Industrial Organization - PSE

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Uber's Surge Pricing

01 **What is Uber's "surge pricing" policy? How does it compare to alternative forms of congestion pricing, for example in residential electricity markets or public transportation systems?**

Surge Pricing Policy

Uber's business model is based on a multi-sided "Network Effect", where the more drivers and riders exist the more effective and efficient it becomes, however, no market is perfect. Sometimes ride requests increase unexpectedly, an imbalance exists such that the availability of driver is limited and the wait time for a ride is high or no rides are available, Uber employs a "surge pricing" algorithm to equilibrate supply and demand. The algorithm assigns a simple "multiplier" that multiplies the standard fare to derive the surged fare. The surging price is presented to a rider in the app, and the rider must acknowledge the higher price before a request is sent to nearby drivers (Uber 2018a). This form of dynamic pricing is a congestion-pricing strategy, based on changing circumstances.

Differs from alternative congestion pricing

Congestion pricing is a way of harnessing market powers to reduce waste associated with traffic congestion. It works by shifting rush hour traffic to other transportation modes or off-peak periods. Popularly adopted, it is used for airline tickets, cell phone rate, and electricity rates and most used through variable priced toll lanes, for the time of day. Truck drivers, for example, will avoid traveling on highways during peak hours, in Germany savings as much as $500 per vehicle can be made (FHWA, 2019).

What makes Uber comparatively dissimilar in their market-clearing methodology, is the **real-time component** to dynamically price (DP) and match supply + demand. Another unique concept is "dynamic waiting" for ride-pooling, this collaborates users in proximity to mitigate congestion (Korolko, N., 2008). Variable toll roads do not yet have the technology to assess traffic in real-time and price the toll roads accordingly, but most importantly communicate this fare change to drivers ahead of travel, to truly be successful.

further expanding flaws of classical congestion pricing is the unequal equity impacts, for it to be effective, a manual redistribution of wealth needs to occur (Eliasson, 2006). Uber, on the other hand, can automatically identify the required target market, so that equity distribution is automatically corrected.

02 **How does surge pricing affect the incentives of the drivers? Of the riders?**

Surge Pricing Incentivizing drivers

Drivers are automatically notified in the Uber app when demand increases through a map that shows the busiest areas and information about surge prices. This encourages more drivers to serve the busy area over time and shifts rider demand, to restore balance. Best illustrated by Hall, J,.(2015) An example of the incentive in action, was for a sold-out Ariana Grande concert at Maddison Garden. The number of desired rides spiked 4x normal rates, this Surge signaled drivers to get on the road, increasing driver supply by 2x the pre-surge baseline. Drivers were incentivized to work because, during the 75 minutes window, prices were between 1.2 and 1.8x normal rates. On the flip side, in an observation carried out for New Year's Eve, in NYC, where the Uber application malfunctioned, and no surge pricing was offered to drivers. Rides fulfilled dropped drastically, partners simply did not want to drive NYE with no added incentives. This reference scenario illustrates why surge pricing is necessary to induce prompt driver response.

Surge Pricing Incentivizing Riders

Surge pricing is a "relief valve" for the ridesharing marketplace(Uber, 2018). Without it, when demand for rides exceeds the number of available drivers**, riders wait longer or do not get a ride at all**. From an economic efficiency stand point, it's beneficial because those requesting a ride during peak, mean they truly value Uber more than any other option in that particular moment, this can be interpreted as allocative efficiency (Hall, 2015). According to the empirical model developed by Castillo (2018), it was revealed that riders are very inelastic in the short run, in terms of both prices and pickup times, especially during sensitive moments – i.e getting to the airport or a wedding on time. Indicating Surge pricing is not a drastic deterrent as there is always a segment willing to pay.

03 **What are the potential efficiency gains of surge pricing compared to uniform pricing?**

Efficiency Gains

Traditional taxi businesses, with uniform pricing experience what is coined as the "Wild Goose Chase" (WGC). This is a problem because drivers need to "chase" customers and *don't have the choice* to find a better rate. By traveling to the other side of town, it **wastes driver time, petrol and leaves geo locational gaps**. Uber's surge pricing aids to avoid this "bad market situation" 90% of the time (Castillo, 2017). Research also found a nonmonotonic relation of supply as a function mean pick up times, indicating that 'surge' pricing indeed avoids **high waiting times for customers** and significantly lowers the number of **canceled trips**. Compared to uniform pricing, surge pricing increased welfare by 3.53% of gross **revenue** (Castillo, 2018).

The Surge pricing acts as a price signaling strategy, whereby separating and identifying individuals with more urgent needs, or ones with higher disposable income to spend on Uber's services. This price discrimination is also known as Second Degree price discrimination. Equilibrium **profits increase with discrimination compared to a uniform price** (if $p\text{-}f > 1/2 \{(p1\ f) + (p2\text{-}f)\}$. However, this stands only if the differences are more to do with product differentiation than differences in exogenous benefits. (Armstrong, 2006).

findings in fact show that without surge pricing, the Uber platform would copy the taxi model by constantly setting higher prices to avoid the WGC, which is very bad both for welfare and revenue.

04

Who are the winners and losers of surge pricing?

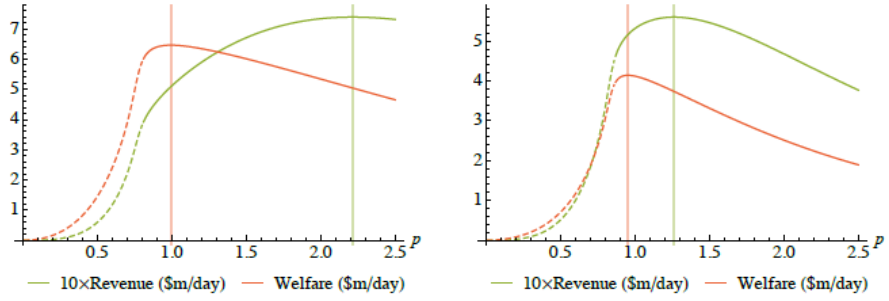
Stakeholders - Winners

1)Drivers – Surge pricing removes the element of the WGC, so time spent with a rider in the back seat is roughly 40% higher, increasing the capacity of the market rewarding more time back to the driver. (Castillo, 2017)

- It cut costs of petrol, by ensuring the perfect place and time to maximise earnings.
- The time rewarded back to Uber drivers allows for significant flexibility, enabling people to work second jobs, thus making more income.

2) Uber Business – Revenue modelling shows that both lower and higher elasticity rates equate to greater revenue potential than user welfare potential. In other words, Uber always wins. Interestingly though, if elasticities are high after the surge multiplier reaches 1.23X, revenues will experience a downward trend, all while maintaining much higher revenues than prior to surge pricing. (diagram below).

3) Price and Time inelastic users - Bottom line is even if demand is high during a period, riders are almost always guaranteed a driver. The reliability of the service is what provides the highest value, this reliability is founded on Surge.



(a) Cohen et al. (2016) elasticities. (b) Twice the Cohen et al. (2016) elasticites.

Stakeholders – Losers

A number of critics have suggested that surge pricing can hurt riders, calling it a form of price discrimination, or even price gouging (Dholakia, 2015; Crilly, 2016). As per the above graph It's clear that overall welfare does experience a downturn..

1) Lower Income & Time inelastic users– are the biggest losers. For those in urgent need of the service, yet at a lower socioeconomic position, having the fares triple will significantly diminish their utility. In Platform economics this is also referred to as "negative same-side effect", in other words, as user volume increases, there is an adverse effect on utility.

2) Drivers – Can be hurt, if their earnings might be too low unless they carefully plan their actions around surge pricing. In fact, during low demand periods Uber drivers lose welfare, as prices are lower than Taxi rates, the uncertainty of "Surging" consumer patterns can be a problem.

3) Uber business – due to the unknown duration of the surge multiplier, users may look to engage with other competitors instead, leading to lost potential revenue.

Points 2 & 3 however are relatively of lesser weight than point 1.

Conclusively since Welfare captures all stakeholders – drivers, platform, passengers, the surge pricing exhibits a trade-off in beneficiaries. whereby a 30% increase in prices, only decreases welfare by less than 4%, however a 30% decrease in prices, leads to a 41% decrease in welfare (Castillo, 2017). – this confirms Arnott (1996) theorem that market failure would emerge from this model if prices were too low. Therefore, S**urge pricing is an overall economic win to maximise welfare of all.**

05

How does competition between Uber and Lyft affect your analysis of surge pricing?

Competition in ride-sharing

Lyft benefited from the second-mover advantage, managing to copy Uber's business model, technology, and piggybacking off the public education of the service and hence serve an identical market. When a passenger uses more than one platform this is called "multi-homing", in the case of Lyft, the platform is viewed as homogenous by drivers but heterogeneous by the buyer which leads to a "Competitive bottleneck" (Armstrong, 2006). Surge pricing in effect is the phenomenon that represents the perceived heterogeneity, despite the reality being that Lyft's prices do not undercut significantly, (Lyfts surge pricing model is a percentage-based formula, instead of a multiplier but very similar outcome). When Surge occurs people may look to switch applications to beat the market, however since Lyft also have a Surge mechanism, it's rare for switchers to get a better deal, but a chance to get available drivers.

This does not affect the analysis because when switching occurs between applications, it is usually when capacity is maximised on Uber. This competition is healthy and acts as a natural check and balance for Uber not to exploit market power. Since Uber has maintained their first player advantage, it has the larger market coverage 2-2.5x more supply and demand than Lyft (Chen, L, 2018). With more users and drivers, it is viewed as the more reliable platform, that people will continue to turn to primarily before Lyft.

06

Do you think that surge pricing should be outlawed? Regulated i.e have a fixed upper limit on the multiplier of surge pricing?

Surge Outlawed ?

Several cities like Honolulu, Manila, New Delhli and Singapore have banned or capped surge pricing (Puckett, 2018; Kazmin, 2016; Yee, 2018; Yusof, 2018).
As suggested in Castillo's welfare-maximizing model, an optimal price would be "just above the price where WGC's start", which looks to be only slightly above normal market price, but definitely below the 1.3x multiplier, no matter the level of elasticity. This is because there is a risk setting the price too close to the threshold, in case of risking significant losses given the uncertainty of the market and if we opted for a welfare-maximizing result, it would result in setting prices too close to the profit maximizing one. However, I don't believe any price setting is necessary. As the nature of this service is private, not public and tending towards a "luxury" good, my stance on this matter, is more in line with the Chicago school of thought… liberalization>regulation. This market has proved to be, with digital dynamic pricing algorithms, more efficient than classical ride-sharing services. This revolutionarily disruptive model has been a catalyst for an abundance of digital mobility services, triggering a new era of platform economic solutions and we must encourage innovation. By stepping in and applying caps, may disincentives budding entrepreneurs from continuing to push the boundaries of plausibility.

A Fresh Solution to Capitalism

The only recommendation I would impose on Uber is to create a "Danger Protocol" to protect people at lower income levels, in need to be picked up for their own safety. In February of 2020 global leaders gathered at the OECD in Paris, to discuss how to prevent, address and eradicate violence against women. Uber can take an active role within the private sector and dedicate some Corporate Social Responsibility around this topic, by **capping ride prices for endangered individuals especially aimed at females**. As a regulatory body, I would not force, but urge for, a surge pricing algorithmic signal to be beaconed, when a "Danger Alert" is activated, thereby invoking a rapid displacement by the drivers. However, the Uber business would not impose this full price to the passenger, but rather subsidize the cost internally. Unlike the highly regulated Taxi industry, since we allow Uber to extract large rents from the market freely, some philanthropy should not be a big ask.

Thank You

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**References from Dholakia, 2015; Crilly, 2016; Puckett, 2018; Kazmin, 2016; Yee, 2018; Yusof, 2018 – were all taken from the - Castillo (2018) reading.*