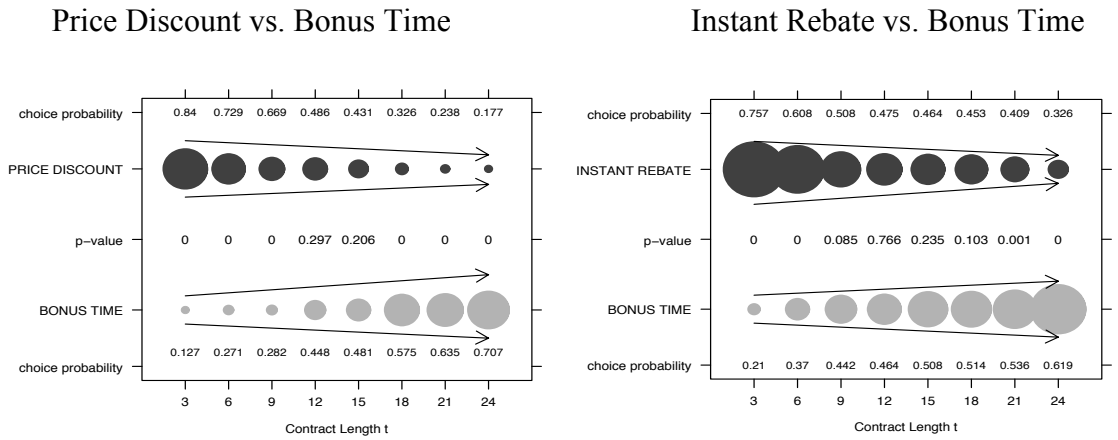

Study 4b (Cell phone plan)



## Figure 7: Example of Choice Task in Study 5

| **Condition "Instant Rebate vs. Bonus Time"** |
|---|
| **Base subscription of the Internet provider (terminable at any time):**<br>Contract duration of **1 month: $ 50**<br><br>**Alternative offers of the Internet provider:**<br>With the $50 per month subscription in mind, I would choose:<br><br>• Alternative Offer 1: A **12-month** contract for **$50** per month **with an Instant Rebate of $16.67 per month**.<br>• Alternative Offer 2: A **12-month** contract for $50 per month, where the **last 4 of the 12 months of service are free**.<br>• I would **not choose either offer**. I would prefer to stay with the base 1-month contract at $50 per month |

## Figure 8: Binomial Tests for the Price-Discount and Bonus-Time Condition (Study 5)



## Figure 9: Examples of Choice Tasks in Study 6

### Study 6a Full-Information Condition

**Base subscription of the Internet provider (terminable at any time):**

Contract duration of **1 month: $ 50**

**Alternative offers of the Internet provider:**

With the $50 per month subscription in mind, I would choose:

- Alternative Offer 1: A **12-month** contract for **$33.33** per month. (TOTAL AMOUNT TO PAY: **$400**).
- Alternative Offer 2: A **12-month** contract for $50 per month, where the **last 4 of the 12 months of service are free**. (TOTAL AMOUNT TO PAY: **$400**).
- I would **not choose either offer**. I would prefer to stay with the base 1-month contract at $50 per month.

### Study 6b Value Equivalency Calculation

**The Internet service provider offers the following contracts.**

**Base subscription**

Contract duration of **1 month: $ 50 (terminable at any time):**

**Alternative offers**

- Alternative Offer 1: A **12-month** contract for **$33.33** per month.
- Alternative Offer 2: A **12-month** contract for $50 per month, where the **first 4 of the 12 months of service are free**.

**Please calculate the total cost of the two alternative offers (please round your result to the nearest dollar, e.g.: 1.99 becomes 2):**

- Total amount to pay over 12 months of alternative offer 1: $ ---
- Total amount to pay over 12 months of alternative offer 2: $ ---

Which of the following offers would you prefer and choose?

- Alternative Offer 1: A **12-month** contract for **$33.33** per month.
- Alternative Offer 2: A **12-month** contract for $50 per month, where the **first 4 of the 12 months of service are free**.
- I would **not choose either offer**. I would prefer to stay with the base 1-month contract at $50 per month.

**Figure 10: Example of "Time (Money) Slack" Measurement Task for a Future Time Point of One Month in Study 6c**

**"Thinking about your schedule (budget)"**

"Please, think about your activities (expenses) today and your available spare time (money). Now consider your likely activities (expenses) and available spare time (money) for the same day of the week **in one month from now**.

**On which day do you expect to have more spare time (more financial reserves)?"**

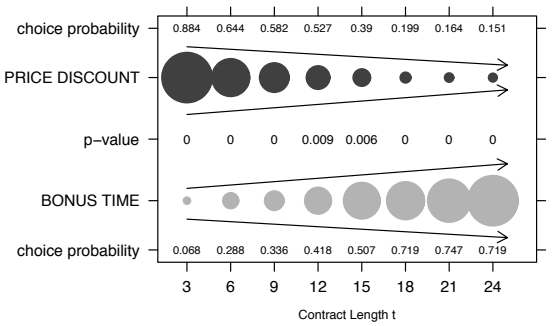
Please answer on the following 10-point scale:

1= much more time available today, 10 = much more time available in one month from today

**Figure 11: Binomial Tests for the Price-Discount and Bonus-Time Condition (Study 6)**

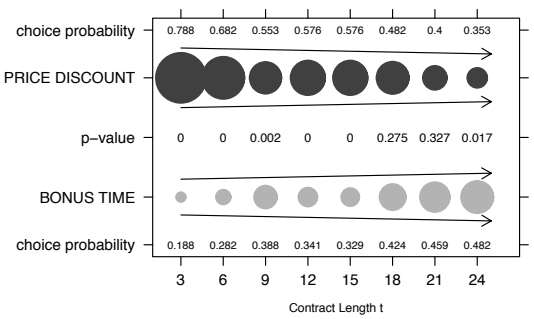
Study 6a

Low Financial Literacy



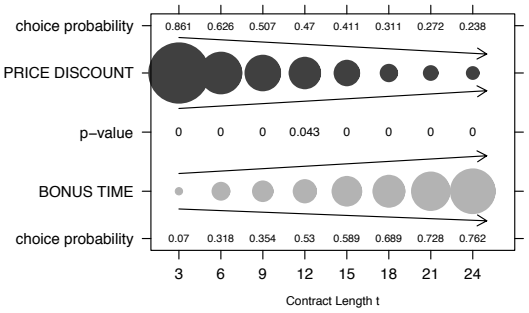

Study 6a

High Financial Literacy



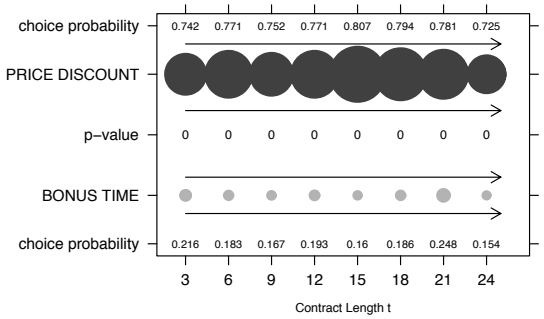

Study 6a

Partial Information



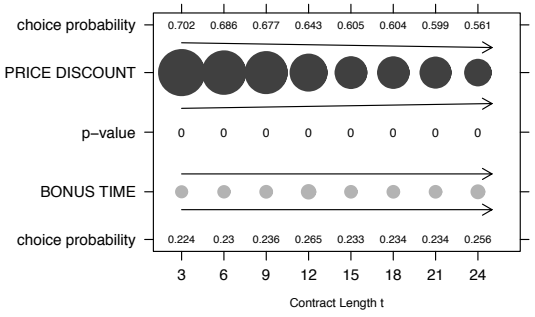

Study 6a

Full Information




Study 6b

Correct Calculation (N=223)




Study 6b

Incorrect Calculation (N=28)

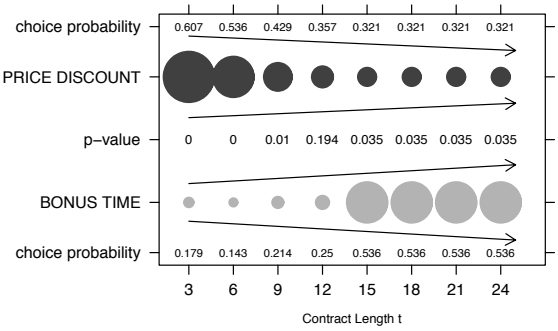


**Figure 12: Visual Representation of the Pre-paid cards in Study 1**


**Figure 13: Line Plot Showing Cumulative Purchases of Menus 1 and Vegetarian (Normalized 0-1) by Respondents in Control (A) and Treatment group (B) (Study 1)**

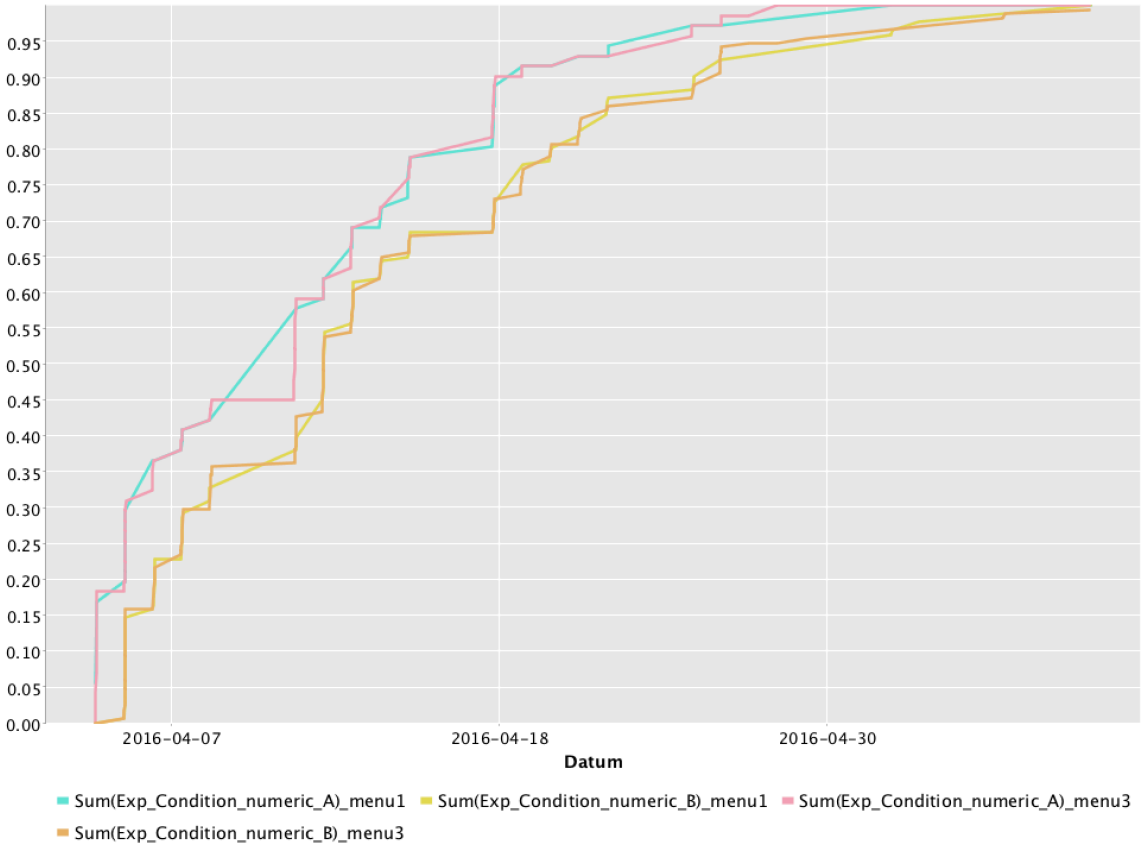
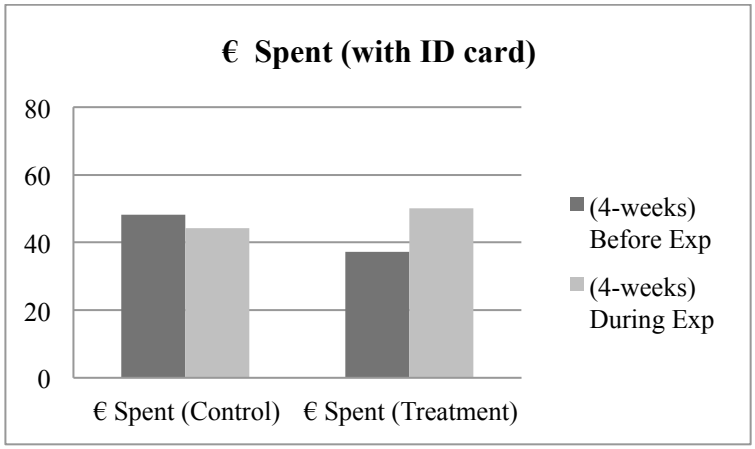


**Figure 14: Purchases Done by Premium pre-paid Card Owners with ID Cards**



# Appendix

This appendix contains additional material to the manuscript. Section A and B refer to the research project "Time Preferences for Subscriptions". Section A gives a detailed description of matching tasks and discount rates calculated for studies 2, 3, 4, 5 and 6a. It also includes an additional study (Study A1), which tests the methodology used to elicit time preferences. Section B describes the data samples' reduction and reports preliminary studies not included in either the manuscript or in section A. Section C refers to the research project "The Compromise Effect in Post-Purchase Consumption" and provides a detailed description of the pre-tests used to develop the pre-paid cards used in the field experiment.

## Section A: Analysis of Discount Rates

In addition to the choice tasks, for many of the studies reported in the paper we have also elicited respondents' time preferences for subscriptions' extensions through "matching tasks". These tasks presented respondents with a one-month subscription (for instance priced $50 in study 2) and asked for their willingness to pay (WTP) for contracts' extensions given this basic subscription (price discount framing). In a second set of questions, we asked respondents how many months they would expect to receive for free (bonus time framing) within the subscription extensions ranging from 3 to 24 months. We report an example of the price-discount condition in Figure A-1 (which also provides the phrasing we used for all similar studies). In the bonus-time condition, we asked respondents to indicate the minimum number of free months that they would expect to receive (for instance, in study 2a at the beginning of the contract period while in study 2b at the end) to switch from the monthly contract to a subscription with a longer contract duration, as shown in Figure A-2.

(Insert Figure A1 about here)

(Insert Figure A2 about here)

Answers to the matching tasks allowed us to compute individuals' discount rates. We have determined the monthly exponential discount rate *r* for duration of *T* and a base contract fee of *B* using the following equation:

$$\boldsymbol{r} = \ln\left(\frac{\boldsymbol{B}}{\boldsymbol{p}}\right)\boldsymbol{T}. \qquad \text{(Equation-1)}$$

The (monthly) discount rate *r* indicates the discount of the monthly price *p* asked by a consumer to switch from the base contract (e.g. $50 for 1 month in study 2) to a longer contract. These discount rates are calculated based on the WTP and bonus-time responses that we collected in the matching tasks of our surveys. In the following sections we report the results of several studies of the manuscript in terms of discount rates.

**Study 2**

Study 2 examines consumers' time preferences by comparing WTP for longer subscription periods with WTP for a basic offer and by eliciting the number of free months expected by respondents to switch to longer contract periods. In studies 2a and 2b, we investigate how much consumers are willing to pay per month for longer contracts relative to a one-month base subscription fee of $50. We contrast WTP to how many free months are needed (in bonus time) to switch from the one-month contract to a longer contract. In study 2a, we add bonus time at the beginning of the contract period; in study 2b, we add it at the end.

*Results of the matching task.* As Table A1 shows, our analysis of discount rates reveals higher rates for short-term contracts than for long-term contracts and show decreasing discount rates the longer the subscription period (consistent with hyperbolic or quasi-hyperbolic models of time preference), regardless of whether the benefits of choosing longer subscriptions are framed as price discounts or bonus time. We refer to patterns of decreasing impatience/increasing patience in our studies as "hyperbolas" or "hyperbolic-shaped" without committing to a specific functional form to characterize these patterns—see Doyle (2013) for a review of delay-discounting models—because the focus of this paper is more on the preference reversal rather than the functional form of discounting under different frames. In both experiments (2a and 2b), the discount rates decrease with longer subscription periods. Figure A3 plots the monthly discount rates (reported in detail in Table A1), clearly indicating that when we asked respondents for the number of free months needed before they agreed to switch to longer contract periods discount rates decrease significantly over longer contract durations and we see a hyperbolic-looking discounting function. As shown in Figure A3 this pattern for the bonus-time condition is consistent with existing research on decreased discounting over greater durations (Ariely and Loewenstein 2000; Ariely and Zauberman

2000; Laibson 1997; Loewenstein and Prelec 1993). Respondents preferred price discounts for shorter contracts, and then preferred bonus time for longer contracts.

Comparing the framing conditions in the two experiments (Figure A3 and Table A1), we find highly significant differences in the monthly discount rates in almost all cases. In other words, the framing of promotions in terms of price discount or bonus time significantly alters time preferences. The large preference reversal we see here—that people discount bonus time more than price discounts for shorter periods, while the opposite is true for longer periods—holds regardless of whether the bonus time is added at the beginning or at the end of the contract. Figure A3 illustrates the point where consumers' preferences change, and shows that we observe a hyperbolic-looking discount function for the bonus-time condition, whereas we observe a much flatter and almost linear pattern in the price-discount condition.

(Insert Table A1 about here)

(Insert Figure A3 about here)

A two-way repeated-measures ANOVA on discount rates reveals a significant interaction of the framing of the promotion (price discount vs. bonus time) and contract duration ($F(7, 1053) = 66.11$; $p < .001$, in study 2a and $F(7, 1389) = 97.58$; $p < .001$ in study 2b). This finding indicates customers' decisions to extend subscriptions depend critically on the length of these subscriptions. We return to this issue in a comparative discussion of all studies at the end of this appendix section (Table A11). In Table A11, we also report correlations between a participant's discount rates and the contracts durations. This analysis reveals, at the individual level, that the discrepancy between the discount rates in the two framings increases with longer contract durations (average $\rho=0.669^{***}$ and median $\rho=0.754$ in study 2a), underlining the tendency of respondents in study 2 (and in all other studies) to exhibit higher discount rates for price discounts than for bonus time in long-term contracts and the opposite for short-term contracts. We find a crossover point in people's time

preferences that does not vary substantially between the two experiments. These results suggest that for contracts with duration of less than 11 months, subscription promotions should not be presented as bonus time, because people discount bonus time much more than price discounts for shorter subscriptions. The reverse pattern of preferences applies to longer contract periods. In other words, respondents asked for a bonus time greater than its equivalent price discount for contracts of shorter duration, and asked for a price discount higher than its equivalence in bonus time for contracts of longer duration.

Pervious research found that preferences might change across elicitation methods—evidencing labile preferences (Fischhoff 2006). Here, we find that reframing an option as either a choice (results reported in the manuscript) or an intertemporal tradeoff (results reported in this web appendix) yields similar results, thereby suggesting differences in discounting by frame explain choices (rather than choices being based on discounting in one frame but based on something else in the other condition).

**Study 3**

The objective of Study 3 is to test the magnitude effect of the reference subscription price and of the values characterizing the bonus time framing. In Study 2, the base contract used as a common reference for all trials was a one-month $50 subscription, while in this study, we lower the cost of the subscription to $10.

*Results of the matching task.* The discount rates are computed as before. Figure A4 presents the crossing hyperbolas and shows once again that we observe hyperbolic-shaped discounting in both framing conditions (regardless of the positioning of the bonus-time benefit, either at the beginning of the contract period as in Study 3a or at the end as in Study 3b). In particular, we note that the discount rates differ between the framing conditions for

every time period except the one closest to the crossover between the functions (the 9-month contract). Comparing this figure with Figure A3 in Study 2, we find two differences. First, in line with other studies of discounting, we observe higher discount rates in this study, where people are considering smaller amounts of money. This difference is particularly pronounced for the price-discount condition where we observed relatively low discount rates in the previous two studies. In Study 2, we observed an almost flat and linear relationship between contract duration and monthly discount rate in the price-discount condition, but this relationship appears more hyperbolic than linear in Study 3. Both changes are consistent with the impact of magnitude effects on discounting, because people are considering small dollar values for shorter contract durations (and discounting more steeply) and slightly higher dollar values for longer contracts (and discounting slightly less). However, we still find a crossover in people's discount functions for contracts lasting about 10 months. Table A2 shows discount rates in the price-discount and bonus-time conditions of Study 3. These results are similar to those given in Table A1, which indicates that offering a much cheaper basic subscription does not change the main result of Study 2, where the cost was five times higher.

(Insert Figure A4 about here)

(Insert Table A2 about here)

As in Study 2, we performed a two-way repeated-measures ANOVA and observed a significant interaction between promotion framing and contract duration ($F(7, 1188) = 75.15$, $p < .001$ in Study 3a and $F(7, 1195) = 32.51$, $p < .001$ in Study 3b). This finding once again suggests that the shapes of the discount functions are significantly different, resulting in the crossover we observed in the first two studies. Although we observe elevated levels of discounting and a change in the shape of the discount function in the bonus-time condition in this study where the dollar amounts are smaller, we see the same preference reversal demonstrated in the first two studies and in the choice tasks reported in the paper.

**Study 4**

In Study 4, we asked respondents about their monthly WTP before starting the experiment. Study 4b was identical to Study 4a, except that instead of asking participants about Internet services, we asked about their preferences for cellular phone plans offering unlimited voice and data. The analysis of the matching task reveals the same pattern of discount rates observed between the price-discount versus bonus-time frames, regardless of the service on offer (e.g., cell phone vs. Internet).

*Results of the matching task.* As Figure A5 and Table A3 show, the analysis of the results of these adaptive experiments replicates previous studies' results using the same fixed base subscription rate for all respondents. Although the base rate for these subscriptions has been customized for each respondent in this study, the monthly discount rates of both framing conditions reveal the same pattern that was previously established—a hyperbolic-shaped more pronounced discount function for bonus time that crosses over the discount function for price discounts. As before, we observe that the shapes of discount functions are significantly different, resulting in the crossover that we observed in all previous analyses.

(Insert Figure A5 about here)

(Insert Table A3 about here)

As in the previous studies, in this case too we have performed a two-way repeated-measures ANOVA and we have observed a significant interaction between promotion framing and contract duration ($F(7, 1182) = 56.87$; $p < .001$, in Study 4a and $F(7, 720) = 16.28$; $p < .001$ in Study 4b). In addition, Table A11 reports the average and median correlations between the differences in individual discount rates (calculated as $r_{PD}$-$r_{BT}$) and the eight contract durations considered (3, 6, 9, 12, 15, 18, 21, and 24 months). These correlations

are all positive and strongly significant, which means that the discrepancy between the levels of discounting in the two frames increases over longer time periods. In other words, the longer the contract, the greater the difference between the discount rates derived from price discounts and bonus time. In the third column of Table A11, we show that the vast majority of participants (between 82% and 96% of all participants in all studies) express the type of inconsistency we found at the group level and exhibit higher discount rates for price discounts than for bonus time in longer contracts, while the opposite is true for shorter contracts.

**Study 5**

In Study 5, we test whether the preference reversals observed so far also exist when we change the way respondents are questioned in the price-discount condition. To this end, we have included an instant-rebate condition to control for the possible effect that framing a price reduction in absolute terms instead of relative terms could have on time preferences. In this condition, we asked respondents what instant rebate on the overall sum of the subscription fee they would like to receive to switch to a longer subscription (see Figure A6 for an example of the matching tasks in the instant-rebate condition).

(Insert Figure A6 about here)

*Results of the matching task*. Figure A7 and Table A4 show the monthly discount rates in the three conditions studied, showing a pattern in line with our expectations: respondents preferred the instant rebate to reduced monthly fees for longer contracts, while the opposite is true for shorter contracts. In particular, for shorter contracts, respondents preferred a price discount to an instant rebate and an instant rebate to bonus time.

(Insert Figure A7 about here)

(Insert Table A4 about here)

As in the previous studies, the two-way repeated-measures ANOVA found that the crossover in discount functions is significant, as revealed by the significant interaction term reported in Table A11 ($F(7, 2870) = 136.36$; $p < .001$).

**Study 6a**

In Study 6a we submitted respondents a matching task to elicit time preferences for subscriptions of eight different lengths in the two different frames (price discount and bonus time). We have also measured respondents' time preferences for money (patience), risk tolerance and financial literacy.

*Results of the Matching Task in Study 6a*

*Time preferences for subscription.* Figure A8 shows the average discount rates of participants computed on the basis of their answers to the matching tasks (detailed discount rates are reported in Table A5). We observe the same pattern of discounting as in previous studies. The preference reversal occurs after 6-month contract duration, which is a switching point close to that observed in Study 1a (our large-scale field experiment). As in previous studies, the two-way repeated measures ANOVA found that the crossover in discount functions is significant, as revealed by the significant interaction between promotion framing and contract duration ($F(7, 5637) = 133.86$; $p = .0144$).

(Insert Figure A8 about here)

(Insert Table A5 about here)

*Risk tolerance.* Participants' risk tolerance was calculated based on their choices between six gambles (a measure used by Chetan et al. 2010), where the higher the value of the gamble chosen, the greater the risk tolerance. We find the correlation between risk tolerance and discount rates in the price-discount and bonus-time frames are (significantly) negative in both

cases (Table A6), which is reasonable because the signing of a longer contract is riskier than the signing of a shorter one. Consumers risk committing themselves to paying for services they do not need or services another vendor might supply for a lower cost in the future. Moreover, consistent with the idea that translating this risk tolerance into subscription preferences is easier in the price-discount condition, the correlation between these measures is stronger in the price-discount condition than in the bonus-time condition, perhaps because thinking about and applying your preferences in the price-discount condition is easier.

*Time preferences for money and subscriptions*. An indicator of time preferences for lump sums was calculated as the share of larger later (LL) monetary rewards chosen by the respondents, where the higher the number of LL outcomes chosen, the more patient the respondent. We correlated this measure of time-preference with discount rates for subscriptions separately for the bonus-time frame and the price-discount frame. We find negative correlations in both frames (which is logical: the more patient the respondent—a large value in the time preference for money task—the smaller the value of the promotion required to sign a longer contract—a small value in the subscription-time-preference task; see Table A6). Finally, consistent with the idea that translating this time preference into subscription preferences is easier in the price-discount condition, the correlation between these measures is stronger in the price-discount condition than in the bonus-time condition.

(Insert Table A6 about here)

*Financial literacy*. To test whether a participant's level of financial literacy can influence discounting and contribute to the observation of preference reversals in our studies, we first calculated the difference in the discount rates between the price-discount and the bonus-time condition. If people with a high level of financial literacy are able to better understand the difference between frames and translate their risk and time preferences into their subscription preferences, then these people should discount subscription benefits

similarly across frames. Consistently with expectations, we found that the difference in discount rates is negatively correlated with financial literacy ($\rho = -.373$, $p < .001$), which means that people with a high financial literacy have shown a smaller difference in discount rates between the two frames, because they were able to better read the different frames and therefore discount them similarly.

To further examine whether the preference reversal is stronger for respondents with below-average financial literacy, we present in Table A7 a comparison of the correlations shown in Table A6 for respondents below and above the median level of financial literacy. In all four cases, the correlations between risk tolerance and time preferences with discount rates are weaker for the bonus-time framing, but they are even weaker for people with low financial literacy, which means that their choices have been less consistent (with their risk and time preferences) and have led to a stronger reversal of preference between frames.

(Insert Table A7 about here)

To further examine the moderating effect of financial literacy, we have regressed risk tolerance and financial literacy on the average discount rates in each frame of a subscription benefit when subscribing to contracts extensions. Table A8 reports the coefficient estimates for a robust regression with unstandardized variables and a constant term for risk tolerance. The coefficient estimates of financial literacy, as well as of the interaction between financial literacy and risk tolerance, are significant, indicating financial literacy moderates the effect of risk tolerance on discounting behavior. Once again, the idea is that people with less financial literacy have a relatively more difficult time translating their risk tolerance into preferences for subscriptions.

We have performed a similar robust regression, swapping time preferences for money, to further examine our hypotheses of moderation. Table A9 reports coefficient estimates for time preferences and financial literacy, together with interactions between them. Also in this

case, the interaction term is significant for the price-discount frame and approaches significance for the bonus-time frame. Financial literacy moderates the effect of time preferences on discounting behavior as people with a high level of financial literacy have less difficulty translating their time preferences into subscription preferences in price-discount (and eventually in bonus-time) frames; those with a low level of financial literacy have greater difficulty with this task.

(Insert Table A8 about here)

(Insert Table A9 about here)

**Study A1: Alternative Preference Elicitation Method (and Full Information Condition)**

In study A1, not reported in the manuscript, we consider issues of possible measurement variance, and we test if eliciting time preferences through a *choice task* rather than a *matching task* reveals different patterns. Because several studies find that time preferences vary between elicitation methods, and that *matching tasks* often produce lower discount rates than *choice tasks* (Ahlbrecht and Weber 1997; Frederick et al. 2002; Hardisty et al. 2013; Read and Roelofsma 2003), Study A1 tests whether eliciting time preferences through a *choice task* instead of a *matching task* reveals different patterns. Study A1-a also includes a third experimental condition—the full-information condition—that discloses the equivalence of the bonus-time and the price-discount frames (similarly to Study 6b in the manuscript). This new "control" condition has the purpose of helping us identify people's "pure" time preferences for subscriptions, regardless of the framing of the promotion, and can improve the comparison with the distortion created by the framing (we already addressed this important point in Study 6b in the manuscript). Study A1-b eliminates the matching task completely to confirm that the choice-task results persist even in the absence of the matching task.

In study A1-a, we present participants with a series of pairwise choices between the basic contract and longer contracts in such a way as to imitate how time preferences are often measured, people who make a choice between receiving a fixed smaller-sooner reward versus larger-later rewards of increasing size (or fixing the larger-later reward and varying the smaller-sooner reward). These methods are variously referred to as "titrators" or "multiple price lists" (MPL) across various applications (Coller and Williams 1999). In contrast to matching tasks (such as those used in our previous studies; see Figure A1 and Figure A2), participants choose an option per pair (Figure A9), and we use the point where they switch from preferring the smaller-sooner to preferring the larger-later option to infer their indifference point.

In study A1-b we test whether the fact that respondents perform the matching task affects the preference reversal we observe in their choices. This study has made sure that respondents only perform the choice task—omitting the matching task—to test whether the result is valid under these conditions. If, for example, the preference reversal were eliminated in Study A1-b's choice-only method, we might infer this apparent preference reversal was, to some degree, an artifact of the matching task, which would weaken our confidence in the results. Because study A1-a tests whether the method used for eliciting time preferences is associated with the observed inconsistencies, Study A1-b tests whether the choice results are a demand effect produced by having already performed a matching task.

**Method**

Respondents and design. In Study A1-a, we randomly assigned 178 respondents from Amazon Mechanical Turk to one of three conditions (price discount, bonus time, and full information) for the MPL task. From the same panel, for Study A1-b, we recruited 131 respondents. The methods of this study were identical to those of the previous studies, except

that the entire experiment consisted only of the choice experiment, without any previous elicitation of time preferences.

Stimuli and procedure. We presented respondents in Study A1-a with an MPL and asked them to make several choices between one-month Internet service contracts for $50 and contracts with a longer duration at various discounted prices, as in Study 2 (non-adaptive survey, in the manuscript) with the only difference that the cost reduction was presented in three, rather than two, frames. In each treatment, we submitted to the participants eight questions (one for each contract duration) consisting of one titration comparing the base subscription with alternative offers of longer contracts with lower overall costs. The frame in the price-discount condition presented the cost reduction for choosing a longer subscription as a reduced monthly fee. Therefore, each pair in a question's titration consisted of the base subscription at $50 per month, on the one hand, and a contract with a longer subscription period, but a cheaper monthly rate on the other. As Figure A9 shows, with each additional pair, the monthly price of the longer contract was reduced further while its duration remained unchanged. In order to ensure comparability between treatments, the prices displayed in the right-hand column of Figure A9 were determined in such a way that the total fees paid for the subscription were equivalent to those to be paid if a period of one to five months was offered for free.

(Insert Figure A9 about here)

The bonus-time condition used a similar question design, with the benefit presented in the form of varying numbers of months received for free (e.g., "1 month at $50" vs. "6 months with 1 month for free"). With each new choice pair in the question, the numbers of months given away free of charge increased by one up to five. We applied the same pattern to the full-information condition that revealed the equivalence between the bonus-time and the price-discount frame. We presented each option with longer contract duration by referring

to the number of free months as well as the reduced monthly fee resulting from this promotion (e.g., "1 month at $50" vs. "6 months with 1 month free [$41.67 per month]").

Study A1-b was identical to the adaptive survey in Study 4a (reported in the manuscript) but without the matching task. Again, we deleted this section in order to test whether completing the matching task somehow produces the preference reversal we have observed.

**Results and Discussion**

*Time preference*. The individual monthly discount rates for the respondents of study 6a were calculated for each of the eight questions asked. To do this, we examined the data for each MPL to find the monthly price, or the amount of bonus time, at which the respondent's choice switched from the one-month contract to the longer contract. We could then determine the respondent's discount rate *r* for the price-discount frame using the following exponential formula:

$$r = -\frac{\ln\left(\frac{p}{50}\right)}{T}, \qquad \text{(Equation-A2)}$$

where T is the duration of the longer contract and p is the monthly price at which the respondent was willing to switch to the subscription of length T. Overall, we determined eight discount rates per participant: one for each duration. For the bonus-time and full-information conditions, the computation was analogous, but adjusted so that the number of free months t at which the respondent switched between the options could be used, yielding the following equation:

$$r = -\frac{\ln\left(\frac{T-t}{T}\right)}{T}. \qquad \text{(Equation-A3)}$$

Equations –A2 and –A3 are analogous insofar as they yield the same discount rate r regardless of whether a respondent chose a six-month contract at $41.67 per month or a six-month contract with one free month. This allows us to compare the two frames examined in

the experiment. Figure A10 and Table A10 show once again that respondents express decreasing impatience (hyperbolic-seeming discounting) and a lower discount rate under the price-discount frame, relative to the bonus-time frame, when facing shorter contract length. This is equivalent to a preference for receiving a price discount over bonus time. As in studies 1-5, after certain contract duration, this relationship is reversed and respondents prefer free months. Furthermore, for each contract duration, the discount rates obtained on the basis of full information lie between the discount rates of the other two treatments for contracts with duration of six months or more. Comparing the other two conditions, however, the discount rates based on full-information lie closer to the lower of the two discount rates resulting from bonus time and price discounts.

Table A10 also reports several tests of significance of the null hypothesis of the equivalence of the three conditions of Study 6a. The results of ANOVA are reported for comparison purpose with previous studies, but we note the data in this study meet neither the assumptions of the homogeneity of variance (Levene's Test) nor of normality (Shapiro-Wilk test's $p<0.001$ for all contract lengths). To avoid biased estimates due to heteroscedasticity, we have computed a Brown and Forsythe F-test, and the results indicate a significant difference between treatments for durations of 18, 21, and 24 months. Due to the non-normality of our data, we applied a nonparametric (Kruskal-Wallis) test to compare average discount rates. These tests show a significant difference in the discount rates between the three treatments for contract durations of 21 and 24 months. Therefore, the three treatments only differ significantly in long-term contracts.

From a closer comparison of the bonus time and price discount conditions using a Wilcoxon-Mann-Whitney test (that does not require normality), we found differences for contracts of 12, 18, 21, and 24 months (with p-values of .080, .048, .007 and .012), suggesting

differences in the way people value bonus time versus price discounts, as expressed in these multiple price lists.

(Insert Figure A10 about here)

(Insert Table A10 about here)

To further examine whether a preference reversal occurs between the price-discount and the bonus-time frame, we conducted a mixed ANOVA that considered the effects of treatment, duration, and their interaction. The result shows a significant interaction between promotion framing and contract duration ($F(7, 791) = 2.52$, $p = .014$), confirming the pattern in discount rates between contracts of different duration significantly differs between the two treatments.

*Choice experiments.* In Study A1-b, we conducted the same choice experiment as in Study 4 (in the manuscript), and Figure A11 reports choice probabilities and results of a binomial test. As in previous studies, we observe that people prefer contracts offering a price discount for short durations, and we observe the opposite for long durations. Therefore, the preference reversal revealed in previous studies does not seem to be an artifact of having performed the matching task.

(Insert Figure A11 about here)

*Discussion.* Study A1 reveals preference reversals using a choice task (MPL) rather than a matching task. However, the discount rates resulting from the full-information condition lie between the discount rates observed for the other two frames. In particular, the hyperbola is close to the lower bound of the other two conditions, suggesting that providing all available information reduces impatience. Providing people with information about the equivalence of the two promotional frames (price discount vs. bonus time) should eliminate the preference reversal (we have already investigated this issue in Study 6b in the manuscript). Furthermore, a comparison of the discount rates resulting from Study 6a with

discount rates resulting from Study 2b (which was identical in structure to Study 6a but used the matching task to elicit time-preferences) reveals that most of the discount rates resulting from choice tasks are larger and decrease more steeply than discount rates resulting from matching tasks, which is consistent with prior literature (Ahlbrecht and Weber 1997; Frederick et al. 2002; Hardisty et al. 2013; Read and Roelofsma 2003).

Study A1-b suggests that questions on time preferences regarding the choice of longer contract durations do not affect the pattern revealed in previous studies. Therefore, the results of Study A1 suggest the preference reversals we have observed so far are not limited to, nor produced by, a matching procedure. Rather, the choice patterns appear relatively robust to differences in the methods used to assess preferences.

**Comparative Discussion of Matching Tasks Results**

In each study, we found a significant interaction effect between duration and framing in people's discounting of subscriptions (see Table A11 for F-statistics and p-values). We also tended to find strong effects of duration (declining impatience) and significant main effects between frames. In short, matching tasks of studies 2–6a find that people's discounting of subscription benefits is extremely variable, but the crossover produces the predicted interaction effects observed in each study, so that people express higher discount rates for price discounts than for bonus time in longer contracts. As Table A12 further shows, the within-subjects correlation between the difference in discount rates and contract durations is significant in all studies. This table reports the average and median correlation between the differences in individual discount rates (computed as $r_{PD}$-$r_{BT}$) and the eight durations considered (3, 6, 9, 12, 15, 18, 21, and 24 months). These correlations are all positive and strongly significant, which means that the discrepancy between the levels of discounting in

the two framings increases with longer time periods. In other words, the longer the contract, the greater the difference between the discount rates derived by price discounts and bonus time. In the third column of Table A12, we show that the vast majority of participants (between 82% and 96% of all the participants in all the studies) expressed the kind of inconsistency that we found at the group level, and showed higher discount rates for price discounts compared to bonus time in longer contracts, while the opposite is true for shorter contracts.

(Insert Table A11 about here)

(Insert Table A12 about here)

## Section B: Data Samples Reduction and Preliminary Studies

### Data-Reduction Note

For all studies using data collected online, we have verified the total response time and deleted answers with a completion time of less than the 10th percentile of the time needed for all complete submissions. Also, we have dropped respondents whose answers made no sense, such as respondents showing a systematic choice of answers (e.g., always choosing the 2nd or 3rd option in all tasks) or reporting illogical values (e.g., asking for more than 3 months of bonus time in contract durations of 3 months). In Study 6a, the 14-item scale used for measuring time preferences included two attention checks that 38% of the sample failed. Therefore, we dropped those responses. Also, we have dropped incomplete responses (see Table A13)

(Insert Table A13 about here)

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### Preliminary Studies

In addition to the studies reported in the paper, we conducted eight experiments that we summarize in the following subsection.

#### Generalizability Across Services

*Gym memberships*. Fifty Swiss students participated in an in-class survey examining preferences for subscriptions to a fitness studio. The survey consisted of a matching task asking respondents to state the maximum price they were willing to pay (price-discount condition) or the maximum number of months for free they would have liked to receive (bonus-time condition) to switch from a one-month subscription at the price of 100 CFH to a

longer subscription (3, 6, 9, 12, 15, 18, 21, 24, and 36 months). In line with the other studies, the analysis of discount rates reveals higher rates in the bonus-time condition for shorter contracts and higher rates in the price-discount condition for longer contracts (with a switching point between 9 and 12 months).

*Pay TV*. Seventy-nine Swiss students participated in an in-class survey examining preferences for subscriptions to a pay-tv provider. The survey consisted of a matching task requiring respondents to state the maximum price they were willing to pay (price-discount condition) or the maximum number of months for free they would have liked to receive (bonus-time condition) to switch from a one-month subscription at the price of 30 CFH to a longer subscription (3, 6, 9, 12, 15, 18, 21, 24, and 36 months). In line with other studies, the analysis of discount rates reveals higher rates in the bonus-time condition for shorter contracts and higher rates in the price-discount condition for longer contracts (with a switching point at 6 months).

*Financial services*. Thirty-one Swiss students participated in an in-class survey examining preferences for cars' leasing agreements. The survey consisted of a matching task requiring respondents to state the maximum price they were willing to pay (price-discount condition) or the maximum number of months for free they would have liked to receive (bonus-time condition) to switch from a one-month leasing-rate at the price 300 CFH to a longer leasing agreement (3, 6, 9, 12, 15, 18, 21, 24, and 36 months). In line with other studies, the analysis of discount rates reveals higher rates in the bonus-time condition for shorter contracts and higher rates in the price-discount condition for longer contracts (with a switching point between 18 and 21 months).

*Education*. Seventy-eight Swiss students participated in an in-class survey examining preferences for subscriptions to a foreign language course. The survey consisted of a matching task requiring respondents to state the maximum price they were willing to pay

(price-discount condition) or the maximum number of weeks for free they would have liked to receive (bonus-time condition) to switch from a one-week course at the price of 200 CFH to a longer course (2, 3, 4, 5, 6, 8, 10, and 12 weeks). In line with other studies, the analysis of discount rates reveals higher rates in the bonus-time condition for shorter contracts and higher rates in the price-discount condition for longer contracts (with a switching point between 6 and 8 weeks).

Furthermore, we converted discount rates into choice probabilities as follows: per each duration, we counted the number of people requesting a price discount of more than 50% and the number of people requesting a number of free weeks higher than half of the contract duration (e.g., for a six-week course, we counted individuals requesting four weeks for free as preferring bonus time). We compared these choice probabilities with a binomial test and revealed that, after six weeks, respondents switched from contracts offering price discounts to contracts offering bonus time.

**Measurement of Financial Literacy and Full Information (Alternative to Study 6).**

This study is similar to Study 6a (in the manuscript) and tests whether we can reduce the preference reversal by providing participants with additional information on the equivalence of the alternatives in the choice experiment. In Study A (N=169 Amazon Mechanical Turk), the choice experiment presents the total cost of each contract as a choice alternative conveying that the alternatives are equivalent in total cost. In study A, we test further whether the preference reversal relates to numeracy (financial literacy), a measurement collected by asking respondents to solve the following five simple problems from the domain of financial mathematics (as opposed to the scale by Fernandes, Lynch, and Netemeyer 2014 used in Study 6a):

Question 1: Suppose an Internet access provider offers monthly subscriptions at $100 (renewable after each month). For a 12-month subscription, they offer a 25% Price Discount in the form of a reduced monthly fee. What is the monthly fee (in $) for such a 12-month contract?

Question 2: Suppose an Internet access provider offers monthly subscriptions at $100 (renewable after each month). For a 12-month subscription, they offer a 25% Price Discount in the form of a certain number of free months (out of the total 12 months). In such a 12-month contract, how many months are for free?

Question 3: Suppose an Internet access provider offers monthly subscriptions at $80 (renewable after each month). For a 12-month subscription, they offer a reduced monthly fee such that one would only have to pay $70 per month. How big is the discount on the monthly fee? (Choose one of the following answers)

- More than 10%
- Exactly 10%
- Less than 10%

Question 4: During a special promotion, an Internet access provider offers subscriptions at half price. The regular monthly fee would be $100. How much money do you save (in $) if you subscribe for a 6-month contract?

Question 5: During another special promotion, an Internet access provider offers monthly subscriptions at $50 (renewable after each month). This is two-thirds of the regular monthly fee. What is the regular monthly fee (in $)?

In Study B (N=548 Amazon Mechanical Turk) the choice experiment conveys the value equivalency confronting the respondents with some simple calculations that reveal the monetary equivalence of the two frames (a manipulation similar but not entirely equivalent to what we used in Study 6b in the manuscript):

- Regular prices for subscriptions: 1 month $50, 15 months $750
- How much would you save off the 15 months contract if you got 6 months for free?
- So, what is the average monthly cost of the 15 months contract with 6 free months?

Consistent with other studies, our analysis of discount rates reveals higher rates in the bonus-time condition for shorter contracts and higher rates in the price-discount condition for longer contracts (with a switching point at 6 months). However, in study A, the results of the choice task indicate that when the total cost of the subscription is put in brackets, the preference reversal disappears. In study B, the subjects are repeatedly taught how to mathematically convert offers from one promotional frame to the other. Therefore, they should be aware of the equivalence of offers 1 and 2. As expected, no preference reversal occurs in this case either.

In study A, in order to test whether low numeracy could influence discounting and thus contribute to the observation of the preference reversal, we first calculated the difference in the discount rates between the price-discount and the bonus-time conditions. We then summed the absolute differences to arrive at an index of how much more/less discounting we observe for a respondent between the two conditions (i.e., how different people's behavior is across the two conditions). These amounts are negatively correlated with numeracy—which is qualitatively in line with our expectations—but the result is not significant ($r = -.17$, $p = .210$). In Study B, to investigate the relationship between a respondent's choice behavior and his calculation skills, we used the information about his mathematical abilities, which we obtained from the calculation tasks shown above. A Fisher's exact test revealed a significant association between an individual's calculation skills (measured by the number of right

answers he gave in the calculation tasks) and choice behavior for five out of eight contract durations (i.e., 9**, 12*, 18*, 21***, and 24** months).

In summary, this study reveals that the pattern of preference reversals we have found in previous studies disappears when the value equivalence is made clear to the respondent and, furthermore, offers some support for the idea that the difference in discount rates—that is, time inconsistency caused by different frames—is greater for consumers with low numeracy.

## Section C: Detailed description of pre-paid Cards Configuration and Development (Study 1)

### Historic Data Analysis

In the timeframe considered, 5.006 different ID cards were used to purchase 38.102 meals. Considering only the menus we used for the field experiment, we have registered 6.837 purchases of menu 1, 5.261 purchases of menu 2 and 5.418 purchases of menu 3 (veg). Furthermore, of those 5.006 IDs, 829 persons never ordered a menu, 1.068 ordered only once a menu, half of our sample (52.30%) purchased e menu twice or less within the time frame and only 6.5% of all individuals in the sample purchased a menu 10 times or more in the time frame. On average, a subject visited the canteen 7-8 times in the four weeks analyzed; therefore, we have decided to include a total of 5 menus in the promotional pre-paid cards (instead of more). Regarding the pricing strategy, we used the usual average prices of the menus: menu 1 and menu 3 for 2.90€ are and menu 2 for 3.50€. Therefore the maximum price for five meals with no promotion would have been 14.50€ for the pre-paid cards Basic and Premium and 17.50€ for pre-paid card Gold. With the price/ flexibility configuration shown in Table 1, the purchase of a card Basic allows saving 8.50€, the purchase of a card Premium allows saving 3.50€ and the purchase of a card Gold allows saving a maximum of 1.50€ (when choosing the most expensive menu for five times). To further analyze whether this cards configuration could serve our purpose and trigger a compromise effect, we pre-tested it with a questionnaire.

### Pre-Test

We submitted a questionnaire to 153 first semester's students (88 females and 65 males, aged between 18 and 25) during a Bachelor's marketing class in return for the chance of winning a 100€ worth Amazon voucher. The questionnaire consisted of a choice task asking respondents to choose one of the three pre-paid cards described in Table 1. Subsequently, we asked respondents to state their level of satisfaction and confidence with the choice made and the difficulty, stressfulness and sense of confusedness related to it (on a 7-points Likert scale). We have also asked the frequency of visits to the canteen, if they are vegetarian, their age and gender. The choice task results reveal that 43% of respondents chose the card Premium (the compromise option), 35% chose the card Basic and 22% chose the card Gold. Test of the difference of two proportions confirms that the share of choices of card Premium is higher than that of card Basic ($\#_P$ = .43 vs. $\#_B$ = .35 Z=-1.99, P>|Z| = .046) and of card Gold ($\#_P$ = .43 vs. $\#_G$ = .22 Z=-5.25, P>|Z| = .000) confirming that the 3-item choice-set triggered a compromise effect. In line with our expectations, t-test results show that choice satisfaction and confidence are significantly lower for respondents who chose the compromise option compared to respondents who chose a non-compromise option (satisfaction: $M_P$= 4.71 vs. $M_{B+G}$= 5.16; t= -1.929 and *p*= .055; confidence: $M_P$ =4.92 vs. $M_{B+G}$ =5.43 with t= 2.028 and *p*= .044). However, we do not find statistically significant differences regarding choice difficulty, stressfulness and confusedness between respondents who chose card Premium and respondents who chose card Basic or Gold (difficulty: $M_P$= 3.52 vs. $M_{B+G}$= 3.31; t= -0.73 NS; stressfulness: $M_P$ =2.88 vs. $M_{B+G}$ =2.82 with t= -0.208 NS; confusedness: $M_P$= 2.78 vs. $M_{B+G}$= 2.37; t= -1.65 NS). In addition, we predicted the likelihood of choosing the card Premium, using a multinomial logistic regression with predictors: age (<18, 18-25, 26-30 and >30), gender (1= male, 0 = female), being vegetarian (1= yes, 0 = no) and frequency of visits to the canteen (never, 2-3 times a week, > 3 times a week). The dependent variable was the choice between (1) pre-paid card Basic, (2) pre-paid card Gold or (0) pre-paid card Premium

(baseline). This analysis reveals that male respondents were more likely to choose cards Basic or Gold, compared to Premium, but all other demographic indicators were not statistically significant (see Table A14). In conclusion, the pilot study seems suggesting that the designed pre-paid cards can reliably trigger a compromise effect in the field experiment.

(Insert Table A14 about here)

# Tables

**Table A- 1: Monthly Discount Rates in Study 2: A Comparison (Test for Differences in Discounting Behavior: Price-Discount vs. Bonus-Time Framing)**

| | *Study 2a (free months at the beginning of the contract)* | | | | | *Study 2b (free months at the end of the contract)* | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Contract Duration** | $r_{PD}$ | $r_{BT}$ | **P-value** | | **Difference** | $r_{PD}$ | $r_{BT}$ | **P-value** | | **Difference** |
| **3** | 0.045 | 0.135 | 0.000 | *** | -0.090 | 0.042 | 0.124 | 0.000 | *** | -0.082 |
| **6** | 0.034 | 0.053 | 0.000 | *** | -0.019 | 0.034 | 0.056 | 0.000 | *** | -0.021 |
| **9** | 0.032 | 0.031 | 0.836 | | 0.001 | 0.029 | 0.035 | 0.003 | ** | -0.006 |
| **12** | 0.029 | 0.023 | 0.014 | * | 0.007 | 0.029 | 0.027 | 0.110 | | 0.003 |
| **15** | 0.030 | 0.018 | 0.000 | *** | 0.011 | 0.030 | 0.021 | 0.000 | *** | 0.009 |
| **18** | 0.029 | 0.015 | 0.000 | *** | 0.014 | 0.029 | 0.018 | 0.000 | *** | 0.011 |
| **21** | 0.029 | 0.013 | 0.000 | *** | 0.016 | 0.030 | 0.016 | 0.000 | *** | 0.014 |
| **24** | 0.031 | 0.012 | 0.000 | *** | 0.019 | 0.031 | 0.014 | 0.000 | *** | 0.017 |

(† p < .10, * p < .05, ** p < .01, *** p < .001)

**Table A- 2: Monthly Discount Rates in Study 3: A Comparison (Test for Differences in Discounting Behavior: Price-Discount vs. Bonus-Time Framing)**

| | *Study 3a (free months at the beginning)* | | | | | *Study 3b (free months at the end)* | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Contract Duration** | $r_{PD}$ | $r_{BT}$ | **P-value** | | **Difference** | $r_{PD}$ | $r_{BT}$ | **P-value** | | **Difference** |
| **3** | 0.061 | 0.147 | 0.000 | *** | -0.086 | 0.070 | 0.148 | 0.000 | *** | -0.079 |
| **6** | 0.040 | 0.057 | 0.000 | *** | -0.017 | 0.039 | 0.060 | 0.000 | *** | -0.021 |
| **9** | 0.035 | 0.037 | 0.406 | | -0.001 | 0.041 | 0.041 | 0.710 | | -0.000 |
| **12** | 0.034 | 0.026 | 0.001 | *** | 0.008 | 0.034 | 0.028 | 0.094 | † | 0.006 |
| **15** | 0.030 | 0.020 | 0.000 | *** | 0.010 | 0.030 | 0.021 | 0.000 | *** | 0.010 |
| **18** | 0.027 | 0.017 | 0.000 | *** | 0.011 | 0.028 | 0.017 | 0.000 | *** | 0.011 |
| **21** | 0.028 | 0.015 | 0.000 | *** | 0.014 | 0.030 | 0.015 | 0.000 | *** | 0.014 |
| **24** | 0.027 | 0.014 | 0.000 | *** | 0.014 | 0.028 | 0.014 | 0.000 | *** | 0.014 |

(† p < .10, * p < .05, ** p < .01, *** p < .001)

**Table A- 3:Monthly Discount Rates in Study 4: A Comparison (Test for Differences in Discounting Behavior: Price-Discount vs. Bonus-Time Framing)**

| | *Study 4a (Internet access)* | | | | | *Study 4b (cell phone communications)* | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Contract Duration** | $r_{PD}$ | $r_{BT}$ | **P-value** | | **Difference** | $r_{PD}$ | $r_{BT}$ | **P-value** | | **Difference** |
| **3** | 0.028 | 0.091 | 0.000 | *** | -0.063 | 0.038 | 0.075 | 0.00 | *** | -0.038 |
| **6** | 0.022 | 0.042 | 0.000 | *** | -0.020 | 0.029 | 0.038 | 0.032 | * | -0.009 |
| **9** | 0.023 | 0.030 | 0.000 | *** | -0.007 | 0.021 | 0.028 | 0.004 | ** | -0.007 |
| **12** | 0.021 | 0.023 | 0.052 | † | -0.003 | 0.021 | 0.021 | 0.521 | | 0.000 |
| **15** | 0.022 | 0.018 | 0.003 | ** | 0.004 | 0.023 | 0.015 | 0.006 | ** | 0.008 |
| **18** | 0.020 | 0.014 | 0.000 | *** | 0.006 | 0.021 | 0.011 | 0.000 | *** | 0.010 |
| **21** | 0.022 | 0.015 | 0.000 | *** | 0.007 | 0.022 | 0.009 | 0.000 | *** | 0.013 |
| **24** | 0.020 | 0.014 | 0.000 | *** | 0.007 | 0.021 | 0.008 | 0.000 | *** | -0.013 |

(† p < .10, * p < .05, ** p < .01, *** p < .001)

**Table A- 4: Monthly Discount Rates in Study 5: A Comparison**

**(Test for Differences in Discounting Behavior: Price Discount vs. Instant Rebate)**

| **Contract Duration** | **Discount Framing** | **Instant Rebate Framing** | **Bonus Time Framing** | **Diff PD-BT** | **P-value** | **Diff IR-BT** | **P-value** |
|---|---|---|---|---|---|---|---|
| | **Discount rate *r*** | **Discount rate *r*** | **Discount rate *r*** | | | | |
| **3** | 0.059 | 0.097 | 0.146 | -0.090 | *** | -0.046 | *** |
| **6** | 0.053 | 0.048 | 0.052 | 0.008 | | 0.016 | |
| **9** | 0.041 | 0.032 | 0.032 | 0.009 | ** | 0.002 | |
| **12** | 0.033 | 0.026 | 0.026 | 0.007 | ** | 0.001 | |
| **15** | 0.035 | 0.020 | 0.020 | 0.015 | *** | 0.001 | |
| **18** | 0.028 | 0.018 | 0.016 | 0.012 | *** | 0.002 | |
| **21** | 0.027 | 0.018 | 0.015 | 0.013 | *** | 0.002 | * |
| **24** | 0.027 | 0.017 | 0.013 | 0.014 | *** | 0.003 | * |

(† p < .10, * p < .05, ** p < .01, *** p < .001)

**Table A- 5: Monthly Discount Rates in Study 6a: A Comparison (Test for Differences in Discounting Behavior: Price-Discount vs. Bonus-Time Framing)**

| Contract Duration | Discount Framing | Bonus Time Framing | p-value | | Difference |
|---|---|---|---|---|---|
| | Discount rate *r* | Discount rate *r* | | | |
| **3** | 0.052 | 0.150 | 0.000 | *** | -0.103 |
| **6** | 0.047 | 0.040 | 0.027 | ** | 0.012 |
| **9** | 0.042 | 0.028 | 0.000 | *** | 0.014 |
| **12** | 0.037 | 0.022 | 0.000 | ** | 0.010 |
| **15** | 0.032 | 0.015 | 0.000 | *** | 0.022 |
| **18** | 0.032 | 0.012 | 0.000 | *** | 0.016 |
| **21** | 0.030 | 0.011 | 0.000 | *** | 0.019 |
| **24** | 0.028 | 0.010 | 0.000 | *** | 0.022 |

(† p < .10, * p < .05, ** p < .01, *** p < .001)

**Table A- 6: Analyses of Correlation between Average Discount Rates for Price Discount and Bonus Time and Indicators of Risk Tolerance and Time Preferences**

| | Risk Tolerance (RT) | Time Preferences (TP) |
|---|---|---|
| **Average Discount Rate in Price-Discount Framing** | ρ = -.2298 ($p$ = .001) | ρ = -.2563 ($p$ = .000) |
| **Average Discount Rate in Bonus-Time Framing** | ρ = -.1112 ($p$ = .0309) | ρ = -.0557 ($p$ = .3673) |
| **Fisher Test for the significance of the difference between two correlation coefficient** | z = -3.21 ($p$ = .002) | z = -3.14 ($p$ = .001) |

**Table A- 7:Analyses of Correlation between Average Discount Rates for Price Discount and Bonus Time and Indicators of Risk Tolerance and Time Preferences (Median Split for Financial Literacy)**

| | Low Financial Literacy | | High Financial Literacy | |
|---|---|---|---|---|
| | **Risk Tolerance (RT)** | **Time Preferences (TP)** | **Risk Tolerance (RT)** | **Time Preferences (TP)** |
| **Average Discount Rate in Price Discount Framing** | ρ = -.219 ($p$ = .010) | ρ = -.368 ($p$ = 0.000) | ρ = -.242 ($p$ = .003) | ρ = -.202 ($p$ =.010) |
| **Average Discount Rate in Bonus Time Framing** | ρ = -.076 ($p$ = .377) | ρ = -.093 ($p$ = .298) | ρ = -.173 ($p$ = .011) | ρ = -.207 ($p$ = 0.040) |

**Table A- 8: Regression Results for Risk Tolerance, Financial Literacy, and Interaction (N = 377)**

| **Dependent Variable** | **Independent Variables** | | |
|---|---|---|---|
| | **Risk Tolerance (RT)** | **Financial Literacy (FL)** | **Interaction (RT x FL)** |
| **Average Discount Rate in Price Discount Framing** | $\beta_{RT}$ = -.010 (t = -3.78; $p$ = .000) | $\beta_{FL}$ = -.040 (t = -3.86; $p$ = .000) | $\beta_{I}$ = .008 (t = 2.36; $p$ = .019) |
| **Average Discount Rate in Bonus Time Framing** | $\beta_{RT}$ = -.002 (t = -2.21.; $p$ = .028) | $\beta_{FL}$ = -.009 (t = -2.02; $p$ = .044) | $\beta_{I}$ = .003 (t = -1.80; $p$ = .073) |

**Table A- 9: Regression Results for Time Preferences, Financial Literacy, and Interaction (N = 377)**

| Dependent Variable | Independent Variables | | |
|---|---|---|---|
| | **Time Preferences (TP)** | **Financial Literacy (FL)** | **Interaction (TP x FL)** |
| **Average Discount Rate in Price Discount Framing** | $\beta_{TP}$ = -.008 (t = -7.92; $p$ = .000) | $\beta_{FL}$ = -.056 (t = -5.93 $p$ =.000) | $\beta_{I}$ = .008 (t = 6.05; $p$ = .000) |
| **Average Discount Rate in Bonus Time Framing** | $\beta_{TP}$ = -.001 (t = -2.74; $p$ = .007) | $\beta_{FL}$ = -.010 (t = -2.58; $p$ = .010) | $\beta_{I}$ = .001 (t = 1.60; $p$ = .111) |

**Table A- 10: Monthly Discount Rates in Study 6a: A Comparison (Test for Differences in Discounting Behavior: Price Discount vs. Bonus Time vs. Full Information)**

| **Contract Duration** | **Price Discount** | **Bonus Time** | **Full Information** | **(1) ANOVA** | | **(2) Brown - Forsythe F-Test** | | **(3) Kruskal-Wallis Test** | |
|---|---|---|---|---|---|---|---|---|---|
| **Months** | **Discount rate *r*** | **Discount rate *r*** | **Discount rate r** | p-value | | p-value | | p-value | |
| **3** | 0.154 | 0.167 | 0.153 | 0.460 | | 0.452 | | 0.458 | |
| **6** | 0.073 | 0.060 | 0.062 | 0.414 | | 0.437 | | 0.785 | |
| **9** | 0.049 | 0.038 | 0.039 | 0.193 | | 0.222 | | 0.575 | |
| **12** | 0.038 | 0.027 | 0.030 | 0.103 | | 0.129 | | 0.208 | |
| **15** | 0.031 | 0.024 | 0.026 | 0.158 | | 0.173 | | 0.340 | |
| **18** | 0.029 | 0.018 | 0.021 | 0.016 | ** | 0.025 | ** | 0.132 | |
| **21** | 0.029 | 0.018 | 0.020 | 0.005 | *** | 0.008 | *** | 0.024 | ** |
| **24** | 0.026 | 0.016 | 0.020 | 0.018 | ** | 0.022 | ** | 0.044 | ** |

(* $p$ < .05, ** $p$ < .01, *** $p$ < .001)

**Table A- 11: Results of Repeated-Measures ANOVA Testing the Effects of Framing (Price Discount vs. Bonus Time), Contract Duration, and Interaction between Framing and Duration on Time Preferences[4]**

| | Effects on Time Preferences. F-values | | |
|---|---|---|---|
| | **Frame** | **Duration** | **Frame*Duration** |
| **Study 2a** | 10.64** | 111.91*** | 66.11*** |
| **Study 2b** | 33.61*** | 153.08*** | 97.58*** |
| **Study 3a** | 23.14*** | 205.21*** | 75.15*** |
| **Study 3b** | 11.52*** | 111.21*** | 32.51*** |
| **Study 4a** | 80.74*** | 90.51*** | 56.87*** |
| **Study 4b** | 0.70 | 46.06*** | 16.28*** |
| **Study 5** | 4.33** | 293.18*** | 136.36*** |
| **Study 6a** | 0.23 | 257.09*** | 133.86*** |
| **Study A-1** | 1.97 | 296.95*** | 2.52** |

(* $p < .05$, ** $p < .01$, *** $p < .001$)

**Table A- 12: Analyses of Correlation between the Discrepancy in Discount Rates and Contract Length[5]**

| | **Average ρ** | **Median ρ** | **Share of positive differences** |
|---|---|---|---|
| **Study 2a** | 0.669*** | 0.754 | 0.942 |
| **Study 2b** | 0.689*** | 0.797 | 0.957 |
| **Study 3a** | 0.643*** | 0.779 | 0.920 |
| **Study 3b** | 0.643*** | 0.750 | 0.931 |
| **Study 4a** | 0.621*** | 0.751 | 0.895 |
| **Study 4b** | 0.419*** | 0.592 | 0.816 |
| **Study 5** | 0.527*** | 0.656 | 0.910 |
| **Study 6a** | 0.573*** | 0.680 | 0.923 |

(* $p < .05$, ** $p < .01$, *** $p < .001$)

[4] Study A1 refers to a mixed ANOVA because we consider a between-subjects design, and study 6b is not included, because it does not elicit any time preference (only choice probabilities).

[5] Study A1 is not included, because is not comparable with other studies, because Study A1-a is between subjects and Study A1-b does not elicit any time preference (only choice probabilities).

## Table A- 13: Data Reduction Note

| Sample sizes | | | |
|---|---|---|---|
| | **N collected** | **N included** | **Share dropped** |
| **Study 1b** | 306 | 244 | 25% |
| **Study 2a** | 99 | 72 | 27% |
| **Study 2b** | 123 | 95 | 22% |
| **Study 3a** | 106 | 83 | 21% |
| **Study 3b** | 104 | 84 | 19% |
| **Study 3c** | 303 | 234 | 29% |
| **Study 4a** | 135 | 85 | 37% |
| **Study 4b** | 126 | 49 | 61% |
| **Study 5** | 292 | 181 | 38% |
| **Study 6a** | 608 | 377 | 38% |
| **Study 6b** | 303 | 250 | 17% |
| **Study 6c** | 285 | 213 | 25% |

## Table A- 14: Multinomial Logistic Regressions Results (0=Premium-baseline; 1=Basic; 2= Gold)

| **Overall Model** | | **Coefficients** | **Z** | **P>\|Z\|** |
|---|---|---|---|---|
| **0** | (Base outcome) | | | |
| **1** | **Age** (4 categories from treated as continuous) | -2.04 | -1.67 | .095 |
| | **Gender** (Cat.) | 1.22 | 2.73 | .006 |
| | **Vegetarian** (Cat.) | -15.75 | -.02 | .987 |
| | **Frequency of visits** (3 categories from treated as continuous) | .02 | .05 | .963 |
| | Constant | 3.52 | 1.39 | .164 |
| **2** | **Age** (4 categories from treated as continuous) | -.32 | -.28 | .778 |
| | **Gender** (Cat.) | 1.30 | 2.64 | .008 |
| | **Vegetarian** (Cat.) | -.79 | -.95 | .341 |
| | **Frequency of visits** (3 categories from treated as continuous) | -.05 | -.14 | .891 |
| | Constant | -.33 | -.14 | .890 |

# Figures

**Figure A- 1: Example Question from the Price-Discount Condition (Study 2b) (matching task)**

**Base subscription of the Internet provider (terminable at any time):**

Contract duration of **1 month: $ 50**
**Alternative rate of the Internet provider:**

Contract duration of **12 months**

The **largest monthly payment (in $)** amount I would be willing to pay to switch from the $50 per month base subscription to a **12-month contract** is**:**

The most I would pay is $ [ _____ ] (per month).

**Figure A- 2: Example Question from the Bonus-Time Condition (Study 2b) (matching task)**

**Base subscription of the Internet provider (terminable at any time):**

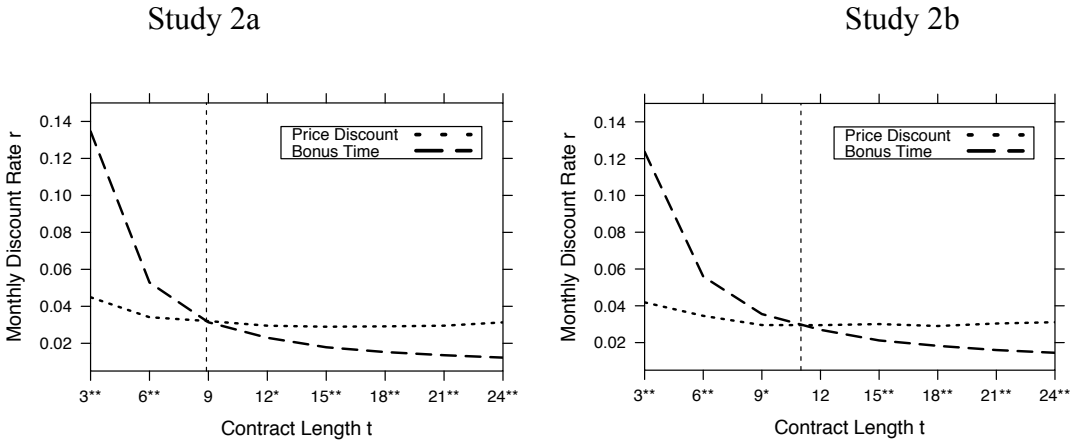
Contract duration of **1 month: $ 50**
**Alternative rate of the Internet provider:**

Contract duration of **12 months**

To switch from the $50 per month base subscription to a **12-month contract**, I would have to receive within the 12 months contract duration at least ____ months of **free service at the end** of the contract**:**

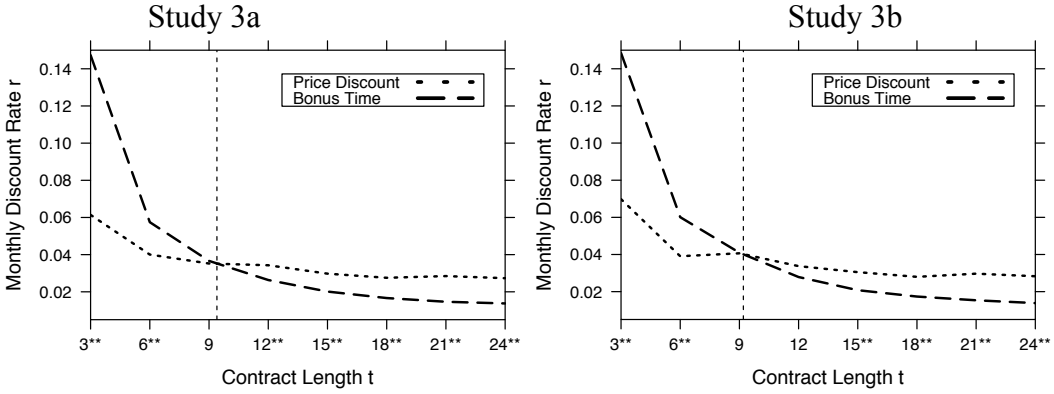
I expect to receive within the 12 months contract duration at least [ _____ ] month(s) for free.

**Figure A- 3: Monthly Discount Rates: A Comparison of Studies 2a and 2b**




(Significant difference between the two discount rates: * $p < .01$, ** $p < .001$)

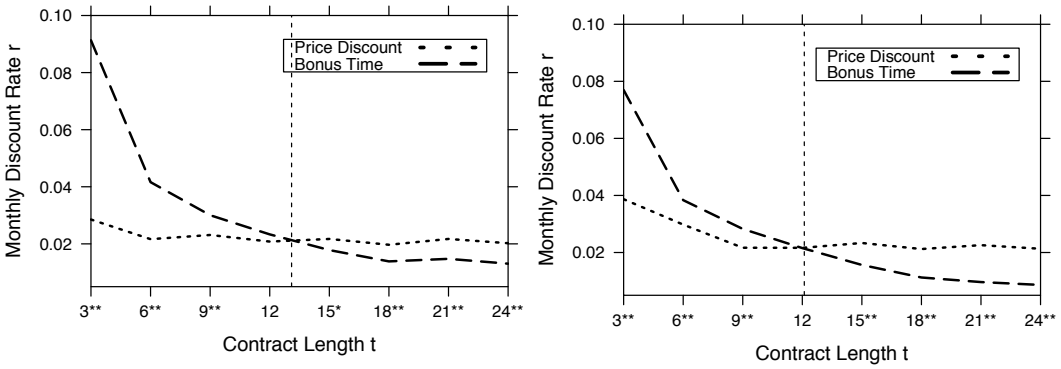
**Figure A- 4: Monthly Discount Rates: A Comparison of Studies 3a and 3b**




(Significant difference between the two discount rates: * $p < .01$, ** $p < .001$)

**Figure A- 5: Monthly Discount Rates: A Comparison of Studies 4a and 4b**

Study 4a (Internet access) Study 4b (Cell phone communications)




(Significant difference between the two discount rates: * $p < .01$, ** $p < .001$)

**Figure A- 6: Example Question for the Matching Task in the Instant-Rebate Condition in Study 5**

**Base subscription of the Internet provider (terminable at any time):**

Contract duration of **1 month: $ 50**
**Alternative offer of the Internet provider:**

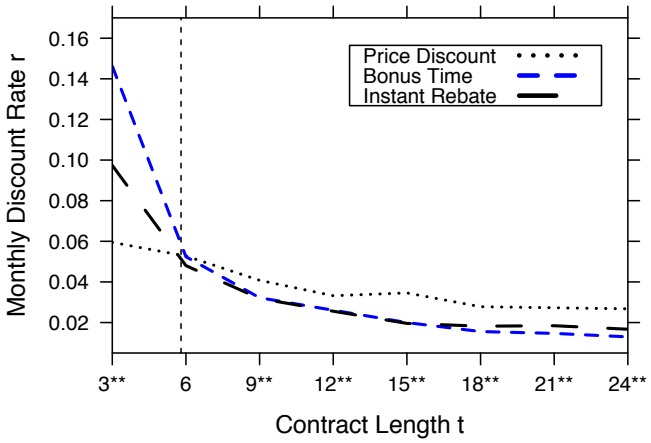
Contract duration of **9 months**

**→ In order to switch to the 9 months contract I would need to receive an Instant Rebate of $ _____ on the total amount of $ to be paid.**

I expect to receive at least an Instant Rebate of $ _____ on the total amount to be paid.

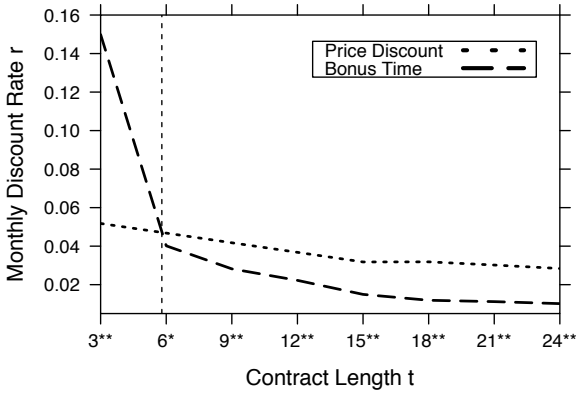
**Figure A- 7: Monthly Discount Rates in Study 5**

**(Price Discount vs. Instant Rebate vs. Bonus Time)**




(Significant difference between the discount rates of the price discount and bonus time frame: * $p < .01$, ** $p < .001$, the difference between the discount rates of the price discount and instant rebates frame is significant for all contract lengths with $p < .001$)

**Figure A- 8: Monthly Discount Rates in Study 6a**

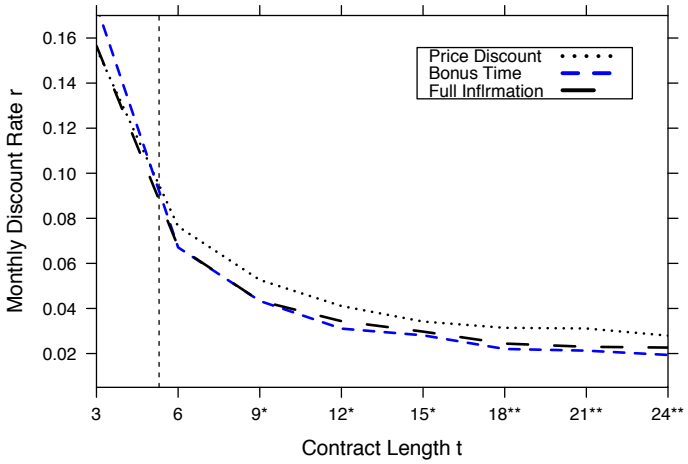



(Significant difference between the two discount rates: * $p < .01$, ** $p < .001$)

**Figure A- 9: Example Question from the Price-Discount Condition in Study 6a**

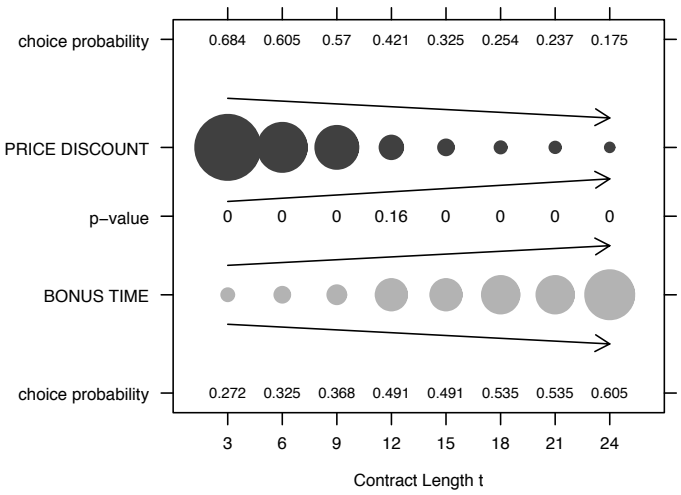
| | I would prefer the 1 month contract | I would prefer the 6 months contract | |
|---|---|---|---|
| 1 month at $50 per month | ¢ | ¢ | 6 months at $41.67 per month |
| 1 month at $50 per month | ¢ | ¢ | 6 months at $33.33 per month |
| 1 month at $50 per month | ¢ | ¢ | 6 months at $25.00 per month |
| 1 month at $50 per month | ¢ | ¢ | 6 months at $16.67 per month |
| 1 month at $50 per month | ¢ | ¢ | 6 months at $8.33 per month |

**Figure A- 10: Monthly Discount Rates in Study 6a**




(Significant difference between the discount rates of the price discount and bonus time frame: * $p < .01$, ** $p < .001$, the difference between the discount rates of the price discount and full information frame is only significant for a contract length of 21 months with $p < .01$)

**Figure A- 11: Binomial Test for Price-Discount and Bonus-Time Conditions in Study 6b**



# Curriculum Vitae

2013-2018 **Ph.D. in Marketing** (May 2018)

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