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# Optimizing service failure and damage control[☆]

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## ABSTRACT

Should a provider deliver a reliable service or should it allow for occasional service failures? This paper derives conditions under which randomizing service quality can benefit the provider and society. In addition to cost considerations, heterogeneity in customer damages from service failures allows the provider to generate profit from selling damage prevention services or offering compensation to high-damage customers. This strategy is viable even when reputation counts and markets are competitive.

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## 1. Introduction

The meeting has just ended on time and you are ready to head out to the airport to catch your flight, so you open the *Uber* app. After typing the destination into the 'Where to' box, the app requires you to make a choice among two economy options: *uberX* at a price of €50.00 or *POOL* at a price of €35.00, as illustrated in Fig. 1. The option *uberX* offers private rides, while the option *uberPOOL* matches riders headed into the same direction.[1] Evidently, the sharing option saves costs but may increase the ride time, which creates inconvenience and a damage if you arrive late. Which option would you select? Clearly, the choice among the consistent service *uberX* and the potentially less reliable service *uberPool* depends on the likelihood that other riders will join the ride, and the damage in case you miss your flight.

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[1] For details, see www.uber.com.

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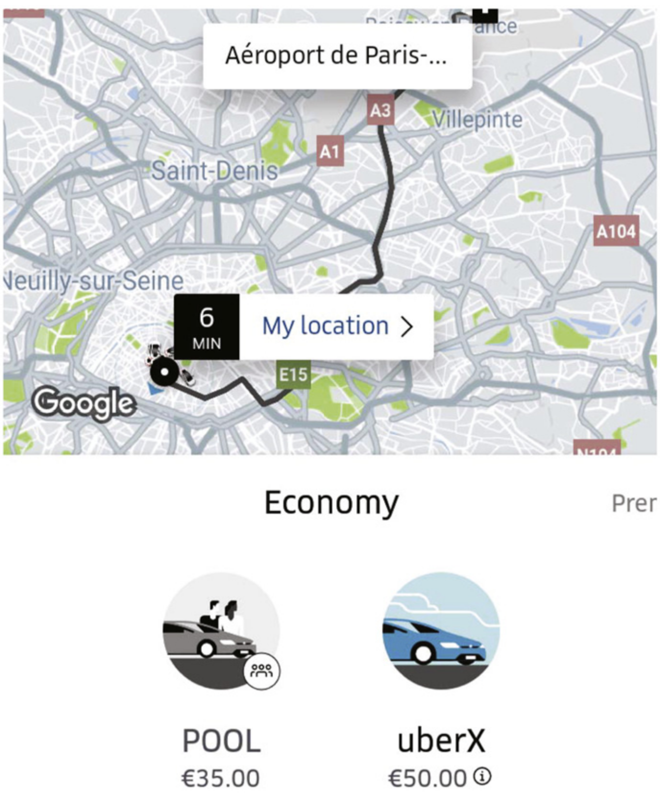

**Fig. 1.** Screenshot of the *Uber* app.

The novel aspect of this service differentiation strategy is that the provider offers a randomized service quality alongside a consistent service (Parasuraman, Zeithaml, & Berry, 1985, 1988).[2] Randomization as part of the business strategy is common in pricing. Examples include probabilistic or opaque selling (Zhang, Joseph, & Subramaniam, 2015; Fay & Xie, 2008), participative pricing (Chen, Koenigsberg, & Zhang, 2017; Schmidt, Spann, & Zeithammer, 2014), and randomized pricing (Varian, 1980). This naturally raises the question: Can service providers and society likewise benefit from offering a randomized service quality?

To find answers, we present a model in which a provider designs the service by choosing the failure rate and the price. Service failures are assumed to have a dual impact: they lead to cost savings for the provider, but they inflict damages on customers. Customer damages from service failures may be monetary (direct follow-up costs) or non-monetary (such as the opportunity cost of time, or hassle costs), or both.[3] Clearly, reducing the failure rate would lead to lower expected damages for customers. However, this increases the cost of providing the service. This tradeoff between size and frequency of customer damages and the cost of reducing service failures drives the optimal failure rate, and therewith the optimal service quality. The model is used to determine the privately and socially optimal failure rates and prices under different market conditions, captured by (a) the cost structure (technology) of the provider, (b) the size of customer damages, and (c) by the degree of customer heterogeneity regarding damage tolerance. In addition, the model is used to examine optimal strategies to enhance profit by offering failure prevention (service backups and protection plans) and monetary damage compensation.[4] Fig. 2 summarizes the main elements of the model.

Several key results are provided. First, randomizing service quality can be optimal for the provider and society more broadly. Reducing the failure rate to zero is optimal and economically efficient only if the benefit of eliminating the customer damages exceeds the cost of fail-safing the service. Second, customer heterogeneity in damage tolerance reinforces the incentives to retain service failures but results in an economically inefficient outcome. Third, use of failure-prevention strategies such as backups and protection strengthen the provider's incentives to offer an unreliable service, whereas the optimal failure rate is

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[2] *United* recently launched its new *Flex-Schedule Program*, which allows opted-in passengers to benefit from vouchers up to $250 if they are willing to accept changes of the flight time within a given day or a downgrade from Economy Plus to regular-old Economy (Bloomberg, 2017).

[3] By choosing a strictly positive failure rate, the provider randomizes service quality and imposes expected damages on its customers — a "calculated misery" (Wu, 2014).

[4] The idea of failure prevention is to address service failures before customers become aware of any damage. For example, providers can apply fail-safing methods (poka-yokes) such as fishbone diagrams or Pareto charts to identify and eliminate failure points (Chase & Stewart, 1994). In contrast, compensation becomes relevant once the damage has occurred, and therefore tends to be inefficient, especially when the damage exceeds the price paid for the service.

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