The Reference Effect of Delay Announcements: A Field Experiment

Effectively managing customers’ waiting experience is critical for firms’ success in services. Providing real-time delay information is a relatively inexpensive yet effective approach to improve customers’ experience while they wait in queue. This approach has been adopted in many service systems in recent years, such as restaurants, hospitals and call centers. To improve customers’ experience and by extension directly or indirectly improve the system performance, it is important for a firm to understand whether and how customers respond to delay announcements.

Customers’ response to delay announcements may depend on their evaluation of the waiting time relative to a certain expected waiting time. In particular, customers may consider waiting time beyond expected waiting time to be a loss, and waiting time less than expected waiting time to be a gain. Prospect theory (Kahneman and Tversky 1979) implies that customers may value lost time more than the same amount of time gained. Consistent with the terminology in the literature, we refer to such customer behavior as the loss aversion behavior. Most applications of prospect theory focus on people’s preference in monetary payoffs. There are very few studies exploring customers’ loss aversion behavior in the temporal domain. Most of these studies are either analytical in nature or conducted through lab experiments. In this paper, we conduct a field experiment at an Israeli bank’s call centers, where we explore whether customers are loss averse in time and how changing the amount of delay information available to customers may impact such reference-dependent behavior. Our paper is the first in exploring customers’ loss aversion behavior in the temporal domain in a field experiment approach.

We start by focusing on the case where customers are provided with accurate delay announcements. We study whether customers respond to such delay announcements and whether their response is reference dependent. One may expect that the answer to these questions depends on the availability and accuracy of the delay announcements. In particular, an accurate delay announcement provides an explicit and meaningful reference point for the customers. Thus, customers provided with accurate announcements may be more likely to be loss averse than customers who are provided with inaccurate delay announcements or no announcements at all. To elicit the impact of delay announcements on customers’ loss aversion behavior and how such impact differs for announcements with different accuracy levels, we have conducted a field experiment where customers are given either inaccurate delay announcements or no announcements in a quasi-randomized manner. This randomized experimental design allows us to attribute the potentially
different abandonment behavior by customers under different announcement treatments to the announcements they received rather than to factors that are external to the announcements.

Note that one of the key challenges to study reference-dependent behavior using field data is that reference point is not directly observable (Barberis 2013). In addition, to study customers’ loss aversion behavior in time, we also need to evaluate customers’ value of time. This value is not directly observable either and thus harder to quantify than the value of money. Thus, to identify the mechanism of customers’ loss aversion behavior and the role of delay announcements in such reference-dependent behavior, we propose a dynamic decision model with consumer learning. It allows us to infer both customers’ value of time and their reference point based on the abandonment behavior observed in the data. In particular, we model customers’ abandonment behavior as an optimal stopping time problem, starting from the time when the announcement is provided (when available). Customers make abandonment decisions by trading off between the waiting cost and the reward of service. To test and quantify customers’ loss aversion behavior in time, our model allows customers’ per unit waiting cost before the expected delay to differ from that after the expected delay. We assume customers are forward-looking and heterogeneous in their cost-reward ratios. The model also allows customers to make abandonment decisions based on factors that are unobservable to the researchers, such as customers’ private information and lack of adherence to rational decision-making, by including idiosyncratic shocks in the model.

To make abandonment decisions, customers form beliefs about their offered waiting time. We assume customers have a prior belief about their waiting time before their visit to the call center. They may update their beliefs about the waiting time as they gain new experience over time. We model such customers’ learning process using the classic Bayesian learning framework. By accounting for such potential learning behavior, we allow customers’ beliefs about their waiting time thus their reference point to be different across different customers and to evolve over time. To address the more basic and related question of whether customers respond to delay announcements (when available) in their learning and abandonment behavior at all, we consider the following two types of models: (1) those where we allow delay announcements to impact customers’ beliefs about their waiting time and their learning behavior, which we refer to as influential models, and (2) those where customers completely disregard the announcements, and form beliefs and learn about their waiting time solely based on their experience, which we call non-influential models.

The datasets we use to estimate the models above contain detailed information about each individual call at the Israeli bank and the detailed announcements (when available) provided during these calls. Using censored maximum likelihood method, we estimate customers’ prior belief about the waiting time, cost-reward ratio, and the variance of the idiosyncratic shock. Our results show that customers’ per unit waiting cost after the expected delay is significantly larger than that
before the expected delay for all customer classes regardless of the announcement treatments. This implies that customers are loss averse in their waiting time regardless of the amount of delay information provided. One may think that customers provided with accurate announcements are loss averse due to the fact that they have an explicit and reliable reference point. However, our results show that customers are loss averse in their waiting time even when they are provided with inaccurate announcements or no announcements, (where there are no explicit or meaningful reference points offered). While the absence of meaningful delay announcements does not alter the fact that customers are loss averse in their waiting time, delay announcements with accurate estimates of the anticipated delay do impact customers’ beliefs about the waiting time and thus their reference points. In particular, we show that the expected average offered waiting time associated with the announcement is the reference point when customers are provided with accurate delay announcements, while the overall expected average offered waiting time (which is independent of the announcements) is the reference point when customers are provided with no announcements.

Our results also shed new lights on consumers’ learning about their waiting time and how delay information impacts the learning. We show that consumers learn about their waiting time through their prior experience regardless of the availability or accuracy of the announcements. However, accurate announcements do facilitate more granular learning compared to the case with no announcements. In particular, when provided with no announcements, customers learn solely based on their prior experience, while customers learn through both the delay information and their prior experience when provided with accurate announcements.

Lastly, many firms use delay announcements to manage customers’ expectations and some firms may even strategically provide announcements much longer than the actual estimated delay to eliminate the negative impact of customers’ reference-dependent behavior. However, our preliminary results show that customers may completely disregard the announcements when they are inaccurate.

To the best of our knowledge, we are the first to explore customers’ loss aversion behavior in the temporal domain in a field experiment approach. We are also the first to study how changing the amount of delay information available to customers (by providing accurate announcements, inaccurate announcements, or no announcements) may impact customer learning and their reference-dependent behavior in time. We show that customer learn and are loss averse in time regardless of the announcements. Yet, accurate announcements do impact the reference point customers use and facilitate more granular learning compared to the case with no announcements. We also provide preliminary evidence that customers may completely disregard the announcement when they are inaccurate. Through counterfactual studies, we demonstrate how customers’ loss aversion behavior impact the overall congestion of the system and the value of providing delay information.