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The Rise of Rideshare in the US Urban Mobility Market

Abstract: This paper analyzes the evolution of the US urban mobility market, taking into account how rideshare platforms such as Uber and Lyft have revolutionized the market for short-distance trips.

Analysis of the effects of rideshare on the taxi cab industry make it clear that the world of technology that we live in today is here to stay. Beyond rideshare, however, Uber and Lyft have diversified their offerings to make their platforms a one-stop-shop for many consumers. We discuss how Uber and Lyft do not sustain profits and inquire how they continue to gain investment funds. We conclude that these companies are looking so far ahead of the current moment that profits are not a due concern for them now. As they continue to diversify and offer more services to meet consumer needs, profits will follow.

Introduction

Platform business has become the most desirable business model in the era of connectivity. Uber, Facebook, and Amazon are all based on this model. Platform businesses have many advantages; since they are positioned between the buyers and sellers, they effectively act as communication companies putting consumers in touch with contractors. They are often secure from competition once they become established in the market. Another reason the platform model is so popular is that once a threshold is exceeded, network effects come into play, making the platform more valuable.

The mobility market comprises all markets that can satisfy transportation requirements from point A to point B. This market includes cars, taxis, trains, buses, airplanes, bikes, scooters, motorcycles, helicopters, etc. Uber and Lyft have become dominant players in the Transportation-as-a-Service ("TaaS") market, which is a sub-market of the mobility market. Uber and Lyft are strong competitors in this market due to multihoming and the growth of the sharing economy.

It is important to grasp the meaning of “sharing economy” to fully understand our analysis. A detailed definition of the sharing economy comes from NYU business professor Arun Sundararajan’s book *The Sharing Economy: The End of Employment and the Rise of Crowd-Based Capitalism*. In this book, Sundararajan concludes that a sharing economy consists of five components. He posits that sharing economies are: “largely market-based, high-impact capital, crowd-based ‘networks’ rather than rather than centralized institutions or ‘hierarchies,’ blurring lines between the personal and the professional, and blurring lines between fully employed and casual labor, between independent and dependent employment, and between work and leisure” (Sundararajan as cited in Anderson & Smith, 2016). This definition is quite complex, as are sharing economies, and aids in understanding the rideshare market and TaaS market in general. We can see how rideshare fits directly into this definition as apps have made networks out of both consumers and producers of their product (i.e. riders and drivers) where drivers can add driving as a side job, make their own hours, and report to themselves as boss. Lyft is a particularly strong advocate for the rise of the sharing economy. In their 2021 Annual Report, Lyft states, “we believe that the world is at the beginning of a shift away from car ownership to Transportation-as-a-Service (“TaaS”) [...] We believe that our ridesharing marketplace allows riders to use their cars less and offers a viable alternative to car ownership” (Lyft, 2021, p. 8). Ridesharing companies and individuals are embracing the principles of the sharing economy because of its potential to transform society (Klimczuk & Česnūityte, 2021). With the sharing economy, individuals are able to lower their transportation costs and companies can profit by offering competitive prices.

The US urban mobility market continues to grow as consumer tastes change over time, and as more Americans move to big cities. This market spans from how goods are transported through a city to how people get from point A to B. Given that this market can be quite broad, our analysis focuses on how people get around using taxi and rideshare services. We focus on rideshare platforms Uber and Lyft while taking into account how taxis previously met this demand for rides, especially in large cities. Because we consider the influence of taxis on this industry, the analysis will span from the early 2000s to the present.

The analysis seeks answers to why the two large-scale rideshare companies both have not been able to sustain profits. As part of this puzzle, we also must take into account the effect on the taxi-hailing market as rideshare platforms continue to grow. We ask a few questions to help solve this puzzle: how do Uber and Lyft track such large investments when they do not post profits? Why have taxi companies not adapted to the platform business model? How can rideshare companies continue to grow despite posting losses quarter after quarter?

The Technology of Production

i) Business Organization

The organization of Uber centers around its platform. Their platform is a two-sided marketplace where buyers and sellers can interact. Uber currently connects consumers and merchants to goods and services in mobility, delivery, and freight markets. Since Uber is a digital marketplace, they have to prioritize growing its network in order to become more valuable. As more people use the application, the utility derived from it increases. For example, if Uber experiences an increase in drivers, then the price for riders falls. This is a direct result of the network affecting the cost of a ride.

ii) Inputs

As technology platforms, Uber and Lyft must focus on creating, maintaining, and improving their core technologies. Their pursuit of innovation has some interesting effects on their balance sheet. Uber's net intangible assets plus goodwill and investments account for nearly two-thirds of its assets (Uber, 2021). This is interesting because comparable companies in the internet and software sector have higher shares of their companies' value coming from intangible assets. Microsoft, Amazon, and Facebook all have intangible assets accounting for greater than 78% of the company's value (Ross, 2020). Uber's total assets grew from approximately \$33 billion in 2020 to \$39 billion in 2021.

iii) Cost Structure

Economies of scope play major roles in platform businesses due to network effects. Uber's core platform has more uses than facilitating mobility transactions. Uber horizontally integrated its business so

it could facilitate transactions in delivery and freight, as well. They easily moved into those spaces because their platform is a scalable marketplace. Uber has made significant progress differentiating from Lyft in this respect. Lyft has taken a different approach. Lyft has vertically integrated its platform in the United States and Canada by pursuing self-driving technologies. This may be a wise decision considering Uber has been aggressive in the delivery market. Perhaps Lyft's investments in artificial intelligence will give them an edge in the self-driving freight market. A consequence of Lyft's vertical nature is that it may have an unbalanced throughput in the future (Buzzle, 2014). An unbalanced throughput can occur if regulations prevent autonomous driving or the expansion of ridesharing regulations. Lyft's core business is in the transportation sector and is more vulnerable than Uber due to its lack of diversification of income. Uber's horizontal integration strategy, therefore, is a safer bet, especially when neither company is sustaining profits.

iv) Variable and Fixed Costs

Uber and Lyft have substantial fixed costs in building their platform. Since they function more as intermediaries between independent parties, they have to guarantee that drivers are able to meet the demand for rides. One of their most substantial costs has come from maintaining this reliability. In fact, satisfying driver demand is Uber's second-largest expenditure after costs of revenue (CB Insights, 2021). Uber and Lyft are often expanding into new territories. The variable costs can change depending on the needs of the location. Uber and Lyft may offer higher driver commissions, incentives, and possibly different insurance requirements. These expenditures are ultimately aimed at securing a supply of drivers. Both companies have made substantial investments in research and design to create fleets of autonomous vehicles to improve their positions in the mobility and freight sectors in today's world of technology. If rideshare companies will be able to replace drivers, operating costs would drastically decrease.

On the other side of the market, costs are a lot simpler. Customers experience changes in costs based on many factors. The price of their trip depends on the service they requested, the length of the drive, the location, time of day, etc. Lyft and Uber have implemented methods to gain customer loyalty. Lyft uses market-wide promotions, targeted marketing promotions, and referral programs to improve its

customer experience (Lyft, 2021). Uber has been aggressive in pursuing customer loyalty. They created a subscription service where members receive reduced fees and discounts for their mobility and delivery products (Uber, 2022). The network appeal from rideshare companies can significantly lower consumers' spending and save time. Consumers therefore have affordable methods of transportation and food delivery, making them better off. Theoretically, the cost of relying on rideshare could be less than owning a car. Rideshare-dependent customers don't have monthly car payments, associated energy costs, car insurance, and parking fees.

The Nature of Demand

Being that Uber and Lyft both operate network-based platforms with two-sided markets in the mobility industry, their platforms are often indistinguishable from each other. Therefore, users have no real incentive to use one service over the other. It is for this reason that these companies work so hard toward customer loyalty. The tendency for users to switch platforms frequently is referred to as multihoming. "Multihoming is the decision of a user in a network to utilize more than one platform or source to receive the same product or service" (Valderrama, 2020). Multihoming makes rideshare companies more appealing employers for drivers because rideshare drivers can be employed as contractors for multiple companies at the same time and easily change who they work for that day, even hour. Compared to the taxi industry, taxi cab drivers only drive for one company at a time and only have one employer. Therefore, multihoming creates more flexibility and autonomy for rideshare drivers, yet another reason that drivers choose to drive for Uber and Lyft over taxi medallions. This especially comes into play with quick surges in demand, which lead to surge pricing for the consumer and surge pay for drivers. Drivers will drive for the service that will offer the most money and riders will ride with the service that costs the least.

Lack of differentiability is a concern for rideshare companies for two reasons. First, rideshare companies have to compete with each other; they have to be price-competitive. This often leads to thin margins or even net losses on rides. The Wall Street Journal reports that Uber experienced a net profit

margin of -2.84% in 2021 (Wall Street Journal, 2022). Information on profit margin before this is not available to the public, however taking into account that the profit margin now is still negative when income is at an all-time high tells us that it likely has been negative in recent years.

The second impact on demand is a result of changes from the network effect (Valderrama, 2020). If users abandon a platform, others will likely follow. Hypothetically, if drivers can make more money by driving for Lyft, then Uber will have fewer drivers to satisfy their customers. If their customers can't find a suitable ride, then they will abandon Uber in favor of Lyft, and vice versa. The main idea behind the network effect is that the network becomes more valuable the more people use it. Network effects play a strong role in Uber and Lyft's success. As more consumers use the platforms, the companies gain brand awareness and name recognition. This is vital to the success of these companies as they supersede taxi hailing.

Network effects in the ridesharing industry follow historical patterns as we have seen with platforms like eBay, Facebook, and Amazon. As more people use a service, the more utility the service can offer the users. Uber has taken advantage of its network by horizontally integrating its business and offering more services. In fact, delivery accounted for 40% of Uber's business in 2020 (CB Insights, 2021). Uber's network created a premium environment for consumers to purchase services in the form of monthly subscriptions starting at \$9.99. Uber One is just one way network effects can significantly improve consumers' lives. For example, a college student living in Chicago would easily get more value from a subscription to Uber One than the twenty-dollar market price. As these rideshare companies grow, they will have to improve their network in order to stay competitive.

Network effects can also have negative consequences for firms. If a firm loses users, its network becomes less valuable. The momentum of decreasing value can be difficult to stop and have devastating consequences for the firm (Solheim & Tovsen, 2017). One of the most pervasive problems network effects cause for firms is multihoming as discussed above.

Effect on Taxi Cabs

As technology has allowed for innovations in the urban mobility sector, platform companies like Uber and Lyft have caused what is known as disruptive innovation. They broke into an existing market of urban mobility, the market for short rides from point A to B. However, they brought with them a new business model, one that each prospective customer holds in the palm of their hand. This app-based business model made Uber and Lyft more attractive to consumers because it meets the consumers' wants for convenience. Their apps make it easy for the customer to input where they want to go, call a ride, and pay with the click of a button. This streamlines the process for both driver and rider. Uber drivers know where they are going, can deny a trip at a moment's notice, and are paid as contractors. Taxicab companies could create mobile apps to operate much like Uber and Lyft, but this would add exorbitant costs to their business model when companies like Uber and Lyft already have a competitive advantage. Taxicab companies are not necessarily set up to invest thousands of dollars into web and software development, especially when they are already up against competitors that are.

Companies like Uber and Lyft begin with astronomical amounts of startup funds that allow them to essentially subsidize losses in the short run, with the hope of generating positive returns in the long run. This is a risky game, and it requires strategic moves to make their goals a reality. This idea hits on our puzzle. We wonder why rideshare companies can post negative profits year after year, and still receive massive investment funds. Since 2009, Uber has received over \$25 billion in investment funds (Salas, 2022). This number is unattainable even for other tech companies who might want to enter the market to compete with Uber and Lyft.

Although there does not appear to be exact numbers on how many taxi medallions have gone out of business due to the emergence of rideshare apps, taxis began to fall behind rideshare and lose market share in this market for local rides. See Figure A in the Appendix for the number of NYC Taxi trips compared to Uber and Lyft trips from 2010 to 2019. This graph from the For Hire Vehicles (FHV) Base Aggregate Report shows how rideshare platforms quickly overtook NYC Taxi trips, further demonstrating the importance of convenience to consumers.

Taxicab companies have struggled to stay afloat amid the rise of rideshares like Uber and Lyft because of these incoming firms' aggressive pricing and use of a platform business model. New York Times technology reporter Kellen Browning writes in a March 2022 article about the 2016 lawsuit where San Francisco taxi company Flywheel sued Uber for predatory pricing (Browning, 2022). This case has evolved into an apparent compromise between taxi companies and rideshare as Uber is working with Flywheel to potentially integrate Flywheel into the Uber app. This way, Uber users would be able to hail a Flywheel cab in the Uber app. This integration of the two styles of rideshare demonstrates how the market has evolved to meet the needs not only of consumers but of various firms in the industry as well.

The case of Flywheel is an interesting one. After running under the DeSoto Cab Company medallion in San Francisco for nearly 90 years, DeSoto rebranded, becoming FlywheelTaxi (Said, 2015). The launch of Flywheel converted the taxi company to an app-based rideshare business like Uber and Lyft, but retained the same taxi cabs and drivers that DeSoto employed beforehand. They even allow other cab companies in the area to be hailed with the platform. DeSoto owner Hansu Kim sees this venture as a "counterpunch to Uber and Lyft" (Said, 2015). Flywheel gathered investments, about \$200,000 (excluding software development costs), to rebrand all of its cabs. Knowing that Flywheel is the predecessor of DeSoto Cab keeps customers comfortable knowing that they are being chauffeured by professional cab drivers. This innovative business model shows that taxi companies can compete with rideshare apps when they are able to gather the appropriate funds to do so.

It is increasingly difficult for taxi companies to compete with rideshare when Uber and Lyft continue to put millions of dollars into advertising and marketing of their product. Uber and Lyft have name recognition and brand awareness that is not nearly as salient in the market for taxi cabs. Most people walk out to the curb, see a cab with its light on, and hail it, regardless of the medallion on the door. Additionally, Uber and Lyft drivers experience much less "downtime" than traditional taxi cab drivers because the platforms' algorithms are tailored to set up a driver's next ride close to where the previous ride left off (Schwartz, 2018). Taxi drivers, however, must find their next customer rather than being

given their next customer by their company. This is yet another reason why the platform model is more efficient for both riders and drivers.

Revenue

To aid in our analysis of this puzzle, it is important to look at how Uber and Lyft's revenues are being spent. For Uber, research and development spending accounted for 37% and 20% of total revenue spent for 2019 and 2020, respectively. This lower spending on research and development in 2020 has two potential causes. First, Uber could have drastically drawn back its spending during this time as the pandemic put strain on the urban mobility market overall. Another is that Uber was not used to spending 37% of revenue on research and development. The company spent only 14% of revenue on research and development in 2018, showing that perhaps the bump to 37% was deemed too much as it adjusted back to 20% in 2020. See Figure B in the Appendix for the complete 2021 income statement from Uber. As for Lyft, research and development spending accounted for 38% and 42% of total revenue spending for 2019 and 2020, respectively. See Figure C in the Appendix for the complete 2021 income statement from Lyft. Lyft has been ramping up its research and development spending, showing that the company is investing in knowledge capital and innovating to create more and better products for its riders and drivers. From further comparison of the two income statements, it is clear that Uber is putting much more towards sales and marketing of their products than Lyft. This could be because of Uber's diverse set of services, especially with the introduction of new ones in recent years. However, Lyft has much higher administrative expenses. These differences between the two rideshare companies show where their priorities lie. Each share of Lyft's spending remained approximately the same through the pandemic whereas Uber took its proverbial foot off the gas due to the shift in demand. It is important to note that Uber's revenue is over \$17 billion and Lyft's is \$3.2 billion. This shows the different scales at which these companies operate although they do still dominate the rideshare market.

As can be seen on the income statements in Figures B and C, both Uber and Lyft are operating at a loss. As the firms continue to diversify their product offerings, expenditure on research and

development, as well as sales and marketing, is crucial to the success of the platforms. By way of such expenditure, they have introduced numerous new offerings including Lyft Bikes, Uber Eats, car rental, and more. This intense approach to research and development facilitates the growth of these companies and helps to answer our puzzle: Uber and Lyft continue to track investments regardless of posting losses because they deliver on their promises.

Conclusion

Rideshare companies have a viable, long-term strategy to expand their business beyond city limits and reach a global scale. The potential benefits gained from society by a streamlined, worldwide “transportation” network could fundamentally change the way people live in the developed world. Uber has already shown that its network effects create value on both sides of transactions. By creating jobs and reducing transportation costs, they have gained support from younger generations.

Advanced technologies can eliminate costs incurred by drivers. Therefore, automated driving has the potential to reduce mobility, delivery, and freight costs even further. Areas that embrace the idea of “Transportation-as-a-Service” will have lower rates of car ownership and be more reliant on companies like Uber or Lyft for their transportation needs. At the same time, rideshare companies will continue to add products and services that complement their network.

Uber and Lyft pursued growth over profits. They are continuing to grow and slowly closing the gap to turn losses into gains. As they continue to dominate the rideshare market, it is critical that they continue to expand, and pursue investment funding, to maintain their market share in this ever-evolving business.

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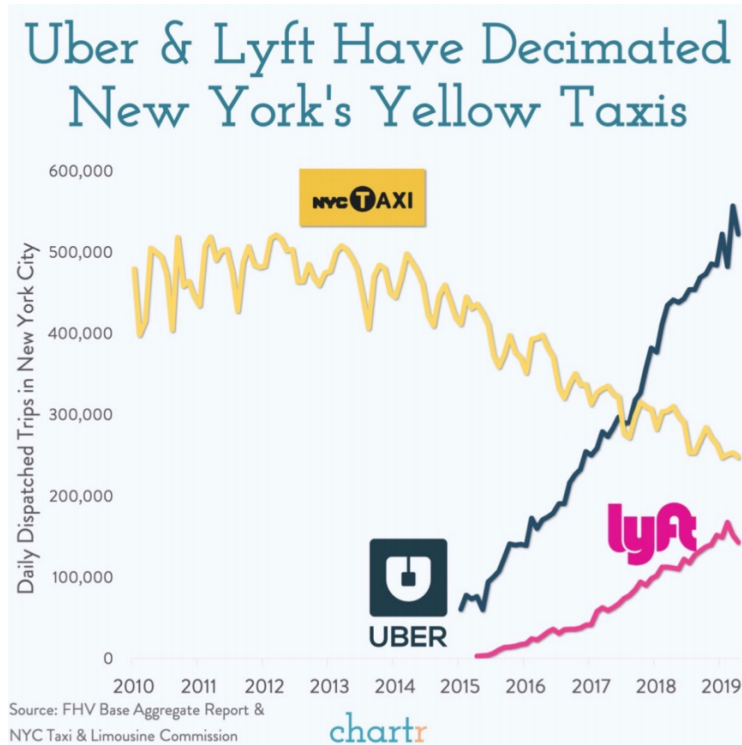
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Appendix

Figure A



This graph from Pesce (2019) shows the number of daily trips taken by NYC Taxi compared to Uber and Lyft. It is clear that since the birth of rideshare from Uber and Lyft, taxi companies have struggled to maintain their share of this sector in the urban mobility market.

Figure B

	Year Ended December 31,		
	2018	2019	2020
Revenue	100 %	100 %	100 %
Costs and expenses			
Cost of revenue, exclusive of depreciation and amortization shown separately below	46 %	47 %	46 %
Operations and support	15 %	18 %	16 %
Sales and marketing	30 %	36 %	32 %
Research and development	14 %	37 %	20 %
General and administrative	20 %	25 %	24 %
Depreciation and amortization	4 %	4 %	5 %
Total costs and expenses	129 %	166 %	144 %
Loss from operations	(29)%	(66)%	(44)%
Interest expense	(6)%	(4)%	(4)%
Other income (expense), net	48 %	6 %	(15)%
Income (loss) before income taxes and loss from equity method investments	13 %	(65)%	(62)%
Provision for (benefit from) income taxes	3 %	— %	(2)%
Loss from equity method investments	— %	— %	— %
Net income (loss) including non-controlling interests	9 %	(65)%	(61)%
Less: net loss attributable to non-controlling interests, net of tax	— %	— %	— %
Net income (loss) attributable to Uber Technologies, Inc.	10 %	(65)%	(61)%

This table shows the 2021 income statement for Uber (Uber, 2021).

Figure C

	Year Ended December 31,		
	2021	2020	2019
	<i>(As Restated)</i>		
Revenue	100.0 %	100.0 %	100.0 %
Costs and expenses			
Cost of revenue	53.1	61.2	60.2
Operations and support	12.5	19.2	17.6
Research and development	28.4	38.4	41.6
Sales and marketing	12.8	17.6	22.5
General and administrative	28.5	40.0	32.8
Total costs and expenses	135.4	176.5	174.7
Loss from operations	(35.4)	(76.5)	(74.7)
Interest expense	(1.6)	(1.4)	—
Other income, net	4.2	1.8	2.8
Loss before income taxes	(32.8)	(76.0)	(71.9)
Provision for (benefit from) income taxes	0.3	(1.9)	0.1
Net loss	<u>(33.1)%</u>	<u>(74.1)%</u>	<u>(72.0)%</u>

This table shows the 2021 income statement for Lyft (Lyft, 2021).