Variance Neglect in Consumer Search

Nicholas Reinholtz, University of Colorado, USA
Daniel Bartels, University of Chicago, USA
Jonathan Levav, Stanford University, USA
Oded Netzer, Columbia University, USA

Normative models of consumer price prescribe more search when price dispersion is greater. In contrast to normative prescriptions, we find consumers spend more time searching when prices are less disperse. Consumers also spend more time searching when prices are higher, a factor that normatively should not influence search persistence.

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Forward Looking Consumers and Firms: Biases and Economic Consequences

Chairs: Liz Friedman, Yale University, USA
Joy Lu, University of Pennsylvania, USA

Papers 3 and 4 focus on the cost-benefit tradeoffs associated with forward-looking behavior. Paper 3 (Goswami and Urminsky) demonstrates through a series of incentive-compatible studies that managers often prefer flat-fee payment structures in cases where hourly payment would cost them less, because they overestimate the time that it takes for employees to complete tasks. As a consequence, they end up overpaying for services. Paper 4 (Reinholtz, Bartels, Levav, and Netzer) examines the amount of time consumers spend searching for good prices before purchase. The authors find consumer search behavior is inconsistent with economic incentives, which suggests consumers should search more when prices are more dispersed. Instead, consumers use an economically-irrelevant heuristic: they search more when the prices are higher.

In summary, these four papers document situations in which people fail to optimize decisions involving time, either when weighing time within the utility function during choice or estimating how much time should be allocated to a task. The papers, taken together, illustrate specific limits of consumer and firm foresight and the costs—both monetary and hedonic—associated with them.

## Putting Duration in Durable Goods: Length of Ownership Neglect in Consumer Choice

### EXTENDED ABSTRACT

A long running ad for Acura assured potential customers that, “Paying for quality can be a difficult decision at first, but over time it gets a lot easier to live with.” In line with Acura’s assurances to prospective customers, we suggest that that premium products will be regarded as more affordable if the duration of ownership is emphasized – both because price premium can be amortized over repeated uses, and because quality differences aggregate with repeated uses. We demonstrate this pattern across a variety of durable goods. Moreover, we show that reminders of repeated use do not increase preference for premium products that are consumed in few sittings (like a bottle of wine) or used infrequently (like a holiday sweater).

Whereas previous research has explored duration neglect in retrospective evaluations (Fredrickson and Kahneman 1993), how considering the cost of time influences purchase decisions (Mogilner and Aaker 2009), or the role of the future self in purchase decisions (Bartels and Urminsky 2015), our research is the first to show how buying decisions shift when consumers are prompted to consider how long they will own the product.

We test our hypothesis in six studies. Studies 1A-C demonstrate that considering future usage increases choice of the higher price, higher quality option. All participants were faced with a choice between a higher priced and lower priced option ($105 vs. $195 digital cameras in 1A and $24 vs. $44 backpacks in 1B and 1C). Participants in the control condition simply made a hypothetical purchase decision, whereas participants in the future-use condition were first asked to briefly write about how long they expected to own the camera or backpack. Writing about length of ownership increased choice share for the expensive option versus control for both the cameras in study 1A (Mexpensive=64%, Mcheap=36%, p=.013) and the backpacks in study 1B (Mexpensive=46% vs. Mcheap=54%, p=.018). Moreover, in study 1B, after choosing, participants were asked to explain why they made their decision. An analysis of the thoughts listed revealed that significantly more people wrote about usage over time in the future-use condition.

### SESSION OVERVIEW

To make optimal choices and maximize happiness, consumers and firms must be forward-looking: decisions made today should account for expectations about the uncertain future. For example, the utility people get from products and experiences depends on how much they will use them and the sequence in which they are enjoyed. Or the amount of time spent engaging in a task may depend on the cost of your time, an estimate of how long the task will take, and the expected benefits from task completion. Past research has documented numerous mistakes in decisions involving time, including neglecting duration in retrospective evaluations (Fredrickson and Kahneman 1993), mispredicting future enjoyment (Nelson, Meyvis, and Galak 2009), and misperceiving future slack (Zauberman and Lynch 2005). The current session adds to this literature by documenting four novel ways, across a variety of domains, in which forward-looking decision makers fail to maximize utility and monetary value.

Taken together, the four papers seek to address two questions: In what ways do consumers and firms inadequately incorporate the future into their decisions? What are potential monetary consequences of these forward-looking mistakes?

The first two papers specifically look at whether people anticipate temporal effects on consumption utility. Paper 1 (Friedman, Dhar, and Frederick) focuses on how consumers fail to spontaneously consider time and product usage when making purchase decisions, and therefore underweight the time benefits of each product. The authors demonstrate that when consumers are reminded to consider future usage of durable goods, they may increase their preferences for higher quality options. Paper 2 (Lu, Karmarkar, and Venkatraman) looks at binge-watching, which is encouraged by streaming services like Netflix. The authors show that when planning future consumption, consumers are willing to pay more to binge-watch, particularly if episodes are sequentially connected rather than independent with points of closure. These results run counter to prior research that suggests people would get greater utility from spreading consumption experiences out.
condition than the control condition ($M_{control} = 7\%$ vs. $M_{future-use} = 22\%$, $p = .001$). In study 1C, we added a third choice elaboration condition, where participants were asked to elaborate on the choice to test whether the observed pattern results from mere elaboration, or specifically from considering future use. We also specified that both backpacks were expected to last five years, to show that the effect is driven by considering additional utility during a fixed time of ownership, and not because the more expensive option is perceived as lasting longer. As expected, participants bought the expensive backpack more often in the future-use condition than control ($M_{control} = 41\%$ vs. $M_{future-use} = 56\%$, $p = .010$), but there was no effect of elaboration ($M_{control} = 41\%$ vs. $M_{elaboration} = 44\%$, $p = .618$).

According to our theory, thinking about future use cues consideration of the cumulative benefits offered by each option, which increases preference for the higher quality option. However, for goods with no recurring streams of utility, such as consumable or infrequently-used goods, we expect thinking about future use should have no effect. We test this in studies 2 and 3. In study 2, we ran a pre-test to match a durable and consumable good on median price paid, and selected a bottle of wine and a cell phone case ($\$15$). We used a 2 (cell phone case vs. wine) x 2 (future-use vs. control) between sub-jects design, for $\$10$ vs. $\$30$ in all conditions. As expected, more participants bought the $\$30$ cell phone case in the future-use condition ($M_{control} = 44\%$ vs. $M_{future-use} = 64\%$, $p = .007$). For the wine, there was no difference between conditions ($M_{control} = 21\%$ vs. $M_{future-use} = 23\%$, $p = .652$). In study 3, we used a 2 (frequently-used vs. infrequently-used good) x 2 (future-use vs. control) design. Participants in the frequently-used condition evaluated two coffee makers, and those in the infrequently-used condition evaluated two ice cream makers, for $\$39$ vs. $\$79$ in both cases. For participants who chose between the coffee makers, significantly more opted for the higher priced option in the future-use condition than in control ($M_{control} = 42\%$ vs. $M_{future-use} = 56\%$, $p = .023$). For those who chose between the ice cream makers, there was no difference between conditions ($M_{control} = 55\%$ vs. $M_{future-use} = 52\%$, $p = .636$).

Finally, in study 4, we use a more subtle manipulation to in-crease the salience of future use: framing the choice as an investment. Since investments are thought of long-term purchases, we posit that when the word investment would be sufficient to cue considerations of future use. We used a 2 cell design (choice vs. investment), where participants chose between the same backpacks as study 1B. At the top of the page, there was a line that read, “Make a great [choice / investment] today!” The dependent measure also asked, “Which backpack would you [choose / invest in]?”. As expected, more people chose the premium option when the choice was framed as an investment than when it was framed as a choice ($M_{choice} = 46\%$, $M_{investment} = 61\%$, $p = .015$).

The current research provides preliminary evidence that con-sumers often do not consider how long they will own the products when deciding between higher and lower priced alternatives, so they do not sufficiently recognize that the differences in benefits cumulate with repeated use. Making time or usage salient increases purchase of the higher priced option for goods that are used over time, but not for goods that are consumed or used infrequently.

**Planning to Binge: How Consumers Choose to Allocate Time to View Sequential Versus Independent Media Content**

**EXTENDED ABSTRACT**

Firms that offer streaming services like Netflix have embraced the phenomenon of “binge-watching” by offering entire seasons of a television-style series at once instead of releasing episodes weekly. The prevalence of binge-watching seems to conflict with prior re-search suggesting that when individuals can choose to allocate their time, they often prefer to savor good experiences by delaying them (Loewenstein 1987; Shah and Alter 2014) or spreading them out (Loewenstein and Prelec 1993; Nelson, Meyvis, and Galak 2009).

One factor that could explain this clash is the degree to which these elements are seen as independent events, as in the savoring research, or as sequential progress towards a completion goal (Evans, Inbar, and Zeelenberg, Barasz et al., in press). Therefore, we hypothe-size that binge-watching preferences may depend on the sequential nature of the individual episodes of an experience (i.e., episodes of a TV show) because of the additional utility from completing sequential or connected experiences, which we test across 6 studies and 1 set of field data.

In Study 1, we asked participants to either categorize TV shows as independent or sequential, or by the likelihood to binge or watch episodes one-by-one (N = 120). We found a significant positive correlation ($r = 0.61$, $t(58) = 5.86$, $p < .001$) between the percentages of participants who categorized the show as sequential (“Sequential In-dex”) and binge-watchable (“Binge-Watch Index”), which provides preliminary correlational evidence in support of our hypothesis.

In Studies 2 and 3, we directly manipulated the perceived independent or sequential nature of the programming using descriptions of fictional TV shows. In Study 2, participants (N = 682) indicated the number of episodes they would want to complete the series, with fewer sessions corresponding to more binge-watching. In the sequential condition, participants planned to binge-watch more by choosing fewer sessions (M = 5.52, SD = 3.33) compared to the independent condition (M = 6.16, SD = 3.46, $F(1, 676) = 6.57$, $p = .01$). In Study 3, we replicated the results with participants (N = 192) creating a 5-day calendar schedule for watching TV shows. Participants in the sequential condition (M = 0.45, SD = 0.16) created significantly “clumpier” calendars (Zhang, Bradlow, and Small 2014) than those in the independent condition (M = 0.35, SD = 0.18, $F(1, 190) = 87.19$, $p < .001$).

In Study 4, we demonstrated that people were also willing to pay more for the opportunity to binge-watch more sequential content. Participants (N = 218) imagined they were planning to watch a fictional show on Amazon Video for $\$20$, with the episodes released one-by-one each week. Participants were willing to pay more (M_{seq} = $\$1.55$, SD = 7.03, F(1, 108) = 5.58, $p = .02$) to have all episodes be made available at once for the sequential (vs. independent) content, which would enable them to binge-watch immediately.

In Study 5, we test for evidence of completion utility for sequential TV shows by looking at how the perceived quality, as mea-sured by the IMBD episode ratings, changed across seasons. We found a significantly positive relationship between rating change and the Sequential Indices from Study 1 ($\beta = 0.22$, $t = 2.72$, $p < .01$), suggesting that the audience may experience utility from completion for sequential shows over time. However, it is important to note that firms could be strategically designing more sequential shows to progress climactically.

In Study 6, we directly test for evidence of completion utility by measuring the enjoyment (7-point Likert scales) of independent vs. sequential videos at two separate time points within an incentive-compatible setting. We found that when participants (N = 279) watched two related sequential videos, their enjoyment significantly increased after watching the second video (and thus “completing” the video series) if they binged the content by not taking a break (M = 5.84, SD = 1.38, $t(96.71) = 2.91$, $p < .01$), but not if they savored by taking a break in between the first and second videos (M = 5.52,
SD = 1.82, \( t(85.43) = 1.55, p = 0.12 \). We found no differences in enjoyment among participants who watched the independent videos.

Finally, we tested the robustness of these findings in a set of field data. We examined the activity of 553 students enrolled in two online courses offered on Coursera: Marketing and Accounting. Marketing was taught over 4 weeks by three professors, and consisted of 34 lectures, with each week’s content independent of the content of other weeks. Accounting was taught over 4 weeks by a single professor and consisted of 29 lectures. Each week, the material built on the lectures from the previous week and contributed to an overarching case study. We predicted that students would be more likely to binge-watch the sequential Accounting lectures compared to the more independent Marketing lectures.

We calculated the average time between “sessions” of lecture video consumption, defined as lecture videos watched within 15 minutes of each other. Greater inter-session times indicate more savoring and less binge-watching. On average, students waited 43.09 minutes (SD = 144.88) more between sessions for the more independent Marketing course compared to the more sequential Accounting course (t(519) = 6.78, p < 0.001). This suggests that when taking a course with independent content, students are more likely to savor and spread sessions out compared to when taking a course with more sequential content. We also found that across two weeks when the courses overlapped, session lengths increased significantly for the Accounting course (t(514.73) = 3.01, p < 0.01), but not for the Marketing course (t(312.86) = 0.37, p = 0.71), which is consistent with our hypothesis that consumers prefer binge-watching sequential content because of the utility derived from approaching completion.

In summary, we find that consumers prefer to binge-watch experiences consisting of sequential episodes compared to independent episodes. This may occur because for sequential episodes, consumers derive enjoyment from making progress and completing a sequence. Our findings have implications for how firms should advertise and release shows with sequential vs. independent content.

### Don’t Fear the Meter: How Time Limits Bias Employment Contract Choices

**EXTENDED ABSTRACT**

Prescriptive models of cost-benefit analysis assume that decision makers can either accurately estimate relevant inputs, such as managers estimating workers’ time, or can at least estimate an unbiased probability distribution of the time needed (Sugden and Williams, 1978). We study how choices between flat-rate and metered compensation options may be non-optimal due to the impact of deadlines on managers’ timing estimates. We contribute to a recent literature on flat-rate biases, by identifying a new misestimation-based process, distinct from prior research, which affects preferences for flat-rate contracts with implications for choices in both employment and consumer contexts. Across six studies, we find that both lay people and experienced managers, playing the role of employers in an economic game, exhibit a strong preference for flat-rate contracts, particularly when deadlines are longer.

For the first set of studies, we had a sample of 113 workers solve a digital jigsaw puzzle, under either a long time limit (15 minutes) or a short time limit (5 minutes), and the workers were paid either a flat fee, or per-minute. In Study 1, online participants (N=171) served as “managers”, and made incentive-compatible choices between hiring a worker, from the pool, with a flat-fee contract or a per-minute contract. Based on the worker’s actual completion times, the per-minute contracts had significantly higher expected value than the flat-fee contracts (p<.001), particularly for the longer time-limit condition. Nevertheless, the majority of managers (71%) chose the suboptimal flat-fee contract. In particular, managers were more likely to choose the flat-fee contract under the long-time limit (89%) than the short time-limit (51%, p < .001), leading to lower earnings in the long time-limit condition (p<.001).

This occurred because managers over-estimated workers’ completion times (Goswami and Urminsky 2016), more so in the long time-limit condition than the short (p<.001). In fact, most managers (87%) chose the contract that would be optimal based on their time estimates. The time estimates fully mediated the effects of time limit on contract choices. In contrast, participants’ choices differed in a risk-preference task (choosing between a fixed payment and a gamble) constructed to be equivalent to the contract options (p=.041 overall, p<.001 long time-limit condition), which rules out a risk aversion explanation. In fact, the effects of deadlines on contract choice held controlling for risk preference.

Study 2 (N=146) replicated these results in a study in which online participants serving as managers made similar contract choices for hiring a set of 50 workers (rather than just one, as in Study 1). Study 3 (N=178) again replicated the results in a variation of the manager task in which the managers knew that they had been randomly assigned to one of the two deadlines (long or short) in order to eliminate potential information conveyed by time limits. Lastly, Study 4 replicated the findings with a sample of experienced managers (N=92).

In the second set of studies, we used a spelling proofreading task, in which, unlike the jigsaw puzzles, the quality of the completed work could potentially vary. Workers (N=429) completed either an easy or difficult proofreading task under short or long time limits and were either paid a flat-fee or per-minute. In Study 5, a set of online participants serving as managers (N=438) then made incentive-compatible choices between hiring a worker paid a flat-fee or per-minute, in which their payment was determined by both how much time their worker took and how accurate the worker’s job was. Based on the actual workers, the expected value was higher for the flat fee contracts under either time limit (p=.001), but more so for the long-time limit condition (p=.04). Managers nevertheless preferred the flat-fee contract, particularly in the long-time limit condition (83% vs. 44%, p<.001), regardless of task difficulty. Because the per-minute contract was in actuality even more profitable in the long time-limit conditions, the managers’ choices were more suboptimal in the long-time limit conditions (easy task, difference p=0.013; difficult task, difference p=.022).

These findings were due to managers’ overestimation of workers’ completion times, especially in the long-time limit condition. In fact, the time estimates explained the contract choices of the majority of managers (77%), and the estimates fully mediated the effect of time limits on contract choices. Participants’ contract choices differed from their preferences in the equivalent risk-preference task (p<.001), and the results held controlling for risk preferences. The findings were also not explained by differences in beliefs about worker productivity, taking task quality into account, under the different contracts. The findings were replicated in Study 6 (N=62) with a sample of experienced managers.

Prior research has documented flat fee biases for ongoing service usage, where decision makers are shown to prefer a fixed payment schedule for unlimited usage of telephone minutes (Train et al., 1987) and gym access (DellaVigna and Malmendier, 2006). Such preferences have been attributed to risk aversion (Lambrecht and Skiera, 2006), cognitive ease (Nunes, 2000), or the motivational benefits of pre-commitment. In this paper, we document a parallel bias in a new domain, which cannot be explained by any of these.
factors. Specifically, we find that decision makers prefer a fixed payment when hiring temporary workers and we provide evidence that this is due to misestimating completion time. Salient environmental cues like external time limits can systematically affect decision makers’ judgments about others’ task completion times, resulting in the erroneous preference for flat fee contracts, yielding significant economic losses and inefficiencies.

Our research provides a counterpoint to prior work on employment decisions, which has emphasized the role of rational factors (e.g., ease and cost of monitoring, uncertainty in the environment, workers’ type) in contract choices. These findings may provide a starting point for also investigating other belief-based biases that can influence general choices between contracts under incomplete information in consumer contexts.

Variance Neglect in Consumer Search

EXTENDED ABSTRACT

Consumers often know exactly what they want, but are not sure how much they will have to pay to get it. In these situations, a consumer must search to find an acceptable price for the product or service they are seeking. Because the exact same product can vary in price greatly between retailers (Baye, Morgan, and Scholten 2004; Brynjolfsson and Smith 2000; Isard 1977; Varian 1980), a consumer can probabilistically expect to find a better price by visiting more retailers. However, there are diminishing returns to search. The more retailers a consumer has visited, the less likely the next retailer she visits will have a better price than one she has already seen. There is also a cost to extending search. This cost may simply be time (opportunity costs), but could also be monetary if, for example, searching requires travel. Essentially, the problem of search is whether to accept a known cost of search for the probabilistic prospect of a marginal gain in terms of price.

Normative models of consumer price search uniformly agree that price dispersion—the variance in prices across retailers—should be the primary determinant of search persistence (e.g., McCall 1970; Rothschild 1974; Weitzman 1979). When price dispersion is higher (i.e., greater absolute differences between prices), consumers should search more extensively because the expected marginal return from additional search is greater. We use an experimental paradigm to explore whether consumers follow this economic prescription. Across a series of studies, we find that contrary to the implications of economic models, consumers do not search more when price dispersion is higher. In fact, when price dispersion is higher, we frequently observe consumers searching less. Additionally, we find that the magnitude of prices—whether a product is cheaper or more expensive—impacts search persistence even though it is unrelated to the expected marginal return from additional search.

In our studies, we use a simplified, computer-based experimental paradigm in which participants are asked to find a “good” price for a specific product (i.e., there is no variation in quality, only price). They can “visit” retailers by clicking a button and incurring a cost (a three second delay) and can stop search at any time by selecting a previously seen price without cost. We measure search persistence as the number of retailers a consumer visits before making a purchase. Prices in our studies are randomly drawn from Gaussian distributions. To measure the effects of price dispersion and price magnitude, we vary the standard deviation and mean of the price distributions, respectively.

In Studies 1 (hypothetical) and 2 (incentive compatible), we present evidence of “variance neglect”: Consumers fail to increase their search persistence in response to increased price dispersion. In fact, they search less when price dispersion is higher—the exact opposite behavior prescribed by normative search theories. Further, in these studies, we find consumers search more when the average price of the product is higher (holding price dispersion constant). Normative models suggest that price magnitude should be an inconsequential factor in determining search persistence.

While these findings may trouble those who believe regular people can approximate the economic behavior prescribed by rational actor models, we suggest that they may be evidence for how boundedly-rational people “solve” the complex problem of search. The previously described studies orthogonally manipulate price magnitude and price dispersion. But in the marketplace, these two variables exhibit high correlation (Grewal and Marmorstein 1994; Pratt, Wise, and Zeckhauser 1979). Thus, searching more for higher priced items could be an ecologically rational heuristic, since higher price items tend to have higher price dispersion.

Our proposition is that consumers learn to use average price instead of price dispersion as a cue for search persistence. While this heuristic will not fully approximate optimal search, we believe it is more cognitively tractable for boundedly-rational consumers. This is supported by research on numerical cognition, which shows people can more accurately learn about the central tendency of an observed distribution than they can learn about the dispersion (Obrecht, Chapman, and Gelman 2007, Peterson and Beach 1967).

In Study 3, we show that consumers indeed expect higher price dispersion for higher prices, suggesting they are capable of hypothesized inference process. In fact, they are quite accurate based on previous surveys of the marketplace. Further, in Study 4 we show that the strength of this belief predicts differences in search persistence: People’s beliefs about the price-magnitude/price-dispersion relationship are a significant predictor of their search persistence.

Although inferring price dispersion from price magnitude will frequently yield results consistent with normative theory, it can also lead to over-persistence (when high priced products have low price dispersion) and under-persistence (when low priced products have high price dispersion). In Study 5, we examine cases in which the hypothesized consumer inferences should be more or less accurate. We find that when the price magnitude-dispersion relationship matches consumer beliefs, search behavior looks normative. However, when the magnitude-dispersion relationship violates consumer beliefs, consumers fail to update their expectations and respond in a manner opposite to that suggested by normative models.

REFERENCES


