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# Disruptive Entrepreneurship and Dual Purpose Strategies: The Case of Uber

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**Abstract.** Uber provides a two-sided platform that matches travelers with drivers who choose when, where, and how long to drive using their own vehicles. Uber disrupts local markets with an incumbent taxi industry, and the industry fights back in both its market and institutional environments. This paper focuses on Uber's strategy for addressing the challenges from the taxi industry with an emphasis on dual-purpose strategies that provide in a complementary manner benefits both in the marketplace and in the institutional environment. The focus is on three issues important to Uber's success. The first is whether Uber is a platform company or a transportation service that falls under the jurisdiction of local regulators. The second is whether Uber drivers are classified under the law as independent contractors or as employees. The third is passenger safety and the qualifications required for ride-hailing drivers. The corresponding dual-purpose strategies considered are market engagement, work enhancement, and accommodation. Implementing these dual-purpose strategies involves lobbying, stakeholder mobilization, and institutional venue shifting. A model of a local transportation market is presented as a framework for analyzing market competition and for identifying the incentives of market and institutional participants, including Uber, its drivers and passengers, taxi companies and their drivers, and safety advocates, to challenge or support Uber and ride-hailing. The model distinguishes between full-time and part-time drivers, frequent and infrequent travelers, and whether taxi drivers or taxi companies own the taxi medallions.

**Keywords:** dual purpose strategies • Uber • institutional environment

## 1. Introduction

Disruptive technologies face the challenge of gaining and sustaining success in the marketplace. Some disruptive technologies create new markets, whereas others disrupt existing markets with incumbent firms and workers. Incumbents adapt to the new competition or perish, and some fight back less in the marketplace and more in the institutional environment in which they operate. This paper considers the disruption of the taxi industry by ride-hailing with a focus on the market and institutional strategies used by Uber to address the challenges from the taxi industry and other interests including some Uber drivers, labor advocates, safety advocates, and opponents of the independent contractor model of platform organization.

Although the focus is on Uber, the approach to analyzing the competition in the disrupted market and in the institutional environment is applicable to other technologies that disrupt established industries. The markets themselves can differ considerably as can the technologies, but the incentives for incumbents to fight in both the market and the institutional environments can be quite similar. Uber enters local transportation markets with incumbent taxi industries that are subject to regulation; Airbnb enters local housing rental markets with an array of incumbent housing accommodations including hotels that are both regulated and taxed. The incumbents attempt to use the institutional environment to restrict entry, raise entrants' costs, and reduce their competitive advantage.

Uber's business model is to provide a peer-to-peer platform that matches travelers with drivers who are independent contractors and choose whether, when, and how long to drive.[1] Unlike some other platforms network externalities are quickly exploited.[2] Value is created through ride-hailing—the use of otherwise idle personal vehicles of drivers who voluntarily participate. The innovation provided by Uber is the direct matching of travelers and drivers through an app rather than hailing from the street or calling to have a taxi dispatched. In operating as a platform, Uber seeks to avoid the regulatory system that governs taxis and limousines. Uber's basic strategy for entering a market is to enter first and deal with institutional issues as they arise.[3] Uber often enters a market first with UberBLACK as a means of building market recognition and then introduces UberX with lower fares and a larger network of drivers. It is UberX that generates opposition.

Uber's business strategy has four basic phases.[4] One is a strategy for entering and penetrating markets

with the objective of quickly winning the market and emerging as the dominant firm. Uber typically enters markets without obtaining regulatory approval. The second phase is maintaining and strengthening its market position in the face of market challenges by its rivals without sacrificing its core platform and challenges from the institutional environment, such as the possibility of having its drivers classified as employees rather than as independent contractors. Uber's most important resource is the capacity of its network to carry passengers. The third is extending its platform to accommodate complementary activities such as UberEATS and other delivery services. The fourth phase is to transition to autonomous vehicles, which generates a host of challenging issues. The focus here is on the second phase involving maintaining Uber's market position and its business model to position itself to execute the third and fourth phases of its strategy.

Uber enters markets where there is an established taxi industry whose market organization can range from an effective cartel to competitive with easy entry. A cartelized industry with a captured regulator provides the most attractive market opportunities for Uber, but the incumbent industry then has the strongest incentives to oppose ride-hailing. The nature of the opposition depends on the shares of the rents obtained by taxi companies and by their drivers. In Las Vegas, where the taxi industry is concentrated and the taxi companies own the medallions, the incumbent firms have strong incentives to develop relationships with local government and taxi regulators. Two days after UberX was launched in Las Vegas, the taxi industry succeeded in obtaining an injunction that forced UberX to shut down. In Toronto, drivers own the medallions and taxi companies provide dispatching, so drivers as well as the taxi companies have strong incentives to oppose Uber. Their strategy is to influence the city council to treat Uber as a transportation service that should be regulated under the same framework applied to taxis. In Calgary, drivers hold 55% of the taxi plates (medallions) with taxi brokerages holding the rest. The principal opposition is the taxi drivers, and they succeeded in keeping Uber out of Calgary until December 2016, when the city council approved regulatory changes to accommodate ride-hailing.

This paper focuses on three issues that pose serious threats to Uber and its business model. The first is whether Uber is a platform that matches travelers and drivers or is a transportation service that falls under the jurisdiction of existing regulatory frameworks. As a transportation service, drivers can be required to obtain commercial licenses and insurance, pay fees and taxes on their commercial activity, and undergo regular inspections. Also, Uber could be subject to price regulation and controls on where and how it operates. The second issue is the classification of Uber drivers as independent contractors. Unions, labor advocates, and some Uber drivers argue that ride-hailing drivers should be reclassified as employees, which would entitle them to the protection of labor laws and eligibility for overtime pay, vacations, unemployment compensation, and workers compensation. Drivers reclassified as employees would also be easier to unionize. The third issue is passenger safety and security and particularly driver qualifications. Safety advocates and the taxi industry argue that Uber drivers should be fingerprinted as part of their background checks, have commercial licenses, and have their vehicles inspected on a regular basis. Fingerprinting, commercial licenses, and vehicle inspections are typically required of taxi drivers in the United States. Uber relies heavily on part-time drivers, and fingerprinting, commercial licenses and the associated fees, and vehicle inspections would place substantial burdens on many of them; with fewer drivers the capacity of Uber's network would be reduced. Uber (and Lyft) withdrew from the Austin, Texas, market because the city imposed a fingerprinting requirement.

These issues are addressed in institutional settings that vary from market to market. In the United States the issue of whether Uber is a transportation service falls under the jurisdiction of city councils and state legislatures, whereas in countries such as France and Germany national law is governing. The issue of whether Uber drivers should be classified as employees falls under the jurisdiction of courts and departments of labor, and on some specific issues such as eligibility for unemployment compensation under the jurisdiction of federal labor law. Driver qualifications and vehicle inspections are largely a matter for city councils and regulatory agencies, but state legislatures can limit the discretion of city councils.

An issue can be addressed in more than one institutional venue. One strategy used by Uber is institutional venue shifting to take an issue from the jurisdiction of city councils, and particularly city councils with strong connections to the taxi industry, to state jurisdiction, where the influence of taxi interests is diluted. Uber has had a degree of success in obtaining state legislation that limits the ability of city councils and taxi regulators to restrict its operations. Uber was successful in obtaining state legislation in Nevada that allowed it to reenter the Las Vegas market. Uber was unsuccessful, however, in obtaining provincial legislation in Alberta.

The disruption of local transportation markets by ride-hailing also disrupts the institutions governing those markets and can result in changes in the rules of the game. Existing regulations and laws can prove to be inadequate, leading to substantial changes in the regulatory framework, as in the case of Toronto which has attempted to create a more level playing field for

ride-hailing and taxis. The changes include revised regulations by city councils, new state laws restricting the authority of local governments to regulate ride-hailing, a new interpretation of the standard for classification of workers as independent contractors, and new interpretations of existing laws and regulations by the courts. The perspective taken here is that the institutions, laws, and regulations are endogenous and shaped by the influence of interests including ride-hailing companies and their drivers and passengers, taxi companies and their drivers, and other interests in addition to the institutional officeholders who choose the rules of the game.

In addressing issues, Uber uses both single-purpose and dual-purpose strategies. A single-purpose strategy is intended to benefit Uber in either its market environment or its institutional environment. For example, defending against a lawsuit claiming that Uber drivers are misclassified as independent contractors is a single-purpose strategy. A dual-purpose strategy provides benefits in both the market and institutional environments. For example, a work enhancement strategy can both attract additional drivers, thereby increasing the capacity of Uber's network, and can reduce the incentives of drivers to participate in a lawsuit on the driver classification issue. Dual-purpose strategies are not necessarily better than single-purpose strategies but instead provide benefits in both the marketplace and the institutional environment, and both sets of benefits should be taken into account in choosing strategies.

Three dual-purpose strategies, corresponding to the three issues, are considered—market engagement, work enhancement, and accommodation. A market engagement strategy can focus on the demand or supply side of Uber's platform. On the demand side, Uber engages local communities through special promotions and partnering with local organizations, which both build market demand for ride-hailing and broaden the potential for mobilizing public support for ride-hailing in opposition to restrictions under consideration by a city council. On the supply side, Uber works to build a deeper pool of potential drivers, which increases the capacity of its network and broadens its base for mobilizing drivers in opposition to restrictions on ride-hailing. A work enhancement strategy also increases capacity and can reduce the likelihood that a trial lawyer can find drivers to build a class action lawsuit on driver classification. Accommodation involves bargaining and compromise, and Uber's bargaining strength is due to the benefits its platform provides to passengers, drivers, and communities, and to its credible threat to withdraw from the market. It may accept restrictions on some aspects of its operations to avoid restrictions on other aspects. For example, to avoid required fingerprinting, Uber strengthens its background checks on drivers. The market engagement and accommodation strategies are typically specific to a local market, whereas the driver classification issue could affect all markets in which Uber operates.

Dual-purpose strategies require implementation in the institutional environment, and the principal implementation strategies used by Uber are stakeholder mobilization, lobbying, and venue shifting. Because of variation in the organization of the local transportation markets and in the institutions with jurisdiction over the markets, Uber typically addresses issues on a market-by-market basis. This requires Uber to supplement its base capability with local professionals, including local lobbyists, and to partner with local groups such as MADD to build both market strength and public support for ride-hailing.

This paper presents a model of Uber's market competition with taxis, and uses the model to structure the analysis of dual-purpose and implementation strategies in the context of the three issues. To illustrate strategy choice and competition, the paper draws upon detailed studies conducted by Holburn and Raiha (2016) of the Calgary, Las Vegas, and Toronto markets. Specifics about those three markets and the competition therein are to be understood as drawn from their studies and will not be individually cited.

The role of the model is several-fold. One is to understand the interaction among strategy choices. This requires a model that represents the market environment and the competition with the taxi industry and identifies incentives for market participants to act in the institutional environment. A second is to provide a framework for evaluating strategies that integrate market and institutional actions, as in the case of dual purpose strategies. A third is to conduct counterfactual analysis, such as allowing tipping and operating with drivers classified as employees.

The approach taken combines quantitative and qualitative frameworks. The quantitative framework involves a formal model of a local transportation market. A micro-model of the market is used to identify the incentives to participate in stakeholder mobilization campaigns and lobbying. Individual drivers and travelers are modeled, which allows distinctions between part- and full-time drivers, frequent and infrequent travelers, and taxi drivers who own and do not own medallions.

Incorporating institutional strategy choice in a formal model is challenging because outcomes are typically determined in the context of institutions that can differ considerably across issues and jurisdictions. For Uber the relevant institutions include legislatures, ranging from city councils to state legislatures to national legislatures, regulatory agencies with varying degrees of authority and potential for capture, courts

at the state and national levels, and executives ranging from mayors to governors to presidents and prime ministers. Instead of attempting to include this array of institutions in a formal model, qualitative analysis is used. The qualitative analysis uses the "nonmarket" frameworks in Baron (2013) to analyze these issues and evaluate strategies, and it uses the model as a framework for tracing the effects of strategy alternatives on incentives for nonmarket action to affect institutional choices. This includes both Uber's market competition with the taxi industry and that industry's nonmarket strategy to restrict Uber's operations and increase its costs.

The next section considers Uber's integrated strategy, and Section 3 introduces the basic model of competition between Uber and taxis. Section 4 expands on the three issues challenging Uber, and Section 5 introduces dual-purpose strategies and uses them in analyzing the three issues. Section 6 offers conclusions, including speculation on the effects on Uber's business model if the outcomes of the three issues are unfavorable for Uber.

## 2. Integrated Strategy and Uber

An integrated strategy as introduced in Baron (1995) is composed of a market strategy for engaging customers, suppliers, and competitors and a nonmarket strategy for engaging governments and individual and collective action. Uber's market strategy for winning a market and sustaining its position is to move first and quickly in entering a local transportation market, and its success is determined by its ability to match travelers with drivers. Uber's business model is built on flexibility and responsiveness. Flexibility is possible because as a platform Uber is unregulated and drivers are independent contractors who choose their driving. Uber taps a large pent-up demand for local transportation and matches demand with capacity provided by drivers seeking to supplement their income. Demand for local travel varies considerably by location and within and across days of the week, and Uber uses surge pricing to elicit additional capacity to respond to periods of high demand. The key to market success is relatively short wait times for travelers and relatively short idle periods for drivers before their next passenger. Surge pricing reduces traveler wait times, and the high demand assures drivers of relatively short idle times.

Uber enters a market maintaining that it does not require regulatory permission because it provides a platform that matches travelers with drivers and hence is not subject to regulation as a transportation service. Once Uber has entered a local transportation market, it frequently faces challenges from local regulators, city councils, and state legislatures and from taxi companies, their drivers, and unions. Uber's nonmarket strategy is to anticipate and respond to the challenges, including withdrawing from a market if harmful regulation is imposed.[5] Uber uses standard nonmarket implementation strategies such as lobbying and grassroots campaigns, but it also uses dual-purpose strategies that are intended to address or forestall a particular nonmarket challenge and to benefit its business model, for example, by attracting additional drivers or inducing current drivers to drive additional hours. Three dual-purpose strategies are considered: market engagement, work enhancement, and accommodation.

As a framework for considering dual-purpose strategies, Uber is viewed as a firm that generates three surpluses. The first is profit that accrues to its owners. The second is driver surplus, which is equal to the difference between the utility from driving for Uber and the reservation value of a driver. The third is passenger surplus, which is the difference between the utility from riding with Uber and the utility from other transportation choices such as taxis. The owners surplus provides incentives to enter and exit markets and to choose among single-purpose and dual-purpose strategies. Drivers surplus provides incentives to participate in nonmarket strategies, such as stakeholder mobilization, intended to forestall or reverse regulation. Passengers surplus provides incentives to participate in nonmarket and dual-purpose strategies that could restrict the availability or cost of ride-hailing. The model presented in Section 3 focuses on pricing and the owners surplus, and the drivers and passengers surpluses are identified and used qualitatively in Section 5 to analyze dual-purpose strategies in the context of the three issues.

Nonmarket issues, such as those considered here, are resolved in the context of institutions, and the nature of those institutions differs substantially. The issue of whether ride-hailing is a matching platform or a transportation service is decided in voting institutions, including city councils, regulatory commissions, and state legislatures. The issue of whether ride-hailing drivers are independent contractors or employees is decided in judicial and regulatory institutions, including courts, regulatory agencies, and state and federal departments of labor. The issue of driver qualifications is addressed in voting bodies, regulatory and administrative agencies, and courts. Incorporating all these institutions into a model along with market strategies would result in a very complex model. Moreover, because a nonmarket issue is institution specific, much of that complexity is irrelevant to a particular issue and can obscure rather than clarify the analysis of effective strategies. In contrast to the variation in institutions, local transportation markets are relatively similar, which allows the same matching technology and pricing system to be used in each market.

Thus, the approach taken in this paper is to present a model of a representative local transportation market without incorporating the array of institutions and then for each of the three nonmarket issues to introduce the particular institutions relevant for that issue. A model of a voting institution is introduced where the matching platform versus transportation service is analyzed, and a model incorporating courts is introduced where the independent contractor versus employee issue is analyzed.

The focus of the analysis is on the use of dual-purpose strategies for addressing each issue. For each issue an institutional analysis is presented, and the market model is used to identify the incentives of actors, primarily ride-hailing drivers and passengers, to take nonmarket action in accord with the dual-purpose strategy. A dual-purpose strategy is based on these incentives and its effects can be traced through the parameters of the model.

## 3. The Model

The model represents a market Uber has entered with UberX and focuses on Uber's market strategy and the incentives for nonmarket action. The principal parties whose rents are affected by Uber's operations are the company and its owners, its driver-partners, passengers, and competitors, including both taxi companies and their drivers. As the model illustrates, Uber drivers collectively have nonmarket power because they can be mobilized even though they independently choose whether to drive, and Uber can represent their interests in its lobbying. Others have interests in Uber, even though they are not directly affected. Labor advocates argue that Uber drivers have no bargaining power and should be classified as employees, who then can be more easily unionized. Similarly, safety advocates seek more stringent qualifications for drivers, including fingerprinting, drug testing, and vehicle inspections.

Uber's most important market resource is the capacity of its network to carry passengers. Capacity depends on voluntary participation by those who choose to drive with it, and capacity is directly increasing in driver compensation. Uber uses dynamic pricing, which differs from dynamic pricing in most applications because its capacity quickly responds to the higher price during surge periods.[6] Compensation has two components: the price paid by passengers and the share the driver receives.

The model provides micro-foundations for strategy analysis by modeling individual drivers and travelers. This allows distinguishing between mobilization strategies that focus on full-time drivers from strategies that focus on part-time drivers and between frequent and infrequent travelers and their incentives on the intensive and extensive margins. The model represents Uber's operation in a representative market, recognizing that markets can differ in their structure and demand and supply characteristics.[7]

Uber competes with the incumbent taxi industry and with other ride-hailing firms, such as Lyft, on a market-by-market basis. Taxis are regulated on fares, driver qualifications, and employment conditions, and in many jurisdictions drivers are represented by a union. A union competes with the taxi firms to capture rents. Fares are typically fixed and do not respond to high demand, and taxis are generally required to pick up passengers only in their own regulatory jurisdiction but are not required to serve all neighborhoods in their jurisdiction. In contrast, Uber's policy is to serve all neighborhoods within a local transportation market, which means that Uber serves low-income neighborhoods that may be underserved by taxis.

Ride-hailing companies including Uber and Lyft are privately held, and little is known about how they set prices, their size, market penetration, compensation for drivers, and the number of travelers served, so there is little to guide the modeling of their competition. Competition could be represented by a duopoly model, but in many markets Uber is believed to be considerably larger than Lyft and to have exploited a first-mover advantage. This suggests a leader-follower model of competition. Uber and Lyft have some policy differences; for example, Uber discourages and Lyft encourages tipping, so there is a dimension of competition through product differentiation. It is also possible that the ride-hailing companies implicitly collude in pricing. Regardless of how they compete with each other, both compete with taxis in the local transportation market.

In the institutional environment, the interests of Uber and Lyft are closely aligned and are opposed by the taxi industry. The more intense is the competition among ride-hailing firms, the lower are their profits and the greater their penetration into the local transportation market; hence, the larger is the number of their stakeholders, drivers, and passengers and the stronger is the ride-hailing industry in the institutional environment, and the larger is the set of stakeholders that could be mobilized to support ride-hailing in the institutional environment. The model and subsequent analysis focus on the market and nonmarket competition between ride-hailing and taxis. Because Uber and Lyft operate in similar manners, the model includes a single ride-hailing company, referred to as Uber, and a taxi industry.

The ride-hailing market has a number of particular characteristics. First, the participants on both sides of the platform are small and numerous. Second, on each side of the platform, participants do not compete with each other. Third, the gain from participating in the

market does not importantly depend on the number of participants on the other side of the market because surge pricing tends to equalize driver utilization and traveler wait times. Fourth, switching or multi-homing costs are low, so drivers can drive for both Uber and Lyft and travelers can use both. Fifth, given the regulated taxi price, Uber is a price setter that sets a normal period price, and at times of high demand sets surge prices. Thus, Uber prices on both sides of the platform. On the demand side Uber sets the price paid by travelers, and on the supply side Uber sets the share for drivers.

### 3.1. The Supply Side of the Platform: Capacity

Uber's capacity to carry passengers is determined by how many of the pool of eligible drivers choose to drive for it, the number of hours they drive, and when they drive. Passengers directly pay the trip price $p_U$, and drivers receive the price less Uber's commission. Let $s$ denote the share of the price received by drivers, so drivers receive $sp_U$. Uber basically uses the same drivers' share in all markets, so the share is taken as exogenous to an individual market.[8]

Cramer and Krueger (2016) analyze data on Uber drivers in five cities with a focus on the utilization rate of capacity. Their analysis "suggests that the exit and entry of UberX drivers during the course of the day equilibrates the market so that drivers achieve essentially the same utilization rate regardless of how long they work . . . ." Let $\tau$ denote utilization, the probability that a driver has a passenger, and assume that drivers can provide one trip per hour. Thus, the expected compensation of a driver is $\tau sp_U h$, where $h$ denotes the hours driven. Based on their experience, drivers are assumed to have rational expectations about utilization.

Who drives for Uber depends on their opportunity cost. Hall and Krueger (2016) report that about one-third of Uber drivers work full-time, whereas others drive part-time to supplement their income from other jobs or sources.[9] Drivers must provide their own health insurance, retirement savings, and other benefits, and to the extent that a potential driver has such benefits from other employment, their opportunity cost could be higher than that of those without such benefits. Thus, those who choose to drive to supplement their income from other employment can have high (hourly) opportunity costs $w$, whereas those for whom Uber is their sole income source can have low $w$.[10] Thus, part-time and full-time drivers can have different incentives for mobilization. The opportunity cost of a driver is $wh$, where $w$ is assumed to be distributed uniformly on $[0, \bar{w}]$.[11] The bound $\bar{w}$ on the support of the opportunity cost could be a function of the tightness of the labor market, which can affect Uber's capacity and its pricing.

Drivers incur the cost of a trip, and that cost is assumed to be $\frac{1}{2}\theta h^2$, where $\theta$ is a parameter of marginal cost. The utility gain from driving for Uber is

$$U = (\tau(sp_U - \tfrac{1}{2}\theta h) - w)h,$$

so a driver with opportunity cost $w$ drives at the intensive margin $h(w)$ hours given by $h(w) = (\tau sp_U - w)/(\tau\theta)$. The utility gain of an Uber driver then is

$$U(w) = \frac{(\tau sp_U - w)^2}{2\tau\theta},$$

and those with $w \le \tau sp_U$ drive with Uber. Drivers with low opportunity costs, who will be referred to as full-time, drive more hours than drivers with high opportunity costs, who will be referred to as part-time. Using data from six cities, Hall and Krueger (2016, table 2) report that 55% of UberX drivers drive between 1 and 15 hours a week on average, 30% drive between 16 and 34 hours a week, and 15% drive at least 35 hour or more. Each of these groups accounts for approximately one-third of the hours driven for Uber.

The pool of potential drivers is assumed to be large, and those who choose to drive for Uber are assumed to be representative of the pool. Letting $D$ denote the size of the pool, Uber's capacity $C(p_U)$ is

$$C(p_U) = D\int_0^{\tau sp_U} h(w)\frac{dw}{\bar{w}} = \frac{\tau D s^2 p_U^2}{2\theta\bar{w}}. \tag{1}$$

Capacity is a strictly increasing, strictly convex function of compensation $sp_U$, and the drivers' share and the price are perfect substitutes in the supply of capacity. Capacity is decreasing in $\theta$ and in the upper bound $\bar{w}$ of the opportunity cost of drivers.

The compensation ($sp_U$) elasticity $\eta_C$ of capacity is $\eta_C = 2$.[12] This elasticity is composed of two effects. The first is the effect of compensation on the intensive margin, and the second is the effect on the extensive margin. The compensation elasticity $\eta_C^h$ of hours driven for a driver with opportunity cost $w$ is $\eta_C^h = \tau sp_U/(\tau sp_U - w)$, which is strictly increasing in $w$, so part-time driving is more elastic than full-time driving. The compensation elasticity $\eta_C^d$ of the number of drivers is $\eta_C^d = 1$. Using Uber data for surge periods in five cities, Chen and Sheldon (2015) estimate the average compensation elasticity of hours driven by individual drivers. Using two-stage least squares with the first stage based on the average hourly income of all drivers in a city, they obtain an estimate of 0.5. Sheldon (2016) conducts a similar study using data from Chicago and obtains an estimate that is approximately half that obtained by Chen and Sheldon.[13] Surge pricing, however, affects the extensive margin in addition to the intensive margin by attracting additional drivers, both those who otherwise would not drive and those who are attracted from non-surge areas.[14] The overall elasticity $\eta_C$ in a surge period

could be considerably higher than estimates based on the intensive margin. Chen et al. (2017) find an average labor supply elasticity of 1.72.

The extent of Uber's success is limited by the capacity it can generate, and in some markets additional steps are taken.[15] For example, in some markets Uber advertises to expand the pool of drivers. Uber also has some ability to enhance a driver's work experience to expand capacity. Dual purpose work enhancement strategies are considered in Section 5.2.2.

### 3.2. The Demand Side of the Platform: Passengers

Demand for Uber rides depends on the number of people who wish to travel at a given time and the share who choose to ride with Uber. Demand varies considerably over time and geographically, and Uber uses surge pricing to increase capacity during surge periods. To represent the variation in demand, let the number of people considering traveling be $n+\tilde{\epsilon}$, where $\tilde{\epsilon}$ is a random variable with support $[\underline{\epsilon},\bar{\epsilon}]$, $n+\underline{\epsilon}>0$, and $\epsilon$ denotes a realization of $\tilde{\epsilon}$. The timing in the model is that Uber first chooses its normal period and surge period prices, potential drivers decide whether to drive with Uber, the number of travelers $n+\epsilon$ is realized, and travelers choose whether to ride with Uber.

Which of the $n+\epsilon$ travelers choose Uber in a normal period depends on the price $p_U$, their value $\beta$ of a trip, and the option value $\beta^o$ of alternatives such as walking, taking a bus, or not traveling.[16] The option value is assumed to be the same for all travelers, whereas $\beta$ is specific to an individual traveler.

Uber uses a price $p_U$ in normal periods and in a surge period uses a price $p_U(\epsilon)$ that depends on realized demand and Uber's capacity. A normal period is one in which capacity is sufficient to accommodate all passengers at the normal period price $p_U$, and a surge period is one in which capacity at $p_U$ is less than demand. During a normal period the probability $\tau(\epsilon)$ that a driver has a passenger is

$$\tau(\epsilon)=\frac{N(\epsilon;p_U)2\theta\bar{w}}{\tau Ds^2p_U^2},$$

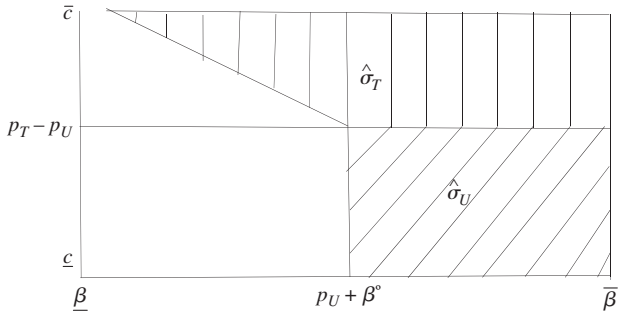
where $N(\epsilon;p_U)$ is the number of passengers Uber carries. Rational expectations require

$$\tau=\int_{\underline{\epsilon}}^{\epsilon_U}\tau(\epsilon)\frac{d\epsilon}{\bar{\epsilon}-\underline{\epsilon}},$$

where $\epsilon_U$ denotes the upper bound on the demand in a normal period.

The demand for taxis is assumed to depend not only on the number of travelers but also on the convenience of a taxi relative to other alternatives. Relative to a traveler's option value, taxis have a convenience advantage in street hailing and at taxi stands but likely a convenience disadvantage in dispatching. Assume that a taxi provides a net benefit $\beta-\beta^o-p_T+c$, where $p_T$ is the taxi fare and $c$ is a convenience advantage ($c>0$) or disadvantage ($c<0$) of a taxi relative to a traveler's option. To simplify the expressions, assume that $c$ is distributed uniformly on $[\underline{c},\bar{c}]$.

**Figure 1.** Market Shares—Taxis and Uber




Consider a traveler who can choose either Uber, a taxi, or his option value $\beta^o$ with a trip on neither. Choosing Uber provides a net benefit $\beta-\beta^o-p_U$ in a normal period, and choosing a taxi provides a benefit $\beta-\beta^o-p_T+c$.[17] The traveler chooses Uber over taxis if $c\geq p_T-p_U$. In most markets $p_U<p_T$, so a taxi must have a convenience advantage ($c>0$) to attract passengers, as in the case of taxis waiting at a taxi stand. An equilibrium with both taxis and Uber operating requires that $\bar{c}>p_T-p_U$. Figure 1 shows the market shares $\hat{\sigma}_U$ and $\hat{\sigma}_T$ of Uber and taxis, respectively.

Uber's market share $\hat{\sigma}_U(p_U)$ in a normal period is

$$\begin{aligned}\hat{\sigma}_U(p_U)&=\int_{p_U+\beta^o}^{\bar{\beta}}\int_{\underline{c}}^{p_T-p_U}\frac{dc}{\bar{c}-\underline{c}}\frac{d\beta}{\bar{\beta}-\underline{\beta}}\\&=\frac{p_T-p_U-\underline{c}}{\bar{c}-\underline{c}}\frac{\bar{\beta}-\beta^o-p_U}{\bar{\beta}-\underline{\beta}}.\end{aligned}\tag{2}$$

The term $(\bar{\beta}-\beta^o-p_U)/(\bar{\beta}-\underline{\beta})$ in (2) is the probability that a traveler values a trip sufficiently to choose Uber, and the term $(p_T-p_U-\underline{c})/(\bar{c}-\underline{c})$ is the probability that the traveler chooses Uber over a taxi; that is, that a taxi does not have a sufficient convenience advantage over Uber. For Uber to have passengers, it is necessary that $p_T-p_U-\underline{c}>0$.

The market share $\hat{\sigma}_T$ for taxis in a normal period is from Figure 1

$$\begin{aligned}\hat{\sigma}_T&=\int_{p_T-p_U}^{\bar{c}}\int_{p_T+\beta^o-c}^{\bar{\beta}}\frac{d\beta}{\bar{\beta}-\underline{\beta}}\frac{dc}{\bar{c}-\underline{c}}\\&=\frac{(\bar{c}-p_T+p_U)(\bar{\beta}-\beta^o+\frac{1}{2}(\bar{c}-p_T-p_U))}{(\bar{\beta}-\underline{\beta})(\bar{c}-\underline{c})}.\end{aligned}\tag{3}$$

The share $\hat{\sigma}_T$ of travelers choosing taxis is strictly decreasing in $p_T$ and $\beta^o$, strictly increasing in $p_U$, $\underline{c}$, and $\underline{\beta}$. The share $\hat{\sigma}_U(p_U)$ is strictly decreasing in $\beta^o$, $\underline{c}$, and $\bar{\beta}$ and strictly increasing in $p_T$, $\bar{c}$, and $\underline{\beta}$.

### 3.3. Ride-Hailing and Regulated Taxis

Competition between regulated taxis and ride-hailing firms depends on the structure of the taxi industry, which can vary from a cartel to a competitive industry with open entry. Since a cartel has the strongest incentive to engage in nonmarket action in opposition to Uber, consider a cartel of $m$ identical taxi firms. Taxi prices are regulated, and if the regulator is captured, the price would be the cartel price. Taxi prices do not vary with demand, and unlike Uber a taxi company chooses its capacity by employing a specific number of drivers or holding a specific number of medallions.[18] Let $q_T$ denote the capacity of each of $m$ taxi companies when the regulated price is $p_T$.

To simplify the model, assume that when the number $n+\epsilon$ of travelers is high, taxi capacity and Uber capacity at $p_U$ are exhausted at $\epsilon \equiv \hat{\epsilon}_U$ defined by

$$\frac{\tau D s^2 p_U}{2\theta\bar{w}} + mq_T = (n+\hat{\epsilon}_U)(\hat{\sigma}_T + \hat{\sigma}_U(p_U)).$$

Uber's expected profit $E\hat{\pi}_U$ then is

$$\begin{aligned} E\hat{\pi}_U = &\int_{\underline{\epsilon}}^{\hat{\epsilon}_U} (n+\epsilon)(1-s)p_U\hat{\sigma}_U(p_U)\frac{d\epsilon}{\bar{\epsilon}-\underline{\epsilon}} \\ &+ \int_{\hat{\epsilon}_U}^{\bar{\epsilon}} (n+\epsilon-m\hat{q}_T)(1-s)\hat{p}_U(\epsilon)\hat{\sigma}_U(\hat{p}_U(\epsilon))\frac{d\epsilon}{\bar{\epsilon}-\underline{\epsilon}} \\ &- F, \end{aligned} \tag{4}$$

where $\hat{\epsilon}_U$ is the demand level at which a surge period begins, $F$ is fixed costs, and Uber's market share when it surge prices is $\hat{\sigma}_U(\hat{p}_U(\epsilon)) = (\bar{\beta}-\beta^o-\hat{p}_U(\epsilon))/(\bar{\beta}-\underline{\beta})$.

The surge price $\hat{p}_U(\epsilon)$ is given by[19]

$$\frac{\tau D s^2 \hat{p}_U(\epsilon)^2}{2\theta\bar{w}} - (n+\epsilon-m\hat{q}_T)\frac{\bar{\beta}-\beta^o-\hat{p}_U(\epsilon)}{\bar{\beta}-\underline{\beta}} \equiv 0, \tag{5}$$

where $\bar{\beta}-\beta^o-\hat{p}_U(\epsilon)$ is assumed to be positive for all $\epsilon$. The properties of the surge price $\hat{p}_U(\epsilon)$ are given in the following proposition.

**Proposition 1.** *The surge price $\hat{p}_U(\epsilon)$ is strictly increasing in $\epsilon$, $n$, $\bar{w}$, $\bar{\beta}$, $\underline{\beta}$, and $\theta$ and strictly decreasing in $s$, $\tau$, $D$, and the option value $\beta^o$.*

The first-order condition for the normal period price $\hat{p}_U$ is

$$\begin{aligned} \frac{dE\hat{\pi}_U}{dp_U} = &\int_{\underline{\epsilon}}^{\hat{\epsilon}_U} (n+\epsilon)\frac{d\epsilon}{\bar{\epsilon}-\underline{\epsilon}}(1-s) \\ &\cdot\left(\hat{\sigma}_U(\hat{p}_U) + \hat{p}_U\frac{-(\bar{\beta}-\beta^o-\hat{p}_U)-(p_T-\hat{p}_U-\underline{c})}{(\bar{c}-\underline{c})(\bar{\beta}-\underline{\beta})}\right) \\ &= 0. \end{aligned} \tag{6}$$

Evaluating (6) yields

$$\begin{aligned} (p_T-\hat{p}_U-\underline{c})(\bar{\beta}-\beta^o-\hat{p}_U) - \hat{p}_U(\bar{\beta}-\beta^o-\hat{p}_U) \\ - \hat{p}_U(p_T-\hat{p}_U-\underline{c}) = 0. \end{aligned} \tag{7}$$

The second derivative of $E\hat{\pi}_U$ is proportional to

$$\frac{d^2E\hat{\pi}_U}{dp_U^2} \propto \hat{p}_U - \tfrac{1}{3}(p_T-\underline{c}+\bar{\beta}-\beta^o), \tag{8}$$

which is assumed to be negative and is verified below. Rearranging (7) yields

$$\hat{p}_U = \frac{\bar{\beta}-\beta^o}{2} - \frac{\hat{p}_U(\bar{\beta}-\beta^o-\hat{p}_U)}{2(p_T-\hat{p}_U-\underline{c})}.$$

Uber's normal period price is lower with competition from taxis than in the absence of taxi competition.

Solving (7) for the normal period price $\hat{p}_U$ yields

$$\begin{aligned} \hat{p}_U = \tfrac{1}{3}(p_T-\underline{c}+\bar{\beta}-\beta^o) - \tfrac{1}{3}\big[(p_T-\underline{c})^2 - (p_T-\underline{c})(\bar{\beta}-\beta^o) \\ + (\bar{\beta}-\beta^o)^2\big]^{1/2}, \end{aligned} \tag{9}$$

where the negative root is required when the second derivative in (8) is negative. The normal period price is independent of $s$, $D$, $\hat{\tau}$, $\theta$, $\bar{w}$, $\underline{\beta}$, and $n+\epsilon$. The price $\hat{p}_U$ in (9) implies $\hat{p}_U < \frac{1}{2}(p_T-\underline{c})$, so Uber under prices taxis in normal periods.

The normal period price $\hat{p}_U$ in (9) is a function of the taxi fare, and differentiating with respect to $p_T-\underline{c}$ yields

$$\begin{aligned} \frac{d\hat{p}_U}{d(p_T-\underline{c})} = &\tfrac{1}{3}\big[(p_T-\underline{c})^2 - (p_T-\underline{c})(\bar{\beta}-\beta^o) + (\bar{\beta}-\beta^o)^2\big]^{-1/2} \\ &\cdot\big[-\hat{p}_U + \tfrac{1}{2}(\bar{\beta}-\beta^o)\big], \end{aligned}$$

which from (7) is positive. Consequently, the normal period price is increasing in the taxi fare and decreasing in $\underline{c}$, where a higher $\underline{c}$ represents less of a convenience disadvantage of taxis. With $p_T$ fixed by regulation, the normal period price $\hat{p}_U$ is strictly increasing in $\bar{\beta}-\beta^o$, so higher travelers' valuations result in a higher price and a higher option value $\beta^o$ results in a lower price.[20]

These properties of the normal period price are recorded in the following proposition.

**Proposition 2.** *The normal period price $\hat{p}_U$ is independent of $s$, $D$, $\hat{\tau}$, $\theta$, $\bar{w}$, $\underline{\beta}$ and is lower than in the absence of competition from taxis, increasing in $p_T$ and $\bar{\beta}$, and decreasing in $\underline{c}$ and $\beta^o$. The normal period price is lower than that charged by taxis.*

The effects of the parameters affecting capacity on Uber's expected profit are given in the following proposition.

**Proposition 3.** *For a fixed regulated taxi price $p_T$, the expected profit $E\hat{\pi}_U$ evaluated at $\hat{p}_U$ is strictly increasing in $\tau$ and $D$ and strictly decreasing in $\theta$ and $\bar{w}$.*[21]

Thus, the expected profit inherits the comparative statics properties of capacity; that is, an increase in utilization or pool size increases capacity and expected

profit, and an increase in the marginal cost parameter or the bound on the opportunity cost of drivers decreases capacity and expected profit.

The expected profit $E\hat{\pi}_T$ of the taxi industry is

$$E\hat{\pi}_T = \int_{\underline{\epsilon}}^{\hat{\epsilon}_U} (n+\epsilon)\hat{\sigma}_T(p_T-\kappa)\frac{d\epsilon}{\bar{\epsilon}-\underline{\epsilon}} + \int_{\hat{\epsilon}_T}^{\bar{\epsilon}} mq(p_T-\kappa)\frac{d\epsilon}{\bar{\epsilon}-\underline{\epsilon}} - kmq^2, \quad (10)$$

where $\kappa$ is marginal operating cost of a trip and $k$ is the marginal capacity cost.

The price $p_T$ is regulated and can range from that of a cartel to a competitive price. Given the price, the capacity of a taxi firm is determined by maximizing $E\hat{\pi}_T$ in (10). If the taxi industry is competitive, the taxi price $\hat{p}_T^o$ is given by $E\hat{\pi}_T = 0$. If there is a cartel, the taxi price $p_T$ maximizes $E\hat{\pi}_T$ in an equilibrium with Uber's choice of $p_U$.

Both Uber's normal period price and the taxi fare are independent of the drivers' share $s$. Thus, competition in a normal period focuses on attracting passengers, and prices and not the drivers' share matter for travelers. In a surge period, however, Uber must attract additional drivers, and that requires increasing driver compensation $s\hat{p}_U(\epsilon)$. Compensation could be increased by increasing the drivers' share; that is, $(ds\hat{p}_U(\epsilon))/ds = \hat{p}_U(\epsilon) + s(d\hat{p}_U(\epsilon)/ds)$ is positive if the surge price is inelastic in $s$. But, increasing $s$ reduces Uber's revenue $(1-s)\hat{p}_U(\epsilon)$ by reducing both Uber's share $1-s$ and the surge price. That is, $(d(1-s)\hat{p}_U(\epsilon))/ds = -\hat{p}_U(\epsilon) + (1-s)(d\hat{p}_U(\epsilon)/ds) < 0$. In addition, revenue in normal periods is reduced. In contrast, increasing the surge price can increase compensation even with a lower drivers' share. Consequently, Uber uses price in responding to a surge in travelers.

### 3.4. Stakeholder Surpluses and Incentives for Nonmarket Action

The three outputs from Uber's operations are the expected profit $E\hat{\pi}_U$, the surplus of Uber's passengers, and surplus of Uber drivers. All three are jeopardized by an issue that causes Uber to withdraw from a market as in Austin or Las Vegas. Other issues threaten to reduce profits and surpluses with Uber remaining in the market. This section considers the incentives of stakeholders to take nonmarket action.

Travelers benefit from Uber's presence, and their surplus is increasing in their valuation $\beta$ of a trip and the convenience advantage or disadvantage of taxi service. If the issue is whether to ban ride-hailing or impose sufficiently onerous regulations that Uber withdraws from the market, the surplus lost is relative to a market with only taxis. Traveler surplus also depends on whether the taxi market is competitive or cartelized. The less competitive is the taxi industry, the greater is the loss of surplus if Uber is forced out of the market, so a mobilization strategy against a ban on Uber is likely to elicit greater participation if the industry is cartelized than competitive. The more the taxi industry is cartelized and the regulator captured the higher are taxi fares, and from Propositions 1 and 2 Uber's prices are also higher. Thus, passengers have a relatively stronger incentive to support Uber. Las Vegas taxi fares are high, and although there are 16 taxi companies, the industry is dominated by 3 companies that control 10 of the taxi companies. Uber was able to obtain 54,486 signatures on a petition in advance of voting on bills in the Nevada state legislature that allowed Uber to operate in Las Vegas.

The loss of surplus for passengers is relative to their option value $\beta^o$ and to the alternative of switching to taxi service. If passengers would exercise their option $(\beta - \beta^o - p_T + c < 0)$, their loss $L_O(\beta)$ is

$$L_O(\beta) = \beta - \beta^o - \hat{p}_U.$$

If passengers would switch to taxis, the loss depends on whether taxi service would expand if Uber were excluded from the market. The assumption here is that it would expand at the regulated price $p_T$ to accommodate additional passengers during at least normal periods. Passengers who, in a normal period, would switch to taxi service $(\beta - \beta^o - p_T + c \geq 0)$, then incur a loss $L_T(\beta)$ given by

$$L_T(\beta) = p_T - \hat{p}_U - c,$$

which is greater the higher is the taxi price and is lower the smaller the convenience disadvantage of taxis.

Travelers in locations where taxi service is inconvenient $(\beta - \beta^o - p_T + c < 0)$ would incur a loss that is increasing in their valuation of a ride, whereas travelers in locations where taxi service is convenient $(\beta - \beta^o - p_T + c \geq 0)$ lose only the difference between the net cost $p_T - c$ of a taxi and Uber's price $\hat{p}_U$. Frequent travelers (high $\beta$) have the strongest incentive to participate in a mobilization campaign when taxi service is inconvenient, and their alternative is their option. If taxi capacity is exhausted in surge periods, travelers exercise their options and incur a loss $\beta - \beta^o - \hat{p}_U(\epsilon)$ if ride-hailing is banned.

Uber drivers represent a constituency that can be mobilized, and their stake can be considerably higher than that of passengers, but they are fewer in number. The surplus $\hat{DS}(w)$ of a driver with opportunity cost $w$ is

$$\hat{DS}(w) = \begin{cases} \dfrac{(\tau s\hat{p}_U - w)^2}{2\hat{\tau}\theta} & \text{if } \epsilon < \hat{\epsilon}_U, \\ \dfrac{(\tau s\hat{p}_U(\epsilon) - w)^2}{2\hat{\tau}\theta} & \text{if } \epsilon \geq \hat{\epsilon}_U, \end{cases} \quad (11)$$

which is strictly decreasing in $w$. Full-time drivers have a stronger incentive to participate than do part-time

drivers because of both a higher loss per hour and more hours driven. As with passengers, the surplus of Uber drivers depends on the competitiveness of the taxi industry through the effect on ride-hailing prices.

The interests of part-time and full-time drivers may not be well aligned, however. Under the title "Is Fingerprinting Good for Drivers?" ride-hailing driver Christian Perea at theridesharingguy.com writes, "Yes and no. As a full-time driver my knee-jerk reaction is YES. Not because it is safer or better for the world or whatever, but because I know that fingerprinting will slow down the onslaught of new drivers that arrive every week. It would increase the barrier to entry and slow the constant flood of drivers that allow these companies to lower rates without suffering a significant loss of drivers. But I also recognize that it makes it more difficult to become a driver."[22]

In the context of the model the "flood" of new drivers results from Uber's recruitment efforts to increase the pool $D$ of drivers. As Propositions 1 and 3 indicate, with a regulated taxi price the surge price $\hat{p}_U(\epsilon)$ is decreasing in $D$, and expected profit is increasing in $D$. Thus, a flood of new drivers lowers drivers' compensation and increases Uber's profits, as ride-hailing driver Perea argues.

## 4. The Three Issues

This section expands on the three issues identified in the Introduction and analyzed in Section 5. The issues were chosen because they threaten Uber's core business model and the ability to supply capacity in a local transportation market. The first issue is whether Uber's business model is a platform matching travelers and drivers or is a transportation service that falls under the jurisdiction of regulatory institutions. Uber enters markets as a platform company, and opponents counter that it is a transportation service and should be subject to the same rules and regulations that govern taxis. The principal nonmarket strategy of the opponents of ride-hailing is raising the costs of operating the ride-hailing business model to the point at which ride-hailing companies are forced to exit or to operate on a level playing field with taxis. This strategy is deployed in several institutional arenas ranging from rule-making bodies such as city councils and state legislatures to courts and regulatory agencies that determine whether existing regulations are applicable to the ride-hailing business model. Uber counters with specific market and nonmarket strategies, and the outcomes of this competition are determined in both markets and institutional arenas.

The second issue is whether Uber drivers are classified under the law as independent contractors or as employees. Uber views its driver-partners as independent contractors who choose whether, when, and how long they drive using Uber's app. As independent contractors they provide their own vehicles, pay their operating costs, and provide their own health insurance and retirement savings. Uber, however, checks driver qualifications, sets prices, and can deactivate a driver for cause or for inactivity. If a court or regulatory agency such as a department of labor finds that drivers should be classified as employees rather than as independent contractors, they could be eligible for vacations, sick pay, unemployment compensation, workers compensation, and social security. Classification as employees would also place drivers under the protection of labor laws and the jurisdiction of the National Labor Relations Board (NLRB), making unionization easier. At best, classifying drivers as employees would increase Uber's costs and limit its flexibility and at worst would force fundamental changes in its business model. The classification issue has turned on the extent to which a company exercises control over a worker, but a new interpretation of the law by the U.S. Department of Labor may have narrowed the conditions for classification as independent contractors.

The third issue is passenger safety and particularly driver qualifications. Uber screens potential drivers and their vehicles but does not use the same standards required for taxis and their drivers. For example, in the United States taxi drivers are typically required to be fingerprinted, have special licenses with associated fees, and have their vehicles inspected periodically. Uber requires none of these. The taxi industry argues that such differences give Uber an unfair advantage and pose safety and security risks for passengers. Uber has responded by providing insurance that covers harm to passengers, but Uber has fought requirements such as fingerprinting that would discourage potential drivers, and particularly part-time drivers, from participating in ride-hailing. As the model in Section 3 shows, driver capacity is a critical feature of Uber's business model, and any threat to capacity could have significant ramifications. As an example of this type of threat, the specific issue of fingerprinting of drivers is considered. Required fingerprinting could be a precursor to random drug testing.

## 5. Dual-Purpose Strategies

Analysis of the three issues is organized around a class of strategies, referred to as dual-purpose strategies, that provide benefits to Uber in both its market and its institutional environments. The benefits are greater the more the strategy exhibits a complementarity between its market and institutional environment effects. A dual-purpose strategy serves two objectives: one in the market and one in the institutional environment. In the market, Uber's principal challenge is to build and maintain flexible capacity. To attract drivers, Uber advertises, offers bonuses to new drivers, puts a floor under initial earnings of new drivers, and so

on. In the institutional environment, Uber faces regulatory challenges with the potential to restrict or block its operations in the market. Increasing the number of drivers strengthens the base on which a mobilization strategy can be implemented. Recognizing the substantial free-rider problem, Uber can urge drivers to attend city council meetings, participate in demonstrations, sign petitions, and provide testament to the benefits of flexibility that ride-hailing driving provides.[23] The mobilization strategy is single purpose and takes the base as given, as is the compensation package used to attract new drivers. A dual-purpose strategy is a commitment to build network capacity to improve market performance and support Uber's objective of averting or overcoming onerous regulation.

The three dual-purpose strategies considered are market engagement, work enhancement, and accommodation. The market engagement strategy focuses on both the supply and demand side of Uber's platform. It increases the capacity of Uber's driver network and deepens and broadens its penetration of the local transportation market. Both expand the base for a stakeholder mobilization strategy to influence city councils and state legislatures to treat the ride-hailing business model as a matching platform rather than a transportation service. The work enhancement strategy is relevant for the issue of whether ride-hailing drivers are classified as independent contractors or employees. The courts play a major role in the classification issue, and a work enhancement strategy is intended to increase the capacity of Uber's driver network and reduce the likelihood that a lawsuit is filed and class action status granted. A (safety) accommodation strategy focuses on driver qualifications and is intended to dampen pressures for more stringent qualification standards that would reduce Uber's capacity by discouraging part-time drivers. The driver qualification issue is multidimensional, and accommodation involves bargaining and compromise.

A dual-purpose strategy can exploit a complementarity between market competition and nonmarket competition, as when increasing the number of drivers both increases capacity and strengthens the base for a mobilization strategy for addressing the transportation service issue. To reduce the likelihood of being treated as a transportation service, Uber has an incentive to expand capacity by more than that which maximizes profit for a platform firm facing no nonmarket challenges. This can affect Uber's market strategy and pricing, so what might appear to be a suboptimal market strategy can be an optimal business strategy. This is formalized in Section 5.1.2.

Implementation of a dual-purpose strategy focuses on three specific nonmarket implementation strategies. One is stakeholder mobilization. The principal stakeholders are drivers and passengers, and their participation depends on their surpluses from accessing Uber's platform, as identified in Section 3.4. A second is lobbying. Because nonmarket competition is localized, local lobbyists are typically hired to supplement Uber's in-house lobbyists. The third nonmarket strategy is venue shifting, which is used when Uber is unsuccessful at the local (city council) level. Venue shifting is considered in Sections 5.1 and 5.2.

Issues addressed in one local transportation market and institutional environment can have spillovers to other local markets and their institutional environment. Institutions can learn from each other by observing the success or failure of regulations implemented elsewhere. This can benefit Uber in the implementation of its integrated strategy. For example, Uber withdrawing from the Austin market because of a new regulation requiring fingerprinting of drivers makes credible its threat to withdraw from other markets considering such a requirement.

Market and nonmarket environments differ importantly across countries and in subnational jurisdictions. A particular challenge for Uber is to develop the capability to deal with nonmarket issues in an array of local transportation markets that differ markedly in terms of the organization of interest groups and the institutions governing the markets. The focus here is on the United States and Canada.

Figure 2 identifies the institutions that govern the three issues, the scope of the impact of the issues, the strategies for addressing them, and the model parameters relevant for the issue. For example, the transportation service and the driver qualifications issues are addressed in city councils and state governments, and their impact is market-specific. The employee classification issue could affect all U.S. markets.

A strategy for addressing one issue can have positive or negative spillovers to other issues. For example, Uber's market strategy of guaranteeing auto leases for drivers increases the capacity of Uber's network and strengthens the incentives of drivers to participate in a mobilization campaign, but it risks a negative spillover by making drivers less independent and more like employees. Similarly, enhancing passenger safety and security by deepening background checks of potential drivers can make drivers seem more like employees.

### 5.1. Uber's Business Model: Platform or Transportation Service

Figure 3 illustrates the strategy competition on the issue of Uber's opportunity to operate as a matching platform once it has entered a local market with UberX. The incumbent taxi industry argues that Uber provides a transportation service that must comply with the same regulations that govern taxi service. The strength of the opposition to Uber depends on how well organized the incumbent taxi industry is in both its market and institutional environments. If the industry is competitive, the opposition to Uber could be

**Figure 2.** Issues, Institutions, and Strategies

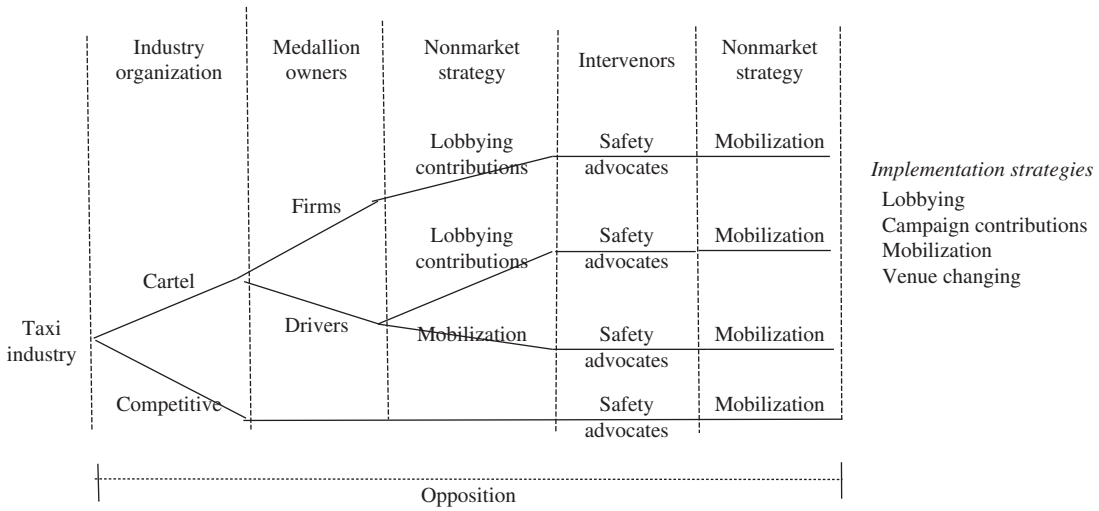
| Issue | Transportation Service | Employee Classification | Driver Qualifications—Fingerprinting |
|---|---|---|---|
| Scope | Individual markets | Entire company | Individual markets |
| Institutions | City councils<br>State legislatures<br>Courts<br>Regulatory agencies | Courts<br>Department of Labor<br>Congress | City councils<br>State legislatures |
| Dual-purpose strategy | Market engagement | Work enhancement | Safety accommodation |
| Implementation | Mobilization | Legal—Litigation and settlement | Mobilization |
| Nonmarket strategies | —Drivers<br>—Full-time<br>—Part-time<br>—Travelers<br>Lobbying<br>Venue shifting | Lobbying | —Drivers<br>—Full-time<br>—Part-time<br>Lobbying<br>Bargaining<br>Venue shifting |
| Side of platform | Demand<br>Supply | Supply | Supply |
| Model parameters | $D, n, \beta^0$ | $\theta, \beta^0, \bar{w}$ | $\beta^0, \theta, \bar{w}, D$ |

weak, whereas if it is a cartel, the opposition could be strong. In Washington, DC, the taxi industry is relatively competitive with easy entry, and the opposition has been relatively weak. In New York City, the number of medallions has been severely restricted with prices reaching $1 million at one point, and the opposition is stronger. Even with a competitive industry, safety and labor advocates can be present.

The dilemma for Uber is that a market is more attractive the more the taxi industry is cartelized and the regulator captured, but the opposition to ride-hailing then is correspondingly stronger. The strength of the opposition depends not only on the organization of the taxi industry but also on whether the medallions are owned by drivers or by taxi companies and investors. In a cartel, if drivers own the medallions, they would be expected to use a mobilization strategy perhaps in conjunction with lobbying and campaign contributions, particularly if the drivers are unionized. If taxi companies or investors own the medallions, they would be expected to rely on lobbying and campaign contributions rather than mobilization because their numbers are limited. The owners of the medallions could attempt to mobilize support among the public, but in many markets such as Toronto taxi companies are not well regarded. Thus, the challenge for Uber depends not only on whether the taxi industry is competitive or cartelized but in the latter case on who owns the medallions and captures the rents.

In Las Vegas, the taxi industry is well organized and competition is limited. Once Uber entered, the industry was able in two days to obtain an injunction that shut down UberX. In Calgary, drivers hold 55% of the taxi plates, and those issued before 2012 are fully transferable with a gray market value of up to CA$100,000.[24] The drivers and taxi companies in Calgary succeeded

**Figure 3.** City Councils and Legislatures



in obtaining an injunction after UberX had been operating for a month. In such situations, Uber's strategy is to switch venues and go to the state legislature (or provincial government) seeking legislation to allow it to operate without burdensome restriction by local regulators. Uber reports that 27 states have enacted legislation that restricts how local governments can regulate ride-hailing.

In Calgary, the city council imposed regulations on drivers that were sufficiently onerous to prevent Uber from operating. The council required ride-hailing drivers to have a CA$220 annual commercial license. A commercial license requirement increases the fixed cost of driving for Uber, and some part-time drivers with high $w$ would, at the extensive margin, stop driving, as shown in Section 5.3.1. The efficient response by Uber is to offer to pay the fees to protect the capacity of its network. Uber offered to pay CA$50,000 annually to the city in lieu of the license fee, but the offer was rejected. Uber also argued that the required driver background checks and vehicle inspections were too "stringent" with an estimated annual cost of CA$600. Such requirements could seriously restrict capacity. Uber suspended its operations in Calgary as a result of the injunction and shifted the venue to the Alberta provincial government.

Advocacy groups also seek to impose requirements on Uber. Viewing ride-hailing as a transportation service, disability advocates argue that Uber falls under the Americans with Disabilities Act and must provide reasonable accommodation for disabled travelers. In San Francisco Uber agreed to accommodate passengers with guide or service dogs. Uber also offers UberWAV, a service that links travelers with vehicles with ramps or lifts.

Uber's opponents use a variety of tactics to reduce its ability to compete in the marketplace. Some members of the public complain about having to pay surge prices, and some of those complaining are aligned with the taxi industry. A bill to cap surge prices failed in the California legislature in 2016. In addition to seeking to cap surge prices, taxi interests in New York sought a temporary cap on the number of ride-hailing vehicles, but opposition by Governor Andrew Cuomo caused the attempt to fail. In Toronto the city council imposed a price floor on the fixed component of fares to reduce Uber's competitive advantage on short trips.

Challenges can give rise to creative responses. In New York City Uber's opponents, principally the taxi industry, claimed that ride-hailing increases congestion. In response New York City Mayor Bill de Blasio sought to restrict ride-hailing growth to no more than 1% a year. Uber countered by adding a "de Blasio" button to its app. Pressing it showed either no cars available or a message stating that if the mayor's cap was approved, wait times would be at least 25 minutes. Uber also took out advertisements attacking the limit and pointing to the possible loss of 10,000 jobs. The mayor's office backed off and joined with Uber to conduct a four-month study of the effect of ride-hailing on congestion in the city. The study found little effect, but the city planned to continue to evaluate the congestion issue.

**5.1.1. Institutions.** If the nonmarket issue is the possibility of an ordinance adopted by a city council, a rule promulgated by a regulatory commission, or a law under consideration by a legislature, the outcome is determined by voting. The outcome of voting depends on the preferences of council members, regulators, or legislators, and those preferences can be influenced by the mobilization of constituents, lobbying, campaign contributions, and connections to interest groups. This section provides a framework for reasoning about influence in voting institutions, and Section 5.1.2 considers mobilization and dual-purpose strategies for influencing voting.

Legislative voting is influenced by competition between those interests that would benefit from an alternative such as treating ride-hailing as a transportation service and those interests that would be harmed. To represent voting, assume that the outcome of a city council vote depends in part on the influence of ride-hailing firms and their supporters and their opponents, primarily unions, and the taxi industry. Let $x(M)$ denote the influence of mobilized Uber drivers, $y$ denote the influence of mobilized Uber passengers and the public, and $\lambda$ denote the influence of Uber's lobbying, where mobilization $M$ is identified in the next section. The taxi companies lobby with intensity $r$, and mobilized taxi drivers generate influence $\gamma$. Their influence is less the more competitive is the taxi industry, and the greater the share of medallions held by taxi companies the greater is $r$ relative to $\gamma$.

The probability $\rho$ that Uber wins in the city council depends on the influence supporting ride-hailing and the influence opposing it; i.e., $\rho(x, y, \lambda, r, \gamma)$. Uber seeks to increase the probability, whereas its opponents seek to decrease it. The relative success of the two sides in generating influence coupled with the preferences of the councilors then determines the outcome.

This framework for reasoning about how strategy translates into outcomes can be formalized quantitatively, but specific cases can involve complex institutional agendas and uncertainty can be considerable. In Toronto the agenda was both complex and endogenous. In the final city council meeting a total of 60 votes were taken on various regulatory provisions and amendments. The mayor supported the original proposed regulations, but by the time of the final passage vote the proposed regulations had been changed enough that he voted against the ordinance.

Some of the provisions in the regulations adopted in Toronto favor ride-hailing, and some favor the taxi industry. The result was the establishment of a relatively level playing field with Uber and taxis operating under the same basic regulatory framework. Uber retained control over pricing with the exception of the price floor, and taxis were given some price flexibility during surge periods, allowed to offer a lower price for dispatched trips, and allowed to impose a surcharge on trips arranged through an app. Ian Black, general manager of Uber Canada, stated "We're certainly pleased. This is a great day for the riders in the city of Toronto, a great day for drivers as well using the Uber platform."[25] Referring to the regulations, he said, "We can certainly live with these."[26]

**5.1.2. Market Engagement and Stakeholder Mobilization.** To generate influence, Uber and its opponents have an opportunity to mobilize their supporters. Supporters have to act to have influence, and action can be costly. Uber reduces the cost of mobilizing passengers by using online petitions and social media. Action is most effective when it is collective. Unionized taxi drivers can easily organize and coordinate actions such as demonstrations and attendance at city council meetings and can fund lobbying. In most markets there are relatively few taxi companies, and they have an incentive to act that is proportional to their rents threatened by ride-hailing. If drivers own the medallions, Uber is likely to face a mobilization strategy, and if the taxi companies own the medallions, Uber is likely to face lobbying supported by campaign contributions. In Toronto, taxi drivers have strong incentives to act and are represented by the Taxiworkers Association of Ontario. In a relatively competitive market such as Washington, DC, the incentives of taxi drivers are weaker.

To mobilize passengers and the public, Uber uses Twitter, articles about the benefits from Uber's presence, community events, promotions such as providing free rides to events, and partnering with organizations such as MADD. In Toronto Uber obtained the signatures of 113 restaurants that use UberEATS to deliver meals. The city of Toronto conducted a survey that revealed a satisfaction rate of 29% for taxi service and 61% for Uber. Uber obtained over 60,000 signatures on a petition, whereas the taxi industry obtained only 6,968 signatures for its "Keep the Taxi Industry Alive" petition. Shortly before the voting by the Toronto city council, Uber circulated a second petition that obtained 85,000 signatures. In Austin, Uber was well received, and a petition was circulated garnering over 65,000 signatures. The influence of online petitions is diminished, however, because signing is virtually costless. Thus, mobilization may be insufficient. After losing in the Austin city council, Uber supported a public referendum that would allow ride-sharing. The referendum failed with 56% of voters opposing the repeal of an ordinance requiring fingerprinting of ride-hailing drivers.

Promotions, specials, and other engagement activities have dual purposes in the implementation of a market engagement strategy. First, they broaden and deepen the pool of travelers who might select Uber; second, they build goodwill that can be useful for nonmarket issues. UberX is effectively precluded from operating outside New York City by a prohibitively costly commercial insurance requirement. Uber (and Lyft) are working in the state legislature to allow ride-hailing throughout the state. The taxi industry and taxi unions, in conjunction with labor advocates such as New York Communities for Change, oppose the legislation, arguing for restrictions on prices and the fingerprinting of ride-hailing drivers. To build support for ride-hailing, Uber offered to provide free transportation for employees of a company that had participated in other Uber promotions. Over Thanksgiving Uber offered $100 credits for college students who post favorable Uber stories on #NYNeedsUber. Uber also advertises under the theme "Join the Chorus" for New York State to join the rest of the country in allowing ride-hailing.[27]

In the context of the model, these activities are components of a demand-side dual purpose market engagement strategy that has as its objectives expanding (increasing $n$) and deepening its penetration (increasing $\hat{\sigma}_U$) into the local transportation market and building goodwill among travelers and the public more broadly as a base for a mobilization strategy. Goodwill can be transformed into mobilization when the cost of acting is low, and frequent travelers have a stronger incentive, identified in Section 3.4, to participate than do infrequent travelers. If there is a cost of participating, infrequent travelers might not participate. Frequent travelers with high $\beta$ may have an incentive to do more than sign an online petition, such as send a personal message to a city council member.

On the supply side of the platform, Uber drivers have incentives to act and can be mobilized. The benefit from acting is an increasing function of their surplus $\hat{D}S(w)$ in (11), which is a decreasing function of a driver's opportunity cost $w$, so full-time drivers have stronger incentives than part-time drivers.[28] The base for the mobilization of drivers depends on the size $D$ of the pool of potential drivers, and $D$ can be increased through advertising and recruitment activities. Increasing the size of the pool results in lower surge prices but higher profit.

Suppose a city council is considering an ordinance that would classify ride-hailing as a transportation service and regulate it under the same framework used

for taxis. Also, suppose that the regulation is sufficiently stringent that if enacted Uber would withdraw from the market, so the surplus of Uber drivers is at stake. Let the cost of action by a driver be denoted $a(w)$ and let the marginal benefits from acting be $\alpha\hat{D}S(w)$, so a driver acts if $\alpha\hat{D}S(w) \geq a(w)$. Because $a(w)$ is likely increasing in $w$ and drivers' surplus is decreasing in $w$, those drivers who act have low opportunity costs, the full-time drivers. Aggregate participation is then $M = D\int_0^{w^o} dw/\bar{w}$, where $w^o$ is defined by $\alpha\hat{D}S(w^o) \equiv a(w^o)$. The larger the pool the greater the participation, although $\alpha$ can be reduced by free-riding, which could be more frequent the larger is $D$. Uber has mobilized drivers, and particularly full-time drivers, in many cities to conduct demonstrations and attend city council meetings.

To formalize the choice of a dual-purpose strategy, consider a recruitment program to increase the pool of potential drivers. Let $\xi$ denote the scale of the recruitment program and $g(\xi)$ denote its cost. The program has two products. First, the pool $D(\xi)$ of potential drivers is increasing in $\xi$; second, the probability $\rho$ that the regulation proposal before the city council fails is increasing in $\xi$. That probability is a function of the mobilized action $M$, which depends on $D(\xi)$. Uber's long-run expected profit $E\Pi_U$ can be expressed as

$$E\Pi_U = E\hat{\pi}_U - g(\xi) + \frac{\rho}{1-\delta}E\pi_U^+ + \frac{1-\rho}{1-\delta}E\pi_U^-, \qquad (12)$$

where $E\pi_U^-$ and $E\pi_U^+ (E\pi_U^+ > E\pi_U^-)$ are the future expected profits if Uber is regulated as a transportation service or not regulated, respectively, and $\delta$ is the discount factor. In (12) Uber is assumed to currently be operating as in Section 3. The optimal program scale satisfies

$$\frac{dE\Pi_U}{d\xi} = \frac{dE\hat{\pi}_U}{dD}D'(\xi) - g'(\xi) + \frac{1}{1-\delta}\frac{d\rho}{dM}\frac{dM}{dD}D'(\xi)(E\pi_U^+ - E\pi_U^-) = 0.$$

Because $E\pi_U^+ > E\pi_U^-$ the optimal program scale satisfies $(dE\hat{\pi}_U/dD)D'(\xi) - g'(\xi) < 0$, so Uber expands the pool of drivers beyond the point that maximizes its current period profit. Uber sacrifices current period profit to increase the number of drivers that can be mobilized, which increases the probability that it remains unregulated.

A mobilization strategy must turn participation into influence. Influence is a function of both the number participating and lobbying. Mobilization can be thought of as an expression of preferences, and council members and legislators have an interest in acting to benefit their constituents. An expression of preferences, however, must be brought home to individual city council members or legislators. Lobbying is the vehicle for taking mobilized support for ride-hailing to council members with the message that Uber benefits passengers, its drivers, and the public more broadly. This message is strengthened by studies and articles about Uber and ride-hailing published on Uber's website and often carried by the media.

To bring the general support for Uber to individual council members and legislators, Uber uses its stable of in-house lobbyists and augments their work by hiring local lobbyists. In Toronto Uber used eight in-house lobbyists and seven hired lobbyists. The taxi industry used 14 in-house lobbyists and 11 outside lobbyists. Uber lobbied almost all of the 44 city council members, whereas the taxi industry focused on the commercial licensing and regulation committee and the regulators with whom the industry had cultivated relationships. Both Uber and the taxi industry focused on the mayor, a member of the city council, who had agenda setting influence. In contrast to the taxi interests, Uber made no campaign contributions in either Toronto or Las Vegas.

### 5.2. Driver Classification: Independent Contractors or Employees

Perhaps the greatest threat to ride-hailing is the classification of drivers as employees rather than as independent contractors. Some Uber drivers and labor advocates want ride-hailing drivers to have employee benefits such as healthcare insurance, reimbursement of business expenses, and government-mandated benefits including social security contributions by the employer, eligibility for unemployment benefits, workers compensation, vacations, overtime pay, and certain protections under the NLRB. Designating drivers as employees would presumably increase Uber's costs and substantially reduce its flexibility, making it less competitive with taxis. It would also provide an opportunity for unionization. In contrast to the foreclosure of individual markets, classification of drivers as employees could apply to all U.S. markets.

The status of Uber drivers relative to labor laws is complex and has not been addressed definitively by the courts. The fundamental issue is whether Uber drivers are currently misclassified as independent contractors and instead should be classified as employees. The test for classification has been the extent of control a company exercises over a worker. Uber drivers drive when they want and for as long as they want, and they drive their own cars. They are paid by passengers but through Uber. Uber does not provide training other than to use its app and navigation system. Uber, however, exercises a degree of control by setting prices and the drivers' share, discourages tipping, requires background checks, and provides commercial insurance for drivers. Uber can also deactivate the app in a driver's vehicle, and the driver has recourse to arbitration but not to an appeal or hearing.

In July 2016 the U.S. Department of Labor provided a new interpretation of existing law that could considerably narrow the classification of workers as independent contractors.[29] The new interpretation is based on an "economic realities" test derived from the Fair Labor Standards Act and the common law. The interpretation focuses on whether a worker is "economically dependent" on a company. How this interpretation applies to Uber drivers is unclear, and whether the interpretation will survive the Trump administration is also unclear. Jerry Howard, chief executive of the 140,000 member National Association of Home Builders (NAHB), "said the new guidance puts too much focus on the extent of workers' economic dependence on a company and the [NAHB] will encourage Congress to scrutinize the guidance."[30]

**5.2.1. Institutions: Courts and Regulators.** The classification issue is immediate because some drivers, in conjunction with trial lawyers, have brought lawsuits seeking employee classification and the associated benefits. Once the issue is in the courts or before a regulatory agency, Uber loses a substantial degree of influence. In the United Kingdom, the Employment Tribunal ruled that a current and a former Uber driver were entitled to paid vacations and the minimum wage.[31] The ruling applied only to the two drivers, but other cases will follow if the ruling is upheld.[32]

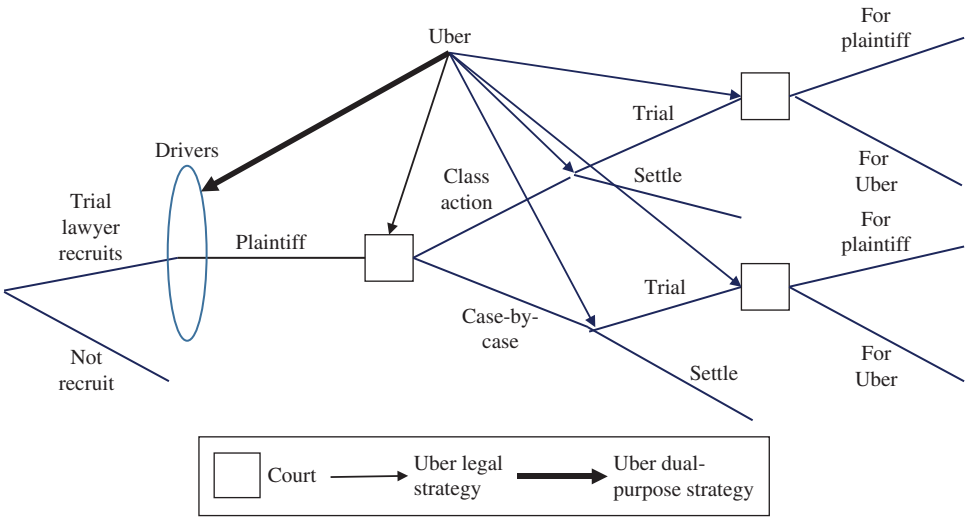
The New York Department of Labor makes its decisions on a case-by-case basis. In the matter of eligibility for unemployment benefits, it must first find that a worker is an employee and second find that the worker is actually eligible for benefits. In 2016 the Department determined that two former drivers for Uber were employees and eligible for unemployment benefits. Uber has appealed other cases in which a driver has been determined to be an employee by the Department and was expected to appeal these two decisions. Bhairavi Desai, executive director of the New York Taxi Workers Alliance, said, "I think this is a game changer. Uber has depended on the political structure turning a blind eye. What these decisions do is force a microscopic review" by the government of a person's employment status.[33]

The strategy of plaintiffs in the court is to seek class action designation and then either settle or go to trial. Figure 4 illustrates a representative process initiated by trial lawyers, in conjunction with a driver, with the objective of attaining class-action status for the lawsuit and extracting a settlement to avoid the cost of a trial. If class-action status is granted, the stakes are far greater and settlement may be more attractive and costly.

In anticipation of possible class action lawsuits Uber drivers are, unless they opt out, bound by an arbitration agreement under which disputes are resolved on a case-by-case basis through binding arbitration. In 2016 the Ninth Circuit Court of Appeals unanimously overturned a ruling by U.S. District Court Judge Edward Chen that the arbitration agreement was invalid.[34] The appeals court ruling undercuts class action lawsuits by reducing the scope of any decision favorable to plaintiffs and hence reduces the incentives of trial lawyers to initiate and litigate such lawsuits.

A class-action lawsuit covering 240,000 drivers in California and Massachusetts sought certain benefits from Uber. In the wake of the Court of Appeals decision plaintiffs attorney Shannon Liss-Riordan, representing California drivers in *O'Connor v. Uber Technologies*, lamented, "It now seems very likely that the scope of this case may be drastically reduced to about 8,000 drivers. That means that drivers who did not opt out of Uber's arbitration clause would need to bring individual claims in arbitration if they want to be a part of this."[35] Liss-Riordan vowed to take the case to trial.

**Figure 4.** (Color online) Courts and Regulators



Uber and Liss-Riordan had reached an $84 million settlement of the lawsuit prior to the Court of Appeals ruling. The settlement covered the class action lawsuit and a number of lawsuits filed by attorneys representing other drivers. In addition to the monetary payment, the settlement required a number of changes in Uber's practices but did not identify drivers as employees or resolve the classification issue.

The settlement reveals changes that Uber is willing to make to avoid classification as employees. The settlement provided that drivers could be deactivated only for "sufficient cause," and drivers could appeal to a panel of highly rated drivers. If the deactivated driver is not satisfied with the decision, the driver could go to binding arbitration paid for by Uber. Also, an association of drivers would be established with elected representatives to discuss work issues with Uber. Drivers would be allowed to place small signs in their cars stating "tips are not included, they are not required, but they would be appreciated."[36] Uber did not, however, agree to accommodate tipping on its app.

Judge Chen rejected the settlement on several grounds.[37] First, the amount was too low relative to the plaintiff's claim.[38] Second, the settlement covered several other cases and precluded their plaintiffs from pursuing trial. Drivers and their attorneys had objected to their inclusion in the settlement. Third, the settlement amount of $1 million attributed to a lawsuit filed under California's Private Attorneys General Act paled in comparison to the case's "verdict value" of over $1 billion.

**5.2.2. Work Enhancement.** As illustrated in Figure 3, a work enhancement dual-purpose strategy focuses both on reducing the incentive of drivers to pursue legal action and on increasing capacity. To reduce the likelihood of drivers going to court or to a regulator, Uber has experimented with voluntary panels of experienced drivers to assess whether a driver has been treated fairly by the company. Uber has allowed the members of such a panel to be elected by drivers. The panels could promote fairness and increase capacity, and they could also reduce the likelihood of disputes reaching the jurisdiction of the courts. The experiment provided a foundation for one part of the rejected settlement.

The classification issue is in the jurisdiction of courts and state and federal departments of labor. Venue shifting to state legislatures and Congress may be possible, but the issue is immediate in the courts, and venue shifting takes time and preparation. Mobilization of drivers and passengers may be possible, but influence is seldom a factor in court decisions.

Uber has at least three objectives with respect to the classification issue. The first is to avoid class action status, and that objective has been realized in part through the Court of Appeals decision. The second objective is to prevail in any case that goes to trial and otherwise to settle prior to trial. The third is to reduce the likelihood that a lawsuit is filed. A dual-purpose work enhancement strategy has the third objective as one of its purposes. The other purpose is to increase the capacity of Uber's network.

A dual-purpose work enhancement strategy can both attract additional drivers and increase the hours driven by current drivers, and it can also decrease the incentive of drivers to take nonmarket action seeking employee classification or a specific benefit such as cost reimbursement from Uber. For example, Uber recently gave drivers a "pause button" that takes them out of the availability pool and allows them to take a break, use a rest room, or as Uber's television advertisement states, enjoy "chilling" without stepping out of the app system. This reduces immediate capacity to some extent but can attract additional drivers by reducing the opportunity cost $w$ or decreasing the marginal cost $\theta$. To the extent that work enhancement increases driver surplus, drivers have less incentive to seek employee status or specific benefits.

Uber has enhanced the driver's experience in additional ways, including providing insurance to compensate passengers in the case of an accident, guaranteeing auto lease contracts, and allowing drivers to choose music on Pandora. The first can be thought of as reducing the option value $\beta^o$ of travelers, the second as reducing a driver's operating cost $\theta$, and the third as reducing the opportunity costs of potential drivers as represented by $\bar{w}$. All three increase a driver's surplus, which decreases the incentive to engage in nonmarket action against Uber.

As an example of a dual-purpose work enhancement strategy, in some markets drivers began renting cars to use in Uber service. This allows a person without a qualifying vehicle to drive for Uber, but some drivers did not have the credit rating to be able to lease long-term to obtain low rates. Uber began providing a guarantee for a long-term lease. The lease guarantee program decreases the marginal cost $\theta$ of driving, increases capacity, decreases the surge price, and increases profit. The lease program also increases the surplus of those drivers who take advantage of it, reducing their incentive to take nonmarket action against Uber. Providing guarantees has a cost to Uber, but it has dual advantages.[39]

Drivers take advantage of a lease guarantee only if it increases their surplus, which is increasing in the number of hours driven. Self-selection means that full-time drivers take greater advantage of a lease guarantee than do part-time drivers, which increases capacity and reduces the surge price. It is full-time drivers that have the strongest incentive to seek employee status, so self-selection helps direct benefits to full-time

drivers and strengthens the benefits to Uber from a dual-purpose strategy.

Some drivers want the opportunity to receive tips, and Uber was prepared to take a step in that direction as part of the settlement of the class action lawsuit. Uber has discouraged tipping, whereas Lyft not only encourages tipping but advertises it. Tipping provides incentives for drivers to improve passenger service, but tipping is inconvenient even when done on an app as with Lyft. If tipping were allowed by Uber by including it on its app, Uber would adjust its prices and drivers' share. Let $t$ be the percent of the price that a passenger tips, so a driver receives $tp_U$ as a tip. The driver's earnings then are $(s+t)p_U$, and the cost to a passenger is $p_U(1+t)$. Conjecture that Uber's optimal normal period price $\bar{p}_U$ and drivers' share $\bar{s}$ when tipping is allowed are $\bar{p}_U = \hat{p}_U/(1+t)$ and $\bar{s} = s - t(1-s)$. Thus, passengers pay $\bar{p}_U(1+t) = \hat{p}_U$, and market share is unaffected at $\hat{\sigma}_U$. Drivers receive $(\bar{s}+t)\bar{p}_U = s\hat{p}_U$, capacity is unaffected, and the surge price equals $\hat{p}_U(\epsilon)$. Uber's per passenger profit is $(1-\bar{s})\bar{p}_U\hat{\sigma}_U = (1-s)\hat{p}_U\hat{\sigma}_U$. Tipping is attractive if the incentive effects on drivers' performance exceed the inconvenience to passengers. Uber and Lyft either have reached different conclusions about the net effect or Lyft views encouraging tipping as a form of product differentiation, with some travelers self-selecting because of tipping. If tipping would enhance the work experience for drivers and improve their performance, the benefits it would provide in reducing the likelihood of driver classification lawsuits could make it an attractive instrument of a work enhancement dual-purpose strategy.[40]

If the dependence doctrine for employee classification were to prevail, an alternative for ride-hailing firms is to rely solely on part-time drivers. Suppose that Uber set a maximum $h^*$ on the number of hours a driver can drive. Drivers with opportunity costs $w \geq w^*$, where $w^* = \tau(sp_U - \theta h^*)$, drive their preferred number of hours $h(w) = (\tau sp_U - w)/(\tau\theta)$. Drivers with $w \in [0, w^*)$ drive $h^*$ hours, and capacity $\bar{C}$ is

$$\bar{C} = D\int_{w^*}^{\tau sp_U} \frac{\tau sp_U - w}{\tau\theta}\frac{dw}{\bar{w}} + Dh^*\int_0^{w^*}\frac{dw}{\bar{w}} = \frac{\tau Dh^*}{\bar{w}}\left(sp_U - \tfrac{1}{2}\theta h^*\right).$$

The capacity $\bar{C}$ is strictly increasing in $h^*$ and evaluated at $h^* = sp_U/\theta$ equals the capacity $C(p_U)$ in (1). The reduction in capacity could be substantial, forcing Uber to intensify its recruiting of drivers, as considered in Section 5.1. A reduced capacity results in higher surge prices and lower profit.

Such measures are unlikely to deter the unions and labor advocates. In addition to wanting classification as employees to be eligible for government mandated benefits, some full-time drivers such as Christian Perea believe that they are being squeezed by the recruitment of new drivers resulting in increased competition among ride-hailing drivers and decreased earnings. In New York City a unit of the International Association of Machinists and Aerospace Workers (IAM) formed the Independent Drivers Guild to represent the interests of 45,000 drivers.[41] The Guild takes an aggressive stance. Commenting on a settlement between Uber and the Federal Trade Commission on an early auto lease program, Jim Conigliaro, IAM general vice president and founder of the Guild, wrote, "The reality of being a ride-hailing driver is a far cry from the rosy picture these apps describe . . . . Companies like Uber shift cost, risk and burden onto drivers and taxpayers when they fail to provide the basic benefits so many Americans take for granted, from health insurance to sick leave."[42] The Guild is a precursor to a union, but federal law pertains to employees and not independent contractors, so collective bargaining rights may not be available without new legislation.

If collective bargaining rights were extended to ride-hailing drivers, part-time drivers, who represent a majority, might reject forming a union to avoid union dues. Seattle found a path to unionization of ride-hailing drivers. In December 2016 the city passed an ordinance allowing on-demand drivers to unionize. Recognizing that most ride-hailing drivers are part-time and would likely vote against unionization, only those who drove at least 52 times over the previous three months were eligible to vote. A court, however, ruled that the ordinance was unconstitutional.

### 5.3. Safety and Security: Driver Qualifications

Ride-hailing provides safety benefits to communities. For example, the availability of ride-hailing can reduce drunk driving. California MADD stated, "In California, Uber's home state and largest market, drunk-driving crashes fell by 60 per month among drivers under 30 in the markets where Uber operates following the launch of UberX. That is an estimated total of 1,800 crashes prevented since July 2012."[43] Safety advocates and the opponents of ride-hailing, however, focus on the safety and security of passengers, which is a major concern for ride-hailing companies. A safety incident involving a driver could dampen demand by making a ride-hailing trip less attractive. This can be represented in the model by an increase in $\beta^o$. A higher $\beta^o$ reduces the share of travelers choosing Uber, which results in lower prices and profits. Incidents also provide an opportunity for safety advocates to seek more stringent driver qualifications. More stringent driver qualifications would increase Uber's market share by lowering $\beta^o$, but the concern to Uber is not the demand side of its platform but the supply-side—the reduction of the capacity of its network.

Hall and Krueger (2016, p. 1) summarize Uber's screening of drivers, "Although the requirements vary

by city, before they can utilize the Uber platform, potential driver-partners typically must: (1) pass a background check and a review of their driving record; (2) submit documentation of insurance, registration, and a valid driver's license; (3) successfully complete a city-knowledge test; and (4) drive a car that meets a quality inspection and is less than a certain number of years old." Moreover, "Uber's driver contract states that the company "may monitor, track and share with third parties driver's geolocation" for safety and security."[44] Uber uses Chekr and Sterling Backcheck to conduct its background checks.

Taxi interests want to decrease the number of Uber drivers, whereas safety advocates want to screen out people who might endanger passengers. Both want more stringent background checks, including fingerprinting of Uber drivers. Taxi interests claim that not requiring fingerprinting gives Uber an unfair competitive advantage. Taxi and limousine unions are funding a public safety campaign, Who's Driving You, that argues for expanded background checks, including fingerprinting.[45] Proponents argue that violent felons, sex offenders, and terrorists could become Uber drivers and pose risks to passengers. Mark Ilacqua, president of Syracuse Regional Taxi, said, "Don't wait for a college student to be sexually assaulted."[46]

In explaining its opposition to fingerprinting of drivers, Uber's public rhetoric focuses on possible injustice to people who have been arrested and fingerprinted but were not convicted of a crime. Despite Uber's rhetoric, the principal reason for its (and Lyft's) opposition to fingerprinting is that in contrast to taxis, most of its drivers are part-time. Requiring fingerprinting could substantially reduce the capacity of Uber's network by driving away part-time drivers. New York City requires ride-sharing drivers to have a Taxi and Limousine Commission license, which requires a medical examination, fingerprinting, a drug test, and vehicle inspection, and can cost over $500. Such requirements discourage part-time drivers.[47]

**5.3.1. Institutions and Fingerprinting.** Fingerprinting could result in a stigma, raise privacy concerns, and impose a burden or at least an inconvenience on potential drivers. Ride-hailing companies believe that the number of drivers, and particularly part-time drivers, could be substantially reduced by requiring fingerprinting. Network capacity is Uber's most important resource, and any reduction in capacity decreases profits. When Austin passed an ordinance requiring fingerprinting of ride-hailing drivers, Uber and Lyft promptly exited the market, throwing 10,000 drivers out of work. The decision to leave the market reflected the expected loss of capacity and also helped establish a reputation for abandoning a market with burdensome regulation. Consistent with Uber's strategy of venue shifting, the governor and members of the Texas legislature vowed to overturn the city council's ordinance once the state legislature was back in session.

Fingerprinting could also be the first step toward more stringent requirements such as drug and alcohol testing. Taxi drivers are not required to undergo such testing, but random drug testing is required for interstate truck drivers. Testing for drugs or alcohol could substantially reduce ride-hailing capacity. In 2015 San Antonio, Texas passed an ordinance that imposed fees on ride-hailing drivers and required fingerprinting and random drug testing of drivers. Uber immediately exited the market in which it had operated for a year. Uber obtained 14,000 signatures on an online petition, and a local pro-technology group organized rallies supporting ride-hailing. The city relented and adopted a pilot program that dropped the fingerprinting and drug testing requirements and withdrew the fees on drivers.[48]

Capacity would also be restricted by requiring ride-hailing drivers to obtain commercial licenses, which typically requires fingerprinting and a lower alcohol limit.[49] Obtaining a commercial license can also require having commercial insurance, which can be expensive for an individual driver.[50] Commercial licensing could also lead to annual fees and mandatory vehicle inspection by local or state government. Uber and Lyft sought legislation in California exempting ride-hailing drivers from certain requirements, such as commercial license plates and the associated fees, imposed on commercial drivers. The bill died in the state Senate. The focus in this section is on fingerprinting, which as the case in Austin indicates, is important for ride-hailing.

Fingerprinting would increase the cost of driving for Uber. The increase could be one-time from the inconvenience of being fingerprinted, but there could also be continuing privacy concerns and stigma. The model can be used to trace through the effects of required fingerprinting on Uber's market strategy and operating profits. The qualitative analysis then focuses on the strategy most likely to be effective for Uber.

If fingerprinting were required, suppose that the additional continuing costs from privacy concerns and a stigma is $\Delta\theta$ and that there is a one-time cost $\delta w$ because of the inconvenience. Thus, potential drivers with $U(w) \geq \delta w$ choose to drive with Uber, and their hours driven are

$$h(w) = \frac{\tau s p_U - w}{2\tau(\theta + \Delta\theta)}.$$

The utility of a driver then is

$$U(w) = \frac{(\tau s p_U - w)^2}{2\tau(\theta + \Delta\theta)} - \delta w,$$

so Uber drivers are those with

$$w \leq w^o \equiv \tau s p_U - \left[2\tau(\theta + \Delta\theta)\delta w\right]^{1/2}.$$

Some part-time drivers at the extensive margin ($w > w^o$) are excluded, and on the intensive margin drivers who continue drive fewer hours. Part-time driving at the intensive margin is more elastic than full-time driving, so the effect on capacity could be substantial.

Capacity is reduced to $C = \tau s^2 p_U^2/(2(\theta + \Delta\theta)\bar{w}) - \delta w/\bar{w}$, which is strictly decreasing in $\Delta\theta$ and $\delta w$. The normal period price is unaffected, surge prices increase, normal periods are less frequent, and surge periods are more frequent. Higher surge prices attract additional drivers at the extensive margin and at the intensive margin increase the hours driven, offsetting a portion of the reduced capacity. Higher surge prices would exclude some frequent travelers at the extensive margin and reduce the surplus of remaining travelers at the intensive margin. Uber's profit is reduced, and if the reduction in capacity is substantial, the effect on profit could be large. Thus, travelers, drivers, and Uber have aligned interests on the fingerprinting issue, provided that there is little effect on safety, as Uber claims.[51]

A continuing driver incurs a loss

$$LDS(w) = \frac{(\tau s p_U - w)^2 \Delta\theta}{2\bar{w}\theta(\theta + \Delta\theta)} - \delta w,$$

which is decreasing in the driver's opportunity cost $w$. Both full-time and part-time drivers have an incentive to oppose fingerprinting, but full-time drivers continue to drive, whereas part-time drivers at the extensive margin quit their (part-time) job. Of particular concern to Uber is that the proportion of Uber drivers who are part-time has been increasing. A November 2015 survey of Uber drivers found that 69% have full-time or part-time work outside Uber, which was up from 62% the previous year. Sixty-seven percent had never driven for income before driving for Uber, up from 51% the previous year. The shift to more part-time drivers is beneficial with respect to a mobilization strategy, but risks reduced capacity from the possibility of more stringent driver qualifications.

Required fingerprinting for Uber drivers could spill over to the issue of the classification of drivers as independent contractors. Required fingerprinting could be viewed by the courts or regulators as an additional instrument of control over drivers, increasing the likelihood of a decision that drivers are misclassified as independent contractors and instead should be classified as employees.

**5.3.2. Dual-Purpose Strategy: Accommodation.** As in Section 5.1.2, Uber's strategy is to mobilize drivers and lobby with the message that requiring fingerprinting would make ride-hailing less available, harming drivers, passengers, and communities. Lobbying is the basic implementation strategy. Uber hired former U.S. Attorney General Eric Holder to lobby against proposed legislation requiring fingerprinting in Chicago and New Jersey.[52] Chicago backed away from requiring fingerprinting under the credible threat that Uber (and Lyft) would halt their operations in the city, as they did in Austin.

Mobilization of drivers accompanied by lobbying can carry two messages. First, some part-time drivers would stop driving and lose their supplemental income. Second, the continuing drivers would drive fewer hours, reducing their primary source of income. Both would decrease capacity resulting in higher surge prices and fewer passengers served.

Passengers benefit from ride-hailing, but discussing in public a measure intended to increase passenger safety is a delicate matter. In Austin ride-hailing proponents filed Proposition 1, a public referendum, to repeal the fingerprinting requirement.[53] Despite a petition with over 65,000 signatures and Uber and Lyft spending a reported $8.6 million supporting the referendum, it received only 44% of the vote. Opponents of the referendum had claimed that sexual assaults by ride-hailing drivers were reported at a rate of one a month in 2015. Uber responded that there had been no arrests of its drivers on such charges. Uber's public rhetoric is to reassure the public regarding safety and the adequacy of its background checks, but a majority of voters in Austin were unpersuaded.[54]

Because mobilization on safety and driver qualifications issues is risky, bargaining and accommodation are more likely the preferred strategy. In the California state legislature, safety activists, union supporters, and the taxi industry pushed for legislation to require fingerprinting of ride-hailing drivers. Uber could mobilize drivers and passengers to oppose a fingerprinting requirement, but the public might side with the safety activists because fingerprinting seems like a reasonable component of screening, and who opposes enhanced safety. Uber used a low-profile strategy relying on lobbying and bargaining. Its bargaining power stemmed from its credible threat to exit as in Austin and San Antonio and because it had demonstrated that it can mount an aggressive campaign against a legislator.[55] Lyft has interests that parallel those of Uber, but there is no need for a coalition because each company separately carrying the message is likely to be as effective. Uber and Lyft are both located in San Francisco, which helps strengthen their bargaining position in California. The bill requiring fingerprinting died in the state senate.

The driver qualification issue remained, however, and Uber sought legislation allowing it to do a deeper background check than was permitted by an existing California law that prevents a company from checking for a criminal record beyond the most recent seven years, unless specifically authorized by legislation.[56] Bargaining led to a compromise enacted in 2016 that authorizes ride-hailing firms to search over a driver's

entire record and to reject anyone who is a registered sex offender or has been convicted of a violent felony or terrorism-related offense. Who's Driving You campaign spokesman Dave Sutton called California's law a "step in the right direction." He added, "We've said again and again that a violent felon . . . should not be driving a passenger."[57] Under an agreement with the state of Massachusetts, in 2017 Uber (and Lyft) began the most stringent background checking of ride-hailing drivers in the United States. The checking does not include fingerprinting.

The Who's Driving You campaign in California continued, but in October 2017 the California Public Utilities Commission concluded that fingerprinting would have little effect on safety and hence was not needed. The accommodations in California and Massachusetts could be a pattern for the country.

## 6. Conclusions

Uber is engaged in a set of ongoing battles in its markets, where taxi companies are introducing apps for dispatching taxis and ride-hailing competitors are proliferating. It is also engaged in a set of nonmarket battles on a number of issues contested in an array of institutional settings, and although Uber is skilled in its nonmarket strategy formulation and execution, the threats are serious. These battles at best threaten its profitability, and some threaten its business model. Predicting the outcomes is beyond the scope of this paper, but it is interesting to speculate about what the future might look like as a function of the outcomes of the three issues considered here. If Uber is successful in its nonmarket competition, it can operate as it has been operating. If it is unsuccessful, change will follow. Some hints about what Uber might be like if the outcomes are unfavorable are contained in the actions of the Toronto city council and the settlement in California rejected by Judge Chen.

If the taxi industry and labor advocates are successful and Uber's business model is treated as a transportation service, its competitiveness would be weakened.[58] The Toronto city council's regulatory framework, which provides a more level playing field, may be an indicator. Ride-hailing is allowed, but additional regulations apply to Uber. The taxi industry is granted some flexibility in its pricing and operations, and a floor was placed under Uber's prices for short trips. Uber is prohibited from accepting street hails and from using taxi stands. Despite Uber's statement that it can live with the new regulations, a substantial risk remains in Toronto because the city council ordered a demand study by an outside firm on the impact of ride-hailing on the taxi driver labor market. The report could lead to a cap on the number of ride-hailing vehicles to protect taxi drivers, who have already lost much of the value of their medallions.

The Toronto city council also addressed safety issues by strengthening background checks on ride-hailing drivers, although it stopped short of requiring fingerprinting. The council required ride-hailing vehicles to carry an identifier on the vehicles at all times and have an inspection at a city-run facility twice a year. Drivers also must obtain the same license as required of taxi drivers, must carry the same insurance, and only the vehicle owner can drive the vehicle in ride-hailing. These additional requirements increase the costs for potential drivers, particularly part-time drivers, and decrease the capacity of Uber's network. How large the effects will be remains to be seen. The overall effect is to reduce Uber's competitive advantage, its capacity, and its profit. At best, Uber's remaining competitive advantage from flexibility and part-time driving could allow it to dominate the local transportation market, and at worst it could be forced to operate like a flexible taxi service.

The issue of the classification of drivers as independent contractors did not arise in Toronto, but the issue remains important in the United States and Europe. If drivers are classified as employees, the nature of ride-hailing would be substantially altered to the detriment of ride-hailing companies and many if not most drivers. The outcome rests with the courts and departments of labor, and the change in U.S. administrations likely will be to the benefit of the independent contractor model. If the economic dependence interpretation of the U.S. Department of Labor remains, however, Uber could move away from full-time drivers and rely on part-time drivers to avoid classification as employees. Substituting part-time for full-time drivers could jeopardize capacity. Uber could attempt to operate with a two-tier wage structure where full-time drivers receive benefits and lower compensation and part-time drivers receive higher compensation but little or no benefits. If drivers are classified as employees and Uber continued to allow them to drive when and for how long they wanted, overtime pay could be required. Uber could be forced to cap the number of hours driven or to schedule drivers. Classifying drivers as employees would also make it easier for unions to organize them.

Uber's extensions into complementary activities such as deliveries also face the driver classification issue, but because of less stringent regulation the incumbent delivery industry typically does not have the links to local government that the taxi industry has. Moreover, passenger safety and security are less relevant issues, and insurance can deal with the standard risks. The delivery industry is populated with a number of large firms and many small local firms, so the industry is relatively competitive. Incumbent firms likely earn modest profits, which leaves them with weak incentives to take nonmarket action to restrict

ride-hailing. The competitiveness of the market, however, means that profitability will turn on Uber's costs relative to those of incumbent firms.

Passenger safety and security remain a concern, and an incident could provide an opportunity for safety advocates and the opponents of ride-hailing to impose more stringent driver qualifications. These restrictions can include deepened background checks, fingerprinting, and required commercial licensing. A natural extension of required fingerprinting is drug testing, which is required by many companies as a condition for employment. The effect on part-time driving and the resulting capacity reduction could mean that Uber is not viable in the market. As the vote on the proposition in Austin indicates, some cities and countries are willing to live without Uber—at least for a while. Uber's strategy continues to be to venue shift to obtain favorable legislation at the state level, but if it fails at the state level, its business model may be successful only in markets in which part-time drivers are not substantially encumbered.

A solution to the driver classification and the driver qualifications issues is autonomous vehicles, but this solution lies in the future. And, it could have issues of its own. Uber began trial passenger service with autonomous vehicles in Pittsburgh and San Francisco, but with a driver in the vehicle. The state of California demanded that Uber obtain a license for its autonomous vehicles, but Uber refused to do so because its service does not fit the state's definition of an autonomous vehicle because a person is present to monitor the driving. Uber promptly packed up its autonomous vehicles and moved them to Arizona, where the governor welcomed the trial.[59] With driverless vehicles presumably Uber would have to own or lease the vehicles, which then raises the issue of whether it is a platform or a transportation service. Without drivers, Uber's ability to use a mobilization strategy to influence issues in its institutional environment is diminished.

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## Endnotes

[1] Evans and Schmalensee (2016) discuss the basic economics of platform companies. Formal models are provided by Armstrong (2006), Caillaud and Julien (2003), Einav et al. (2015), Jain and Townsend (2014), Lee (2014), Rochet and Tirole (2003, 2006), Weyl (2010). Chen et al. (2017) estimate the value of work flexibility to Uber drivers, Cook et al. (2018) decompose the gender earnings differences among Uber drivers, and Hall and Krueger (2016) analyze the supply of labor among Uber drivers, the variation by week, and the hours worked by drivers.

[2] Uber faces a chicken-and-egg problem in each local market in that it must attract enough drivers to make its service convenient and efficient for travelers and must attract enough travelers to make driving profitable. Most markets have pent-up demand that rapidly materializes, attracting drivers quickly.

[3] Baron (2016) discusses Uber's entry strategy and early institutional challenges.

[4] The characterization of Uber's strategy is the assessment of the author and not the company unless explicitly referenced.

[5] Exit from a local market is low cost because Uber's business model does not require significant irreversible investments when entering.

[6] Surge pricing in one (geographic) market segment attracts drivers from other segments and has resulted in complaints from those other segments about reduced capacity and longer wait times.

[7] Each market served by Uber is viewed as independent of other markets, although some markets may be affected by spillovers from other markets. The institutional environments of those markets can be independent of each other.

[8] The drivers' share used by Uber is between 0.7 and 0.8 and varies by city.

[9] See also Chen et al. (2017), who find that the "overwhelming majority" of Uber drivers work less than 12 hours a week on average.

[10] Chen et al. (2017) find that the opportunity cost for an individual driver varies by time of day and day of the week. The opportunity cost $w$ is to be thought of as the average of those drivers who drive a particular number of hours a week.

[11] The opportunity cost $w$ could be affected by a number of factors such as the ability of the driver and driver performance. On the Uber app passengers rate drivers, and drivers rate passengers. To simplify the model, the opportunity cost is assumed to be fixed for each driver.

[12] If the pool of potential drivers includes more people with high than low opportunity costs, that is, there are more potential part-time drivers than full-time drivers, capacity is more elastic in compensation. For example, if the distribution of $w$ is triangular $f(w) = 2w/\bar{w}^2, w \in [0, \bar{w}]$, capacity is $C(p_U) = \tau^2 D s^3 p_U^3/(3\theta\bar{w}^2)$.

[13] Neither study finds evidence of income targeting by drivers.

[14] The *New York Times*, January 15, 2017 carried an article titled "Drivers Become Slaves to the Surge" with interviews of ride-hailing drivers who only drive in surge periods to obtain the highest compensation.

[15] Other platform companies face the same issue. For example, Airbnb is working to expand capacity by attracting apartment tenants, but most landlords prohibit short-term sub-rentals. To induce landlords to allow tenants to participate, Airbnb offers them a share of the revenue from rentals.

[16] In a standard two-sided platform model, a participant on one side of the platform has a valuation that depends on how many participants are on the other side of the market. In Uber's case, this externality can be measured by a traveler's expected wait time for an Uber car and by a driver's wait time for a passenger. Uber's dynamic pricing and the participation decisions of individual drivers fairly quickly adjust demand and supply. Moreover, even in normal demand periods, drivers choose whether to drive based on their expectations about their wait time, or as Uber measures it their utilization—the fraction of time a driver has a passenger. The wait time then could be relatively constant during a day and across days. Cramer and Krueger's (2016) analysis of Uber data shows that the utilization rate is relatively constant over time and that there is little difference among the five cities studied. If the driver's utilization rate is constant, the expected wait time should be relatively constant. The wait

time is assumed to be incorporated in $\beta^o$ for travelers and $w$ for drivers.

[17] If Uber has a quality advantage $b$ and taxis have a convenience advantage or disadvantage $c' \in [\underline{c}', \bar{c}']$, a traveler chooses Uber over a taxi if $p_T - p_U - c' + b \geq 0$. Then, define the net advantage (or disadvantage) of taxis as $c \equiv c' - b \in [\underline{c}, \bar{c}]$, where $\underline{c} \equiv \underline{c}' - b$ and $\bar{c} \equiv \bar{c}' - b$. The analysis proceeds using $c$. Similarly, $c$ could include a safety and security advantage or disadvantage for taxis relative to Uber.

[18] In some markets, taxi drivers lease medallions for a specified number of hours a day, so capacity depends on the number of drivers active. In New York City, drivers lease medallions for 12-hour periods. Leasing results in taxi drivers driving long hours, particularly relative to UberX drivers. Hall and Krueger (2016, table 4) report that 81% of taxi drivers surveyed drive on average at least 35 hours a week.

[19] Uber uses a surge multiplier to set the price in response to demand. The surge multiplier begins at 1.2 and increases in increments of 0.1 in response to demand. Chen and Sheldon (2015, pp. 4–5).

[20] Differentiating (9) yields

$$\frac{d\hat{p}_U}{d(\bar{\beta}-\beta^o)} = \left[(p_T-\underline{c})^2 - (p_T-\underline{c})(\bar{\beta}-\beta^o) + (\bar{\beta}-\beta^o)^2\right]^{-1/2} \cdot \left\{\tfrac{1}{3}\left[(p_T-\underline{c})^2 - (p_T-\underline{c})(\bar{\beta}-\beta^o) + (\bar{\beta}-\beta^o)^2\right]^{1/2} - \tfrac{1}{6}\left[2(\bar{\beta}-\beta^o) - p_T + \underline{c}\right]\right\}.$$

Substituting from (9) yields

$$\frac{d\hat{p}_U}{d(\bar{\beta}-\beta^o)} = \left[(p_T-\underline{c})^2 - (p_T-\underline{c})(\bar{\beta}-\beta^o) + (\bar{\beta}-\beta^o)^2\right]^{-1/2} \cdot \left[\tfrac{1}{2}(p_T-\underline{c}) - \hat{p}_U\right] > 0,$$

which is positive from (7).

[21] **Proof.** The derivative with respect to $D$ of $E\hat{\pi}_U$ in (4) evaluated at $\hat{p}_U$ is

$$\left.\frac{dE\hat{\pi}_U}{dD}\right|_{p_U=\hat{p}_U} = \int_{\hat{\epsilon}_U}^{\bar{\epsilon}} (1-s)(n+\epsilon-m\hat{q}_T)\frac{dp_U(\epsilon)}{dD} \cdot \left(\hat{\sigma}_U(\epsilon) + \hat{p}_U(\epsilon)\frac{d\hat{\sigma}_U(\epsilon)}{d\hat{p}_U(\epsilon)}\right)\frac{d\epsilon}{\bar{\epsilon}-\underline{\epsilon}}.$$

The first-order condition for $\hat{p}_U$ in (6) is

$$\hat{\sigma}_U(\hat{p}_U) + \hat{p}_U\frac{d\hat{\sigma}_U(\hat{p}_U)}{dp_U} = 0.$$

The second derivative is negative from (8), so

$$\hat{\sigma}_U(p_U) + \hat{p}_U\frac{d\hat{\sigma}_U(p_U)}{dp_U}$$

is decreasing in $p_U$. Then, because $\hat{p}_U(\epsilon) > p_U$, the term

$$\hat{\sigma}_U(\epsilon) + \hat{p}_U(\epsilon)\frac{d\hat{\sigma}_U(\epsilon)}{d\hat{p}_U(\epsilon)} < 0,$$

so demand is elastic for $\epsilon \in (\hat{\epsilon}_U, \bar{\epsilon})$. From Proposition 1 the surge price is decreasing in $D$, so $(\partial E\hat{\pi}_U/\partial D)|_{p_U=\hat{p}_U} > 0$.

The analysis for $\tau$, $\theta$, and $\bar{w}$ is analogous.

[22] http://therideshareguy.com/should-rideshare-drivers-be-required-to-get-fingerprinted/.

[23] See Chen et al. (2017).

[24] Plates issued after 2012 are transferrable but only to active taxi drivers.

[25] http://mobilesyrup.com/2016/05/10Uber-toronto-operating-in-legal-grey-area-until-july-15.

[26] http://news.nationalpost/toronto/Uber-still-alive-in-toronto-as-city-council-approves-compromise-deal-to-regulate- ridesharing-services.

[27] *New York Times*, December 21, 2016.

[28] Section 5.2.2 considers job enhancement as a supply-side dual-purpose strategy intended both to increase capacity and increase the surplus of drivers to strengthen a mobilization strategy.

[29] U.S. Department of Labor, Wage and Hour Division, "Administrator's Interpretation No. 2015-1," July 15, 2016.

[30] *Wall Street Journal*, July 15, 2016.

[31] The United Kingdom has three categories of employment: contractors, workers, and employees; workers have more rights than contractors but fewer than employees.

[32] Uber appealed the ruling, and in November 2017 the Employment Appeals Tribunal upheld the ruling. Uber pledged to appeal that decision.

[33] *New York Times*, October 13, 2016.

[34] Judge Chen had ruled that the arbitration agreement was unconscionable. In August 2017 the Court of Appeals for the Second Circuit also overruled a district court and held that the arbitration agreement is enforceable.

[35] *Wall Street Journal*, August 18, 2016.

[36] Untitled statement, Shannon Liss-Riordan and Adelaide Pagano, no date.

[37] Liss-Riordan may have agreed to the $84 million settlement in anticipation of the appeals court decision upholding the arbitration agreement. Other lawyers representing clients in lawsuits that would be covered by the settlement complained that Liss-Riordan would receive $21 million of the $84 million settlement. The *Wall Street Journal*, August 20–21, 2016, wrote that Liss-Riordan "has formed a niche business shaking down Silicon Valley start-ups." Under pressure, Liss-Riordan agreed to reduce her fee by $10 million.

[38] Judge Chen apparently stated that Uber and the plaintiffs had equal chances of winning. (Fisher Phillips, August 19, 2016, http://www.fisherphillips.com/resoures-alerts-Uber-s-100-million-settlement-falls-apart).

[39] Uber expanded the lease guarantee program into a large leasing program, but in December 2017 it sold its leasing business because of heavy losses.

[40] In July 2017 Uber began allowing tipping on its app in 121 cities.

[41] *New York Times*, January 15, 2017.

[42] *San Jose Mercury News*, January 20, 2017.

[43] *More Options. Shifting Mindsets. Driving Better Choices.*, https://newsroom.Uber.com/making-our-roads-safer-for-everyone-2.

[44] *Wall Street Journal*, June 30, 2016.

[45] The campaign is formally organized by the Taxicab, Limousine and Paratransit Association (TLPA), and its website, http://www.whosdrivingyou.org, has a link providing assistance in filing a complaint.

[46] *San Jose Mercury News*, December 28, 2016.

[47] In March 2018 the City Council's For-Hire Vehicle Committee proposed an annual fee of $2,000 per vehicle.

[48] Allison Griswold, writing in *Slate*, concluded, "All in all, the terms look almost exactly like what Uber wanted, and very little like what San Antonio originally proposed" (*Slate*, October 16, 2015).

[49] The state of California enacted a law imposing an alcohol limit of 0.04 percent for ride-hailing drivers, which is the requirement for taxi drivers and drivers of commercial vehicles. The limit for the general public is 0.08 percent.

[50] Uber provides commercial insurance coverage up to one million dollars for its drivers.

[51] It is not clear that the background checks for taxi drivers and people obtaining chauffeur licenses are better than the background checks used by Uber. Uber sent a memorandum to the Austin city government reporting that its background checks had rejected about

one-third of those with chauffeur's licenses who had applied to drive for Uber. (www.cnbc.com. August 23, 2016.)

[52] Maurice Emsellem, NELP, Huffington Press, July 13, 2016.

[53] The ordinance also included other restrictions such as requiring the vehicle to have a "distinctive emblem" displayed.

[54] In May 2017 Austin withdrew the fingerprinting requirement, and Uber and Lyft returned to the market.

[55] Baron (2016, p. 16) writes, "On an insurance issue in California [Uber] employed grassroots and mobilization strategies in the district of a key state legislator, sending mailers to her constituents and producing a television ad with a former professional basketball player delivering the message" (*San Jose Mercury News*, August 13, 2014).

[56] "In California, criminal convictions can only be reported for seven years unless another law requires employers to look deeper into your background." (California Employment Background Check Fact Sheet, http://www.reentrylegalclinic.org/uploads/7/8/5/9/7859920/californiaemploymentbackgroundcheckfactsheet.pdf, accessed November 4, 2016.)

[57] *San Jose Mercury News*, September 30, 2016.

[58] In December 2017 the European Court of Justice of the European Union ruled on a lawsuit filed by a Spanish taxi association that ride-hailing was a transportation service and as such is subject to the regulatory regimes in the member countries. The Court concluded that Uber's technology controlled prices, who could use its platform, and how drivers are compensated and hence was not simply a peer-to-peer matching platform. The Court is expected to rule in 2018 on a lawsuit brought by a French taxi association against Uber.

[59] Uber later applied for a license in California and returned to the state.

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