

Temporal Discounting and Distribution Via Subscription

A Thesis Proposal

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Background

Intertemporal choice describes the decision-making process whereby individuals choose between present and future consumption and expenditures or flows. These choices are typically framed within a discounted utility model: outcomes are evaluated as less impactful the farther away they are perceived to be (Cohen et al., 2016). In the realm of positive utility events, this implies a preference for the immediate satisfaction of needs and desires. Negative utility, in contrast, is best delayed: costs are viewed as less impactful when they lie beyond some distant horizon. While these time preferences are directionally consistent between individuals, the degree to which individuals prioritize immediate consumption relative to other factors varies. The magnitude of temporal discounting an individual applies to their decision making can be evaluated in terms of a personality trait which may change over time alongside with changes in age, income, wealth, and other factors (Bayer, 2018); (Odum, 2011).

Subscription services are a subset of the distant selling distribution model, in that they allow for consumers to receive products according to a set schedule. In the subscription model, all consumption of physical goods is by default deferred to some point in time beyond the point where quantities of consumption are decided. This delay allows shipping and various administrative processes to occur.

Hypothetically, this delayed reception of goods should result in consumers discounting any physical product ordered via a subscription service. Any goods purchased in this way by default will be received and then consumed some point in the future. Immediate consumption is not possible, as it is if goods are purchased directly from a retail store. This discounting process itself is not directly observable, but consumer preferences can be solicited directly, or indirectly observed. This thesis application proposes to evaluate subscription services to determine the degree to which consumption under the subscription model conforms to the predictions of intertemporal choice models, and the degree to which these observations might be impacted by other unique features inherent to the subscription model itself. In essence, this thesis aims to determine whether individual time preferences can be mapped to individual preferences regarding distribution. If preferences for subscription services are a manifestation of low time preferences, then this paper hypothesizes that individuals who are averse to subscription services also have shorter time preferences on average than those who do not.

Willingness to purchase a subscription requires some measure of commitment. Aversion to subscription-based distribution whenever possible may be an expression of an aversion to this commitment, and an expression of preference for future optionality as opposed to this precommitment to set quantities and qualities of consumption. Commitment may offer its own benefits: vendors who offer subscriptions may price their goods lower than comparable alternatives to reward customers

willing to commit to regular consumption. Equivalently, they might offer some period of free consumption to reward regular consumption. Consumers might also benefit from the ease offered by the subscription model. The process of searching for compatible goods is outsourced to the producer, as is the time intensive process of researching and purchasing said goods. A grocery or meal box subscription, for instance, might eliminate the need for a consumer to commute to a distant grocery store, or to worry about checking prices or managing their weekly food budget manually. For those willing to purchase goods via subscription, convenience and reduced cost compensate for delayed consumption.

The decision to enter or leave a subscription service may itself be impacted by framing effects and inertia (Arkes & Blumer, 1985). Consumers build loyalty to their default purchasing models or outlets, via escalating commitment and perceived sunk costs. Switching distribution channels may require significant justification or compensation. For those unused to subscription-based distribution for a specific good or goods, switching to a subscription may require some special compensation. By the same token, individual commitment to subscription services may increase over time, to the point where leaving a subscription requires overcoming significant cognitive inertia in addition to effort costs associated with cancelation. In either case, the default option a consumer faces frames their decision making, impacting it favor of the option closest to their default. Deliberate choices while framing options in the survey may be able to mitigate these effects.

Research on cognitive inertia has found that surveys on product satisfaction taken immediately after reception of a product or service differ from those taken at any other time. Only exceptionally poor or positive experiences deviated from this pattern (Mattila, 2003). According to the author, study participants rate service not on the quality of their most recent experience, but by their overall impressions of the retailer, even when they were specifically asked to rate their most recent experience with the brand. This should impact study results severely. It is plausible that most food purchased at a retail store or via a subscription service is not consumed immediately upon reception. It is highly unlikely that this survey will be systemically presented to study participants immediately after they used either purchasing medium. This thesis aims to study overall impressions rather than specific, recent experiences.

Subscription services bind future choices, committing consumers to predetermined patterns of consumption. For some individuals, this precommitment might be seen another reason to avoid subscriptions, while others might see the chance to commit their consumption as a unique, useful feature. Meal boxes effectively outsource diet-management and meal planning to the distributor, allowing subscribers to save time and energy spent managing their diets, researching meals, and shopping for unique ingredients. The impact of this choice constraint is indeterminate overall, as some individuals may require compensation for their reduced optionality, while others will prefer to limit themselves. Preference reversal due to dynamically inconsistent preferences may explain why some consumers are willing to restrict their future decision making, but examinations of this behaviour is beyond the scope of this research thesis (Casari & Dragone, 2015). Avoiding preference reversal may be particularly relevant for non-naïve consumers subscribed to a diet food subscription service.

Experimental Design

This thesis aims to study the link between temporal preferences and preferences regarding distribution methods by presenting a series of questionnaires to a mixed group of study participants drawn from classrooms and a more extensive sample obtained via social media distribution. Study participants will be asked to submit demographic data to ensure representativeness, before they are presented with a battery of subject matter questions. These questions will test the validity of the following presuppositions:

- Hypothesis A: Decisions framed as choices between subscription-based distribution and retail-based distribution will exhibit the same directional effects as choices between present and future consumption. Subscription services require consumers to discount their future consumption, and thus must compensate them somehow for this effective utility discount.
- Hypothesis B: Framing is central to the decision between distribution models. When the default is established as subscription, results will favor subscription options more than when the default is retail. Escalating commitment implies that the default will be favored over a new option if it is established as a routine purchase (Loewenstein, 1988). In the interest of legibility and simplification, a binary default precedent condition (retail default or subscription default) will be used rather than a sliding time scale for each default. This was done primarily for simplicity: adding another dimension to an already complicated hypothetical decision will only serve to confuse and distract participants from the core present/future consumption problem.
- Hypothesis C: Consumers positively value some factors associated with subscription-based distribution, such as convenience. Hesitance and attraction to subscription services result from conflicting values and priorities.

To ascertain the truth regarding these statements, participants will be asked to answer a series of questions, whose order of presentation will be randomized. Food subscription services were chosen as the subject of choice for several reasons. Firstly, relative to other product categories, most study participants should have some experience purchasing food items, be it via a subscription service, or a local grocery chain. This survey aims to capture the largest possible subject group via online solicitation and thus will not focus on boutique items or gender-specific products, such as specialized, hand-crafted soaps or razor blades. Food subscriptions are non-specific to a specific social class or income level, with offerings across a wide swath of price points.

Food subscriptions are not a perfect subject, however. Research has found that food and alcohol items are discounted at an especially high rate when hypothetical choices are used (Odum, Baumann, & Rimington, 2006). Wariness should be employed before conflating the preferences of humans regarding hypothetical and real food.

The following information will be solicited via a battery of questions, which will be detailed below:

- Variance in willingness to pay when the acquisition date is changed, along with payment dates.
- Correspondence between general time preferences and subscription-frame preferences. These preferences will be solicited using hypothetical offers.
- Default framing, and how willingness to purchase may be impacted by existing history with subscription services. Escalating commitment might impact marginal decisions when switching

distribution methods becomes possible. The degree to which escalating commitment can be created via hypothetical purchase histories is unknown, but suspect.

- Directly asking for consumer's willingness to pay for convenience associated with subscriptions, absent any deliberate framing.

To answer these questions, sets of questions will be presented in three main blocks. Each question from the first block will utilize a standardized offer template, with enter/leave offers being accompanied by some amount of time already elapsed, (positive or zero), a price offer, and a field for what one would need to be paid to receive that product via subscription, and an entry for expected delays of receipt and payment.

"A food item that you routinely purchase [at a local supermarket]/[through a subscription delivery service] is now offered [through a subscription delivery service.]/[at a local supermarket] if you pay for the subscription [today]/[X days from now], you will receive the food item [X] days from now. An identical substitute is also available immediately at a local supermarket.

Suppose you usually pay \$30 for this food item. What is the highest price you would be willing to pay to [receive the item via the subscription delivery service]/[purchase the item at a local supermarket]? [Price Field]

This question would be iterated as follows, for example:

"A food item that you routinely purchase at a local supermarket is now offered through a subscription delivery service. If you pay for the subscription today, you will receive the food item 7 days from now. An identical substitute is also available immediately at a local supermarket.

Suppose you usually pay \$30 for this food item. What is the highest price you would be willing to pay to receive the item via the subscription delivery service? [Price Field]

Alternatively, the frame could be altered to establish subscription delivery as the default:

"A food item that you routinely purchase through a subscription delivery service is now offered at a local supermarket. If you pay for the subscription today, you will receive the food item 7 days from now. An identical substitute is also available immediately at a local supermarket.

Suppose you usually pay \$30 for this food item. What is the highest price you would be willing to pay to purchase the item at a local supermarket? [Price Difference Field]

General time preferences will be solicited with the following question:

"A food item that you routinely purchase at your local supermarket is out of stock for the next 7 days. An identical substitute is also available immediately at a higher price.

Suppose you usually pay \$30 for this food item. What is the highest price you would be willing to pay to purchase the more expensive substitute? [Price Difference Field]

In addition to variations on the three above questions, participants will be asked to evaluate qualities associated with subscription services using a series of 5-point Likert scale questions. For each question within this second block, participants will have the option to choose a number from 1 to 5.

Each number corresponds to the following, in sequential order: Strongly Disagree, Disagree, Neutral, Agree, and Strongly Agree. A five-point Likert scale was chosen to improve response rates, and limit participant confusion (Babakus & Mangold, 1992); (Devlin et al., 1993); (Hayes, 1992). Research also suggests that 5-point scales are more appropriate for European survey audiences, and important feature given the intended mixed European-North American target population (Bouranta et al., 2009). The purpose of this solicitation is to identify which factors study participants associate positively with subscription services, and which factors they identify as salient barriers to using subscription services. This information will use to contextualize other earlier findings but is not itself the focus of this paper. The salience of non-tested factors to study participants will be ranked against the time-preferences/increasing commitment hypotheses. The full questions are as follows:

- Subscription services offer valuable convenience.
- Subscription services require too much commitment.
- If I used a subscription service for a long time, I would be unlikely to unsubscribe from it.
- Access to goods on demand is not necessary so long as I receive enough to last between deliveries.
- I am willing to experiment with shopping outside of retail stores.
- Local stores stock fresher food than those offered by subscription services.
- Subscription services reduce the amount I need to think about recurring purchases.
- Subscription services offer unique products I cannot find locally.
- Food subscriptions are more expensive than local stores.
- With subscription services, I cannot adjust consumption to suit my immediate needs.
- It is easy to unsubscribe from subscriptions you no longer want or need.
- Subscription services reduces time spent travelling to and from stores.
- Subscription services offer limited selection relative to local options.
- Purchasing a food subscription would not save me much time or energy.
- I prefer to shop in physical stores.
- Food subscription services offer foods with desirable qualities I cannot find at local stores.
- I want immediate access to goods when I want them, waiting on a subscription delivery is too slow.
- I am unlikely to switch from current retail sources which I regularly frequent.
- I cannot buy goods in sufficient quantities via a subscription service.
- Subscription services offer discounted prices on goods.
- I prefer the convenience of local stores to subscription services.
- Having my meals predetermined in advance would simplify my life.

Each of these questions alludes to a factor which may facilitate or impede on demand for subscription services over more direct distribution models. Individual preferences will likely rank these factors differently. Some might even interpret certain factors (such as the relative convenience of subscription services over retail distribution) as positive, while others revile them as negative.

Accompanying this battery of questions will be a third block of questions on demographic characteristics. Distribution of the questionnaire will revolve around two key groups: a general social media group, and a classroom group. While the classroom condition will necessarily be constrained by the demographics of the class in question, the social media group will not. To generate a survey

population, the questionnaire will be distributed on several social media platforms. It is possible that the population which views these requests to survey may in some way differ from the general population. Demographic collection will help to manage and track the representativeness of the survey sample from the general population. The following key demographic and background characteristics will be requested from survey participants.

- Age
- Gender
- Educational Status
- Marital Status
- Country of residence
- Whether or not they live in an urban or rural area
- Whether or not they shop for groceries in their household
- How many individuals they shop for when purchasing groceries
- Whether or not they have ever purchased food items via a subscription service
- Whether or not they prefer fresh food box or meal box services
- The length of time they have been subscribed to a food subscription service, if at all

Due to the length and precise nature of some of the questions contained in the test survey, it is crucial that study participants pay full attention to the proceedings. As the questionnaire will not be administered in person to most participants, an alternative mechanism must be used. To gauge participant attention and to ensure that contributors are answering fully and truthfully, several concentration assessment questions will accompany the demographic and background questions at the beginning of the survey. These will ask participants to answer survey-specific, easily retrievable pieces of information, such as the number of sections in the questionnaire. Participants who fail to properly answer these simple questions will have their data excluded from final analysis.

Potential Weaknesses and Limitations

The incidence and magnitude of some cognitive effects may be impacted to varying degrees by hypothetical situations, as opposed to real, observed decisions. Real incentives and choices remain the gold standard of economic experimentation, as they ensure that study participants are truthful in their answers. The subject matter of the proposed experiment, and the proposed timeline and scope of its implementation make incentivised experimentation unfeasible: we lack the resources and accreditation to administer a real food subscription delivery service across international borders. Furthermore, implementing this service would require some participants to purchase real food items, which may lower willingness to participate considerably.

Absent the opportunity to observe participants facing real incentives, hypothetical situations will be used instead to ascertain preferences, which will include hypothetical past behaviours. The level of coincidence between decisions made under these hypothetical situations, and how the same individuals would behave when facing those conditions in the real world is unknown. Experiments with neuroimaging suggest that differences in hypothetical and real choices regarding temporal discounting are insignificant, and that there is no significant difference in the discounting process in real or imagined scenarios (Bickel et al., 2009). The regions of the brain activated while considering real and hypothetical choices are identical (Bickel et al., 2009).

Extensive debate and review have accompanied the question of whether or not incentives alter task performance. While consensus is mixed, a seminal review by Hogarth in 1999 found that incentives do not reliably alter average performance. Instead, incentives decrease response variance, except during judgement and clerical tasks. For preference tasks, the use of real incentives increases risk aversion, while decreasing generosity (Camerer & Hogarth, 1999). Neither review specifically examined time preference experiments.

The choice of a digitally distributed survey trades off strict control over sample composition for a larger sample size and the possibility for a more diverse sample. Distribution online allows us to reach a larger group than would be possible within a classroom setting, but this added power comes at the expense of ability to moderate directly by answering clarifying questions in person. The population solicited online will likely differ demographically from that of a classroom, though this may be a positive feature if this sample is more representative of the overall population, which is intended to primarily capture North American and European consumers. To verify this, this study will gather demographic information alongside the experimental subject data.

Generating an online sample via Mechanical Turk was also considered, as it would allow us to reach a large group online and allowed us to pay participants directly. As discussed previously, however, this experiment design does not allow us to fully compensate participants according to their choices, which will involve purchasing decisions for meal subscriptions which cannot be feasibly delivered. The added benefit of financially incentivizing the subject group is thus null. It is also plausible that sample populations derived from Mechanical Turk may differ substantially from those of the general population: this is an unsubstantiated prediction. Data is available on Mechanical Turk's demographics which indicates that it is typically more representative of the general US population than classroom experiments (Hitlin, 2016). The same source cautions researchers against using Mechanical Turk samples as a direct proxy for the US population, due to differences between samples of the two populations (Hitlin, 2016). Perhaps of greater concern is the prevalence of academic surveys on Mechanical Turk, and the familiarity and experience the userbase has grown to have with specific kinds of questions and answers (Rand et al., 2014). Such familiarity has the potential to skew answers considerably.

Conclusion

The core logic of temporal preferences is thus: individuals will prefer immediate utility to future utility. The degree to which this preference holds relative to other compensating factors such as reduced price varies by individual. Preferences regarding subscription-based distribution relative to retail distribution similarly vary between individuals: while some require little compensation to switch from retail to a subscription, other may require more substantial incentives. This research thesis hypothesizes that there is link between this pair of preferences, as goods received via a subscription service will, inevitably be received in the future so long as a delivery delay exists. Such is the case for food subscription services, which will be the subject of this thesis's investigations. In contrast, when delivery is immediate, subscription services prosper. Digital distribution has opened the floodgates for subscription services for media of all forms: movies, television shows, and video games, all on demand. In these cases, subscription services have already grown beyond retail distribution, or (in the case of video games, have established themselves in parallel to digital retail.)

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