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# The Rise of Ride Sharing in Urban Transport: Threat or Opportunity?

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Additional information is available at the end of the chapter

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## Abstract

Recently, the ride-sharing services have become very popular in urban transport. In particular, the rise of dynamic ride sharing startups have challenged the traditional taxicab services. Although those dynamic developments within urban transport systems have made ride share services substitute for cab services, it has been controversial in the political sphere. Some researchers and policy makers argue that ride-share will lead to the death of public transportation, if government does not intervene in this area. However, market developments suggest the opposite. While competition between those urban transport modes has led to the dramatic decline in taxi fares, consumer welfare and economic efficiency have improved. Examining the rise of ride sharing and its effect on the traditional taxicab market, this chapter concludes that ride share services introduces a unique opportunity for the users of urban transport, but not threat. However, a mixed regulatory structure including deregulation and regulation policies is needed to improve market welfare in both markets. While economic regulations such as fare controls and entry restrictions are not necessary for both ride shares and taxicabs, social regulations are still crucial to improve the satisfaction of users of rideshare and taxicab services in terms of the quality of service.

**Keywords:** urban transport, Uber, ride sharing, taxicabs, regulation, deregulation, market welfare, efficiency

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## 1. Introduction

This chapter examines the rise of ride sharing in urban transportation and its effect on the traditional taxicab services. The aim is to evaluate whether ride sharing is threat or opportunity for the future of urban transportation. The rise of ride sharing has influenced the nature of urban transport in many different areas from the quality of service to the structure of prices and demand within public transportation. The Uber experience suggests that ride sharing in

taxi markets has become substitution for the traditional cab services. Clearly, the ride-sharing system competes with the traditional taxicab service. The success of ride sharing stems from its impact on consumer welfare. This refers to economic efficiency considerations under competitive market conditions. Most importantly, this system eliminates the transaction costs of a taxicab market under regulated market conditions [1, 2]. Conversely, the failure of traditional taxicab services stems from distortions inherent in a regulatory process. Price controls and entry regulations lead to artificial monopoly rents through medallion prices and taxi fares. Clearly, while ride sharing increases consumer welfare, the strictly regulated taxicab markets lead to death-weight losses in consumer welfare and economic inefficiency [3].

For that reason, in order to better understand the effect of ride sharing as a transport mode in urban transportation on the traditional taxi services, we also have to take into consideration the reasons and results of taxicab regulation. For this aim, the chapter provides an overview of the literature on the regulation of taxis. This section of the chapter includes the economic rationale for regulation in the traditional taxicab markets, the lessons from some regulatory experiences, and the effect of fare controls and entry restrictions in practice. The chapter also discusses the impact of ride sharing on the cab service and its regulation in the traditional taxi markets. It concludes with a critical statement on regulation, deregulation, and competition in taxi markets, including some policy suggestions. In this context, the chapter consists of three main sections including introduction. In Section 2, I evaluate the rise of ride sharing and its effect on taxi services in urban transportation. In Section 3, I discuss the regulation of taxicabs and introduce some policy suggestions about regulation, competition, and deregulation by taking into account the rise of ride sharing.

## 2. The rise of ride sharing or invisible hand

A substantial recent development in urban transportation has been the occurrence of ride-sharing system as the rise of invisible hand throughout the world. This intra-city transport mode occurred in San Francisco as Uber and Lyft and has become very popular in the United States in a short time. While Uber entered into the market in San Francisco in 2010, Lyft launched in June 2012. Since 2010, ride sharing has expanded and gained significant market share throughout the world. As of September 2015, Uber performs in 60 countries and 300 cities. Today, Uber is in use in 507 cities throughout the world.<sup>1</sup> It has an estimated market value of over \$68 billion.<sup>2</sup> In the case of many cities, ride sharing started to be substitute for the traditional taxicab services in the intra-city public transportation. One recent report found that ride sharing met an average 46% of all total paid car rides through Uber in the major US cities in the first quarter of 2015,<sup>3</sup> because ride sharing is cheaper than a cab trip.<sup>4</sup> Note that this happened within 5 years.

<sup>1</sup> See <https://www.uber.com/>.

<sup>2</sup> See for information about statistics <http://www.businessofapps.com/uber-usage-statistics-and-revenue> and <http://bruegel.org/2016/02/uber-and-the-economic-impact-of-sharing-economy-platforms>.

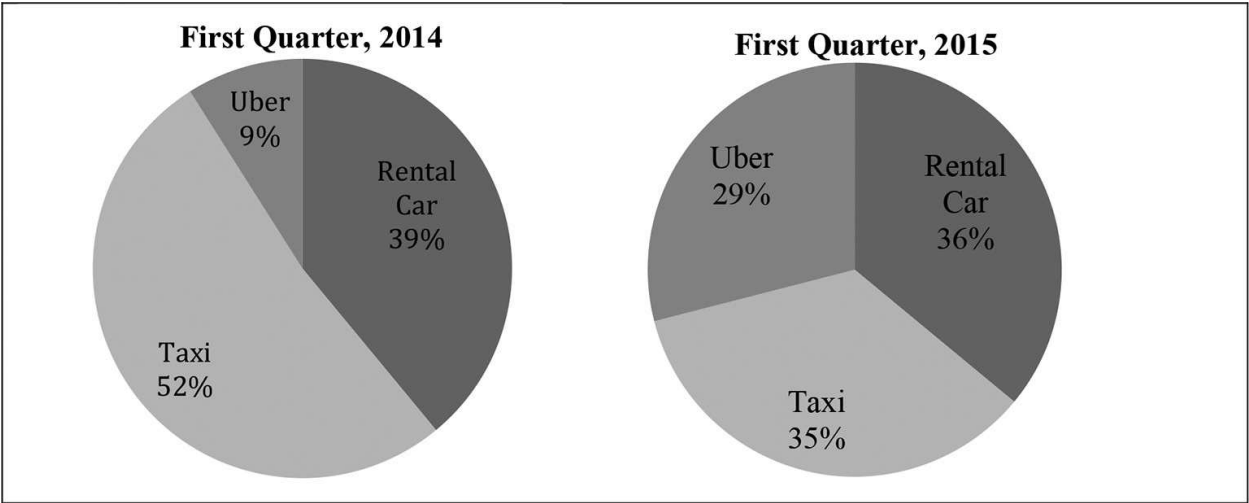
<sup>3</sup> See for more detail <http://www.forbes.com/sites/andrewbender/2015/04/10/ubers-astounding-rise-overtaking-taxis-in-key-markets/#2091ea0722ef>.

<sup>4</sup> A recent study shows that ride sharing is cheaper than taxicab in 21 largest cities in the United States. See for more detail <http://www.businessinsider.com/uber-vs-taxi-pricing-by-city-2014-10?IR=T>.

Even though the dynamic ride sharing emerged recently, the ride-share services have been operating for a long time in the US cities. However, the dynamic ride-sharing services are remarkably different from the conventional ride-sharing applications, and in this sense, the success of the current ride sharing stems from its technological and dynamic nature. Even though the traditional ride-sharing programs were initiated during the World War II to save fuel, this initiation was not successful. However, in the 1970s, it reemerged as solution to environmental hazards from transportation such as energy consumption, air pollution, and traffic congestion. But, aiming at commuters, this system did not involve payment to the driver, even though contribution was made for gas or tolls in some cases. Mainly, the logic of ride-sharing service is to enable commuters to ride together on a regular basis. Park-and-ride lots and high-occupancy vehicles lanes that bypass congestion points in traffic support this system [4, 5]. The first-generation ride-sharing services were not successful. However, Uber has become one of the fastest growing startups in the sharing economy throughout the world. This system has appealed to people for some reasons. First, the dynamic ride sharing commits a regular ride-sharing arrangement for people who are willing to share a ride occasionally. Second, it is particularly attractive for people who are comfortable with computers and cell phone messaging and who are generally mobile in the modern cities. Third, registration and screening by a ride-share service makes this service safe and secure for commuters. Fourth, while the probability to find a quick ride-sharing match has increased over time, wait and pick-up/drop-off times have shortened [4, 6].

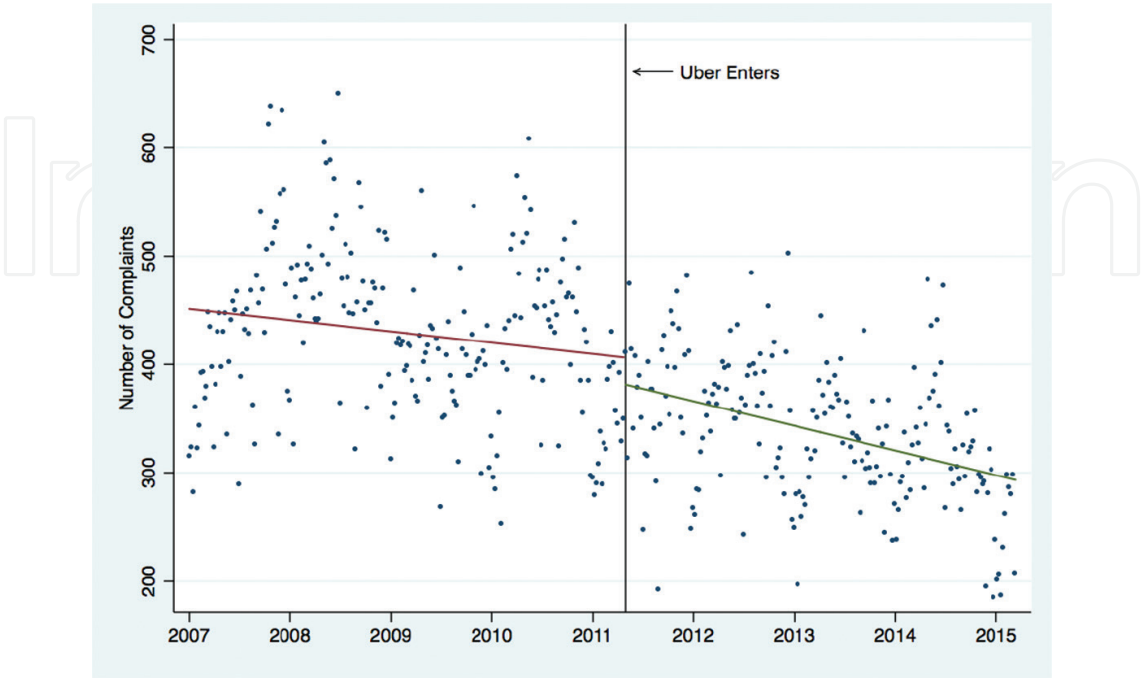
Today, the dynamic Uber or ride sharing connects drivers offering rides and passengers seeking them online through an online app downloaded on smart phones. This app is user-friendly and allows passengers to find the nearest available cars in the ride-sharing system. The cars are private. In other words, ride-sharing companies such as Uber and Lyft do not need to have their own cars. The companies sign up private drivers who are willing to provide rides to paying passengers and pass the ride requests directly to them. The system itself determines the price of the ride and all transactions happen through the online system. In general, 70-80% of each fare goes to the driver and the company keeps the rest.<sup>5</sup> A distinctive feature of ride-sharing service is that it does not include fare controls and barriers to entry as in the traditional taxicab markets. Even though courts in many countries banned or restricted ride-share services because of unfair competition considerations, competitive pressure from ride sharing to the traditional taxi services changes the nature of urban transportation. As a result, the dynamic ride sharing has increasingly become attractive to people who want to use public transport modes in urban transportation. This change in the preferences of consumer using urban transportation has made the ride-share services substitute for the traditional taxicab services. In order to understand this substitution relationship among urban transport modes, we have to look at the change in those transport modes. As depicted in **Figure 1**, while Uber ride increases directly correlate with taxi ride decreases, car rentals are relatively consistent. It is clear that demand for the traditional taxicab service decreases, and concurrently, demand for Uber increases. Because this change in the urban transportation modes continues in favor of ride sharing, we can infer that Uber has increasingly become substitute for the traditional taxicab services.

<sup>5</sup> <http://bruegel.org/2016/02/uber-and-the-economic-impact-of-sharing-economy-platforms/>



**Figure 1.** Uber vs. other urban transportation modes. Source: <http://www.businessofapps.com/uber-usage-statistics-and-revenue/>.

An important effect has been on the quality of taxi services. Wallsten [7] found that taxis respond to competition from the new ride-sharing services in New York City and Chicago by improving quality. The findings from this study confirm that the rise of ride sharing is associated with decrease in pre-trip complaints in New York. **Figure 2** clearly shows that the number of complaints has decreased after ride sharing entered the market in New York City. The findings from the case of Chicago [7] also suggest that complaints for the traditional taxi services have declined after Uber as ride-sharing service entered the market in Chicago. This research concludes that the results from New York City and Chicago are consistent with the idea that the traditional taxi services respond competition from the dynamic ride-sharing services by improving the quality of service.



**Figure 2.** Number of taxi complaints submitted to New York City Taxi and Limousine Commission. Source: Ref. [7].

It is possible to state that the most important effect of ride sharing in urban transportation is the dramatic decline in prices. As reported in **Table 1** and **Table 2**, The rates for ride sharing are generally lower than regular taxis in most major cities in the United States, even excluding the taxi driver's tip. As summarized in Ref. [8],<sup>6</sup> "the column labeled Taxi/Uber shows the taxi fare relative to the Uber fare. If the ratio is over 1, as it is everywhere except New York and Philadelphia, that means that Uber is cheaper than a cab—that is, until surge pricing reaches that level. In L.A., an Uber car is cheaper for this sample trip even with surge pricing up to 1.7x. It is also important to note that you do not have to tip your Uber driver. And most people do tip their taxi driver. If you add a tip of 20% to the cab fares, Uber looks like an even better deal and beats out taxis in every city we analyzed." This finding clearly suggests that price competition leads to the expansion of ride sharing in urban transportation.

	Uber	Taxi	Taxi/Uber
New York	17.75	15.50	0.9
Philadelphia	15.25	14.20	0.9
Portland	15.05	15.00	1.0
Cleveland	13.00	13.95	1.1
Dallas	10.30	11.25	1.1
Miami	13.25	14.50	1.1
Indianapolis	11.65	13.00	1.1
Phoenix	11.00	12.50	1.1
Minneapolis	12.15	14.25	1.2
Baltimore	10.75	13.05	1.2
Columbus	10.20	12.85	1.3
Denver	10.35	13.75	1.3
Detroit	12.30	16.50	1.3
Seattle	11.70	16.00	1.4
San Francisco	12.30	17.25	1.4
Chicago	9.50	14.00	1.5
Boston	11.10	16.60	1.5
Atlanta	10.00	15.00	1.5
Houston	9.00	13.75	1.5
San Diego	11.35	17.80	1.6
Los Angeles	9.40	16.35	1.7

Source: <http://www.businessinsider.com/uber-vs-taxi-pricing-by-city-2014-10?IR=T> accessed on June 12, 2016

**Table 1.** Comparison between Uber and taxi fares.

<sup>6</sup> <http://www.businessinsider.com/uber-vs-taxi-pricing-by-city-2014-10?IR=T> accessed on September 2016.



	Uber	Taxi +20% Tip	Taxi/Uber
New York	17.75	18.60	1.0
Philadelphia	15.25	17.04	1.1
Portland	15.05	18.00	1.2
Cleveland	13.00	16.74	1.3
Dallas	10.30	13.50	1.3
Miami	13.25	17.40	1.3
Indianapolis	11.65	15.60	1.3
Phoenix	11.00	15.00	1.4
Minneapolis	12.15	17.10	1.4
Baltimore	10.75	15.66	1.5
Columbus	10.20	15.42	1.5
Denver	10.35	16.50	1.6
Detroit	12.30	19.80	1.6
Seattle	11.70	19.20	1.6
San Francisco	12.30	20.70	1.7
Chicago	9.50	16.80	1.8
Boston	11.10	19.92	1.8
Atlanta	10.00	18.00	1.8
Houston	9.00	16.50	1.8
San Diego	11.35	21.36	1.9
Los Angeles	9.40	19.62	2.1

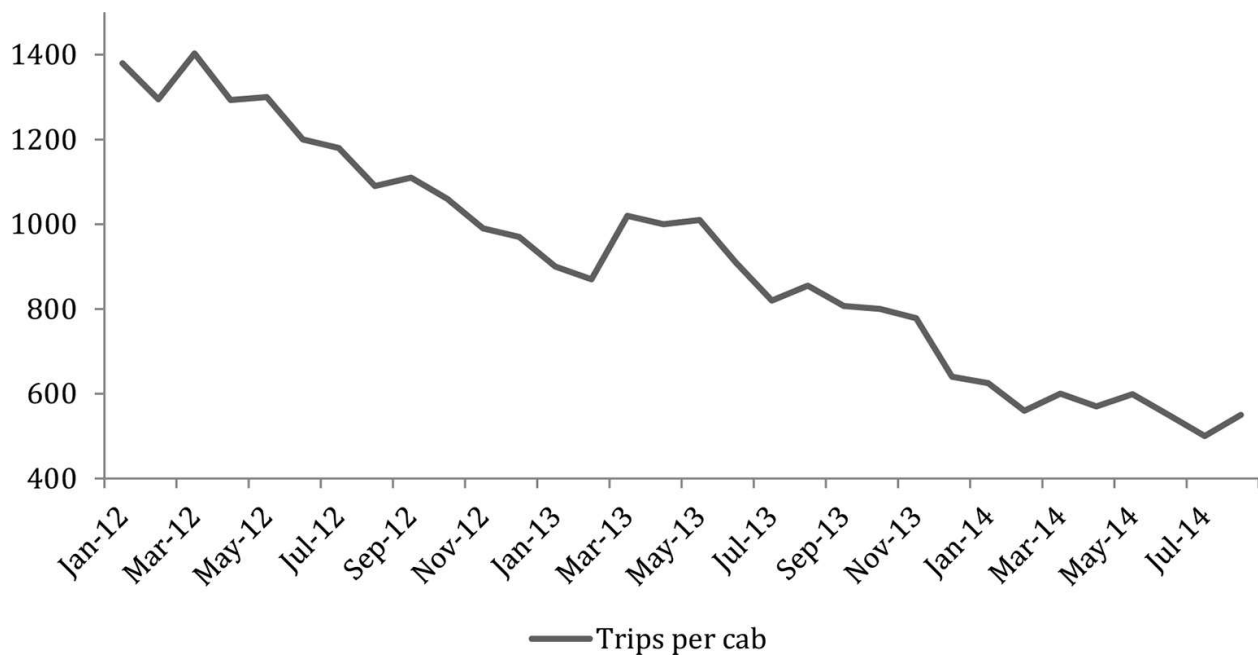
Source: <http://www.businessinsider.com/uber-vs-taxi-pricing-by-city-2014-10?IR=T> accessed on June 12, 2016

**Table 2.** Comparison between Uber and taxi fares with +20% tip.

More specifically, the most remarkable effect of ride-sharing system has occurred in San Francisco and New York, because Uber and Lyft initially launched in these cities. For that reason, in order to better understand the effect of ride sharing on the traditional taxicab services, we examine the cases of San Francisco and New York here, even though it is still at the early stage for a detailed evaluation. Today, in San Francisco, ride sharing meets an important part of demand for urban travel [2]. In other words, the increase in use of ride sharing led to a 65% decline the number of cab trips in San Francisco in 2 years after Uber's entry into the market, as shown in **Figure 3** [7]. Note that this effect occurred within 2 years.

Similarly, a remarkable impact occurred in New York, even though Uber and Lyft only entered into the market in 2011 and 2014, respectively.<sup>7</sup> **Table 3** reports the change in the market shares of intra-city transportation modes in New York City in 2014 and 2015. Whereas the market share of ride-sharing taxi service was 2% in 2014, it reached 8% in 2015 with a 20,600 ride-sharing taxis.<sup>8</sup> In the same period, the market shares of yellow cabs and other transport services declined 9.52 and 5.76%, respectively, even though the number of medalions remained constant at 13,771. This clearly suggests that taxi users started to substitute

ride sharing for cabs. As a matter of fact, the rise in the market share of ride sharing led to an 8% decrease in the number of traditional taxicab trips from 2012 to 2014.<sup>9</sup>



**Figure 3.** Average monthly number of trips per cab in San Francisco. Source: Taxis and Accessible Services Division report by SF Municipal Transportation Agency, 2014.

	2014	2015	Change
Market share of Uber	2	8	+400%
Market share of green cabs	4	5	+25%
Market share of yellow cabs	42	38	-9.52%
Price of medallions	\$1,000,000	\$690,000	-31%
Number of yellow taxicabs	13,771	13,771	Constant

Source: <http://fivethirtyeight.com/features/uber-is-taking-millions-of-manhattan-rides-away-from-taxis>, <http://www.economist.com/news/united-states/21661016-does-uber-substitute-cabs-or-attract-new-riders-it-depends-where-you-live-tale?frsc=dg%7Cc>

**Table 3.** Change in the market shares of intra-city transportation modes in New York City.

As different from San Francisco,<sup>10</sup> the presence of ride sharing in New York has led to a radical decrease in the price of medallions as in Chicago [7]. The medallion prices have dropped dramatically, after they peaked at more than \$1 million in 2013 but fell to less than \$800,000 in 2014 and \$690,000 in 2015.<sup>11</sup> Competition from the ride-sharing services such as Uber and Lyft led to a 31% loss in the value of medallions within 2 years. Also, ride sharing has given rise to a drop in taxi profits. Taximeter revenues declined 18.4% from June 2013 to October 2015, as

<sup>7</sup> See for more detail <http://fortune.com/2016/03/08/lyft-vs-uber-new-york>.

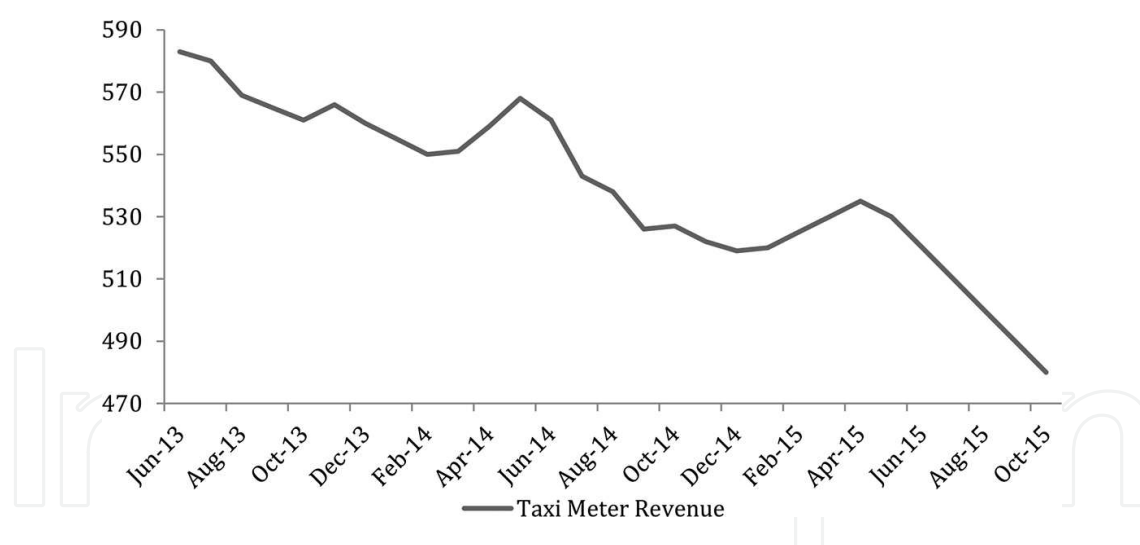
<sup>8</sup> See for more detail <http://money.cnn.com/2015/07/21/news/companies/nyc-yellow-taxi-uber>.

<sup>9</sup> See for more detail <http://www.theatlantic.com/business/archive/2015/07/uber-taxi-drivers-complaints-chicago-newyork/397931>.



depicted in **Figure 4** [7]. The findings from these cities are particularly important because ride sharing in urban transport has emerged and developed in those cities. For that reason, the findings from these experiences shed light to the future of relationship between the dynamic ride-sharing and the traditional taxi services. The current developments clearly confirm the rise of ride-sharing system in the big cities of the United States [4].

In other words, the rise of ride sharing improves consumer welfare and thus leads to efficiency in urban transportation as a whole. **Figure 5** depicts the effects of ride sharing on welfare and efficiency from a point of view of microeconomics in a theoretical basis. In the figure, point M refers to the market equilibrium under monopoly market structure, whereas  $E^*$  represents the equilibrium in a perfect competition market. Note that price is equal to marginal cost (MC) at point  $E^*$ . In a theoretical sense, under a market equilibrium that refers to monopolistic market structure as at point M, there is dead-weight loss (DWL) represented by the area of  $MAE^*$ , since the price under the monopolistic market equilibrium is higher than MC. This is the loss in the welfare of consumers who demand the product or service produced by incumbent firm(s) in this market. On the contrary, the point  $E^*$  refers to an equilibrium in a perfect competition market and there is no loss in consumer welfare at this point. Accordingly, if the market equilibrium shifts from the monopolistic market equilibrium M to the competitive market one  $E^*$ , consumer welfare increases and efficiency improves, since the users of this good or service pay less for the related good/service and buy more. In such market, resources are efficiently redistributed because there is no DWL. The market is the Pareto-efficient.



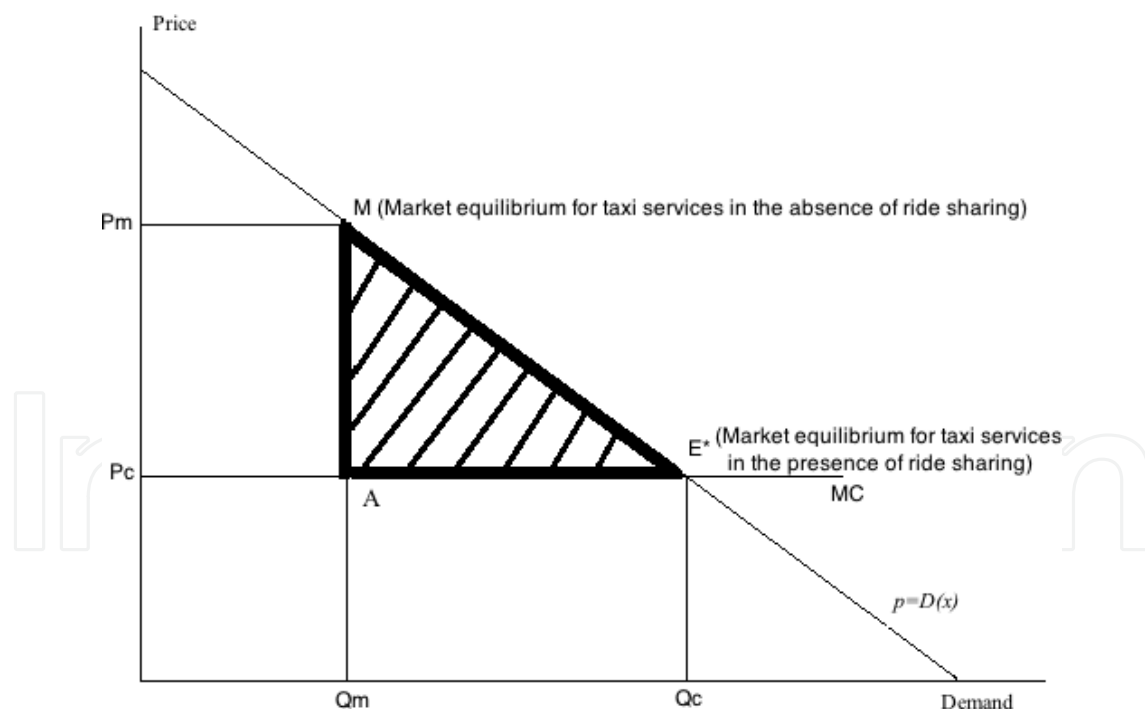
**Figure 4.** Taximeter revenues from cab trips in New York. Source: TLC. <http://www.nyc.gov/html/tlc/html/home/home.shtml>.

Of course, it is not easy to find those kinds of markets in the real world. However, this graphical analysis introduces a reasonable theoretical framework for us to better understand the effect of expansion of ride sharing on the taxi services in urban transportation. Accordingly,

<sup>10</sup> Ride sharing has not affected the price of medallions or licenses in San Francisco, because there is no market for medallions as in New York due to the regulatory mechanism in San Francisco.

<sup>11</sup> See for more detail <http://skift.com/2015/08/12/new-york-city-taxi-owners-form-group-to-take-on-uber/> and <http://www.economist.com/news/united-states/21661016-does-uber-substitute-cabs-or-attract-new-riders-it-depends-where-you-live-tale?frsc=dg%7Cc>.

we assume that the point  $M$  represents the monopolistic market structure in the traditional taxicab markets, because the taxicab markets are traditionally subject to strict government regulations such as barriers to entry and this regulatory environment leads to artificial rents or monopolistic profits for medallion owners and a dramatic increase in taxi fares [9, 10]. Because the level of both medallion prices and taxi fares at the point  $M$  is higher than the ones in the perfect competition market, it is possible to accept that there is the DWL in the regulated taxicab markets. Accordingly, the area of  $MAE$  triangle represents the magnitude of loss in consumer welfare in the absence of competitive pressure from ride-sharing service to the traditional taxicab market under regulation. Conversely, the market equilibrium has moved to the point  $E$  at the competitive level from the monopolistic market equilibrium through the emergence of ride sharing. As discussed above, both taxi fares and medallion prices have declined after the traditional taxicabs started competing with the dynamic ride-share services. This theoretical analysis, which is consistent with the real market developments, suggests that the rise of ride-sharing services leads to a dramatic decrease in dead-weight loss represented by the area of  $MAE$  triangle. We can define this effect as an improvement in economic efficiency in the market for both taxi fares and medallion prices in urban transportation, because medallion prices and taxi fares are close to marginal cost at the equilibrium point  $E$  occurring along with the introduction of ride-sharing services into the market. Overall, the results suggest that the rise of ride sharing in urban transportation improves market welfare and economic efficiency.



**Figure 5.** The effect of ride sharing on market welfare and efficiency in taxi services. Source: This figure and analysis is adapted from Ref. [3].

### 3. Regulation of taxis in urban transport

The conventional academic wisdom is that taxicab market is unique for government regulation [11–14]. Because the main rationale for taxicab regulation is market failure consid-

erations, the aim of regulation of taxis is to ensure economic efficiency by solving market failures. For that reason, taxicab markets have strictly been regulated. Governments have extensively controlled taxi fares and impeded entry to the market. However, this approach is rather controversial today, because, in many cases, regulation of taxis has led to market distortions rather than efficiency. While barriers to entry give rise to monopoly rents for the license owners or interest groups in the market through the regulation-based artificial increases in the value of medallions, price regulation brings about higher fares in the regulated taxicab markets<sup>12</sup> [3, 15, 16].

The failure of regulation and the rise of ride sharing as an alternative intra-city transportation mode have put the inquiry of regulation in taxicab markets into the forefront. While deregulation and competition have been considered as alternative policy measures to regulation [17–19], the ride-sharing system started to threaten the justification of regulation. Regarding competition between ride sharing and cabs, even though it is clear that there is an unfair competition that stems from the regulatory asymmetry between taxicabs and ride sharing, the solution of this problem is not to ban or restrict ride sharing through courts or governments, but to regulate ride-sharing services or to deregulate price controls and entry restrictions in the traditional taxicab market. A plausible solution can be to develop a mixed regulatory mechanism that allows competition between ride sharing and cabs in the market. Since it is clear that the presence of ride sharing leads to innovative developments in the market and competitive benefits for users, a mixed strategy including regulation, deregulation, and competition can lead to more efficient market structure than the traditional taxicab markets [4].

For instance, social regulations should continue to be applied for both the traditional taxicab and dynamic ride-share service. In particular, security and safety for users and drivers are rather important. Also, the quality of service and the qualification of drivers should be regulated in both taxi services. Such social regulations cannot be removed from the urban transportation. However, the regulatory experience in the traditional taxicab markets and the results from the rise of ride sharing in urban transportation suggest that economic regulations such as barriers to entry and price controls are not needed anymore in the process of competition between taxicabs and ride sharing. Governments should deregulate economic regulations, because competition between the traditional taxicabs and dynamic ride-sharing services leads to the remarkable improvements in consumer welfare and economic efficiency by decreasing taxi fares and removing artificial or monopolistic rents in medallion prices. On the other hand, social regulations regarding the quality of taxi service in urban transportation including security, safety, and the qualification of driver are still needed.

## 4. Conclusion

The rise of ride-sharing economy in urban transportation has challenged the traditional taxicab services. The dynamic ride-sharing startups have introduced alternative taxi services to the users of intra-city public transportation. This radical change among public transport modes

<sup>12</sup> Please see Refs. [9, 10] for more detailed information about the effect of entry and price regulations in the taxicab markets on medallion prices and taxi fares.

within urban transport has led to a dramatic decline in taxi fares and thus an improvement in consumer welfare and economic efficiency in the market as a whole. Rapidly, the ride-sharing services have started to become substitute for the traditional taxicabs. While taxicab services have declined, the ride-share services have raised in urban transportation. On the other hand, some researchers and policy makers started querying the regulation of taxicabs, and some others have argued that the rise of ride sharing negatively affects public transportation.

Developments suggest that the rise of ride sharing will not lead to the death of public transportation. Conversely, ride sharing gives rise to the unique opportunities for the producers and users of taxi services in the intra-city public transportation. However, while competition between ride sharing and traditional taxicabs improves consumer welfare, some new problems occur. But, it is clear that the solution of this problem is not to ban or restrict the dynamic ride-sharing services in urban transportation. Instead, policy makers should prefer a mixed regulatory mechanism. The findings suggest that the best policy option is to deregulate economic regulations such as entry restrictions and fare controls and to continue social regulations including security and safety.

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