Impact Of New Technologies On Traditional Transportation Industries

Course Title: Management of Engineering and Technology
Course Number: ETM 520/620
Instructor: Dr. Tugrul Daim
Term: Winter 2015

Mitsutaka Shirasaki

Michael Smith

Ali Al Suliman

Table of Contents

Abstract

This report details the changes in our transportation systems that are occurring and will continue to evolve with more advanced car sharing services as ZipCar and Car2Go and with transportation innovations which fill niches such as Transportation Network Companies (TNC). We will focus on the Goliath in TNC: Uber. Uber's technology strategies will be discussed. This report also analyzes the effect on society, employees, and the public of those three services.

Introduction

Although we have seen technology change our transportation experience with such devices as GPS and cell phones, there are new innovations which may transform the way that we use vehicles. There have been gaps in our usage of vehicles which are just now beginning to be filled by services which leverage relatively new technology.

Background of Ride Sharing

Traditional Ride Sharing such as Carpool, Vanpool, or even Public Transportation System benefits commuters in gasoline, reducing the vehicle depreciation or even eliminating the need to own a car [4]. Other benefits for communities include reduction in traffic congestion, in parking spaces, air pollution or energy consumption [5]. The traditional Ride Sharing system requires advanced planning and arrangement. Sometimes, riders must re-arrange their own schedule around to meet the arranged time. The co-passengers are often friends, coworkers, or regular ridesharing buddies. The recent technological advancement has made it possible to arrange ride-sharing in real-time or on-demand, [6] similar to another part of the transportation segment, car-sharing services.

Background of ZipCar

Car-sharing services are predominantly the rental car services. This segment is different from the ride-sharing such that the service provided by the Car Sharing is not the labor of driving the car and transporting the passenger to the destination, rather, it is the arrangement of a

transportation for the driver and the maintenance of the automobile. This segment of the transportation industry has been transformed by the introduction of Zipcar in 2000. Zipcar introduced a quick instantaneous access to the Car Sharing, easy transaction, and shorter incremental billing system. From the time Zipcar introduced this service innovation in Boston MA in June 2000 for the first time, the company quickly grew to become the world's leading Car Sharing Network in 2012. After only 12 years, Zipcar had more than 777,000 members, 9,700 vehicles, throughout US, Canada, UK, Spain and Austria recording $278,868 million in revenue [7]. In 2013, the Avis and Budget Group acquired Zipcar for $491 million. As a pioneer in short term car sharing market, Zipcar has been established as a brand name. In recent years, there is another company which has become popular in small segment of short term car sharing.

Background Car2Go

Daimler launched Car2Go in Ulm, Germany in 2008 as a pilot program for the private use of Daimler AG employees at first. Car2Go was launched at the second city, Austin Texas, in 2009 with 200 smart cars again with controlled population. In 2010, Car2Go became available for general public and quickly expanded to 12,500 vehicles in 29 cities in 8 countries with 1,000,000 customers by 2014 [8]. For an extended and in-depth look at Car2Go, please refer to Appendix H.

Technology used by ZipCar and Car2Go

Both Zipcar and Car2Go use Radio Frequency Identification (RFID) technology, GPS, Mobile Phone Apps, and cloud based data management [9]. The combination of these technologies has made it possible for the Zipcar and Car2Go to achieve up-to-minute instantaneous access to available vehicles in their Car Sharing Fleet Network. In traditional rental car business, only per day or per week rental was available. Often times, if a customer was late returning the vehicle, it meant the next customer had to wait for the car to be returned. Once the vehicle was returned, it needed to go through a rigorous cleaning, maintenance check, and refueling before the vehicle was handed over to the next customer. This inefficiency often created frustrated and dissatisfied customers. More often, the vehicle had to be reserved days in advance, or even weeks in advance. The service model introduced by Zipcar eliminated this inefficiency by knowing exactly where the vehicles are at the time of deciding to rent a car. Customers can actually see on the smartphone app or on the web whether the vehicle is available to be picked up at the exact moment. [10] This is the same for Car2Go service as well. For the Car2Go

service, this feature is more prominent because the rider can choose any vehicles that are closest to his/her current location.

https://hbr.org/2011/09/the-four-technologies-you-need

Analysis

Service Comparison for Zipcar, Car2Go and Rental Car

Zipcar offers per hour to per day based rental service while Car2Go offers per minute, per hour, and per day based rental service. The table below shows overall comparison of Zipcar, Car2Go, and a rental car. Enterprise is chosen as most comparable rental car company in price.

Table 1: Service Model Comparison of Zipcar, Car2Go, and Enterprise.

	Zipcar	Car2Go	Enterprise
Membership	$25 Application Fee $60 Annual Fee	$35 Application Fee	No Fees
Pricing Model	Per Hour/Per Day	Per Minutes/Per Hour/Per Day	Per Day
Location	120 Locations 198 Vehicles	Within the City Limit 378 Vehicles	10 Locations near Portland Metro
Parking	Normal Rate	Free Anywhere Legal within City Limit	Normal Rate
Gas	Included	Included	Separate
Availability	Variety of Models at different locations	Only SMART Car	Variety of Models within in a location
Vehicle Performance	Excellent	Limited	Excellent
Customer Care	Good	Good	Excellent
Convenience	Good	Excellent	Fair
User Interface	Excellent	Good	Fair

Further analysis [*Refer to Appendix D]* of rate comparison shows that for short trips within a city, the best price and convenience is offered by Car2Go. For short trips out of the city (less than 10 hours), the best price is offered by ZipCar. Otherwise standard rental cars are the best price.

History of Taxi Industry

In many large cities, the city government creates limited licensing of the taxis. Due to the restriction of the number licenses, over time the value of the licenses increases. For example a price of a New York Taxi license (aka medallion) had increased to $1.1 million by 2013. *[See Appendix C]*. This gives the taxi companies a strong reason to lobby to continue to keep the number of licenses low. New York City is a good example of how the taxi permits have been limited to far less of an increase than the change in population, as shown below:

Exhibit 2 History of New York City Medallions versus Metropolitan Population
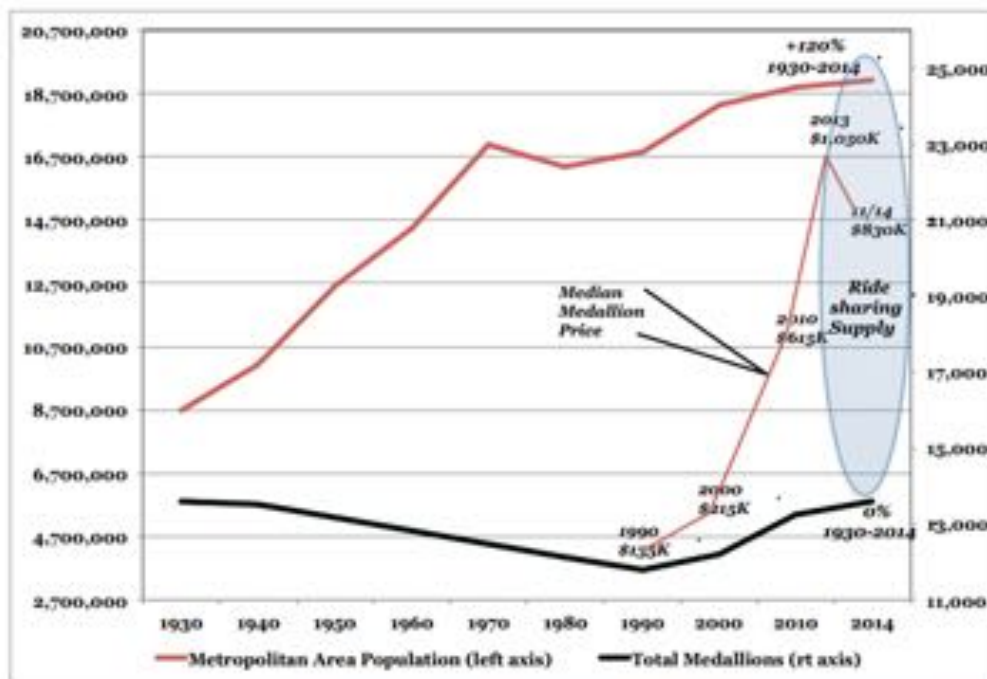
Notice that in this example, the number of taxis in 2014 in New York City is the same as those in 1940, but the population increased from 8.7 million to 19 million. This has left a large gap in the number of passengers and the number of taxi drivers.

How Uber Works

Uber strives to fill the gap between the number of potential passengers and the number of available drivers. [1] Uber increases the number of drivers (supply) by raising fares when they predict there will be more passengers. Raised fares will also slightly decrease the number of willing passengers (demand). Uber also says that their goal is to make sure that there is always a ride available to anyone who needs a ride. [1]
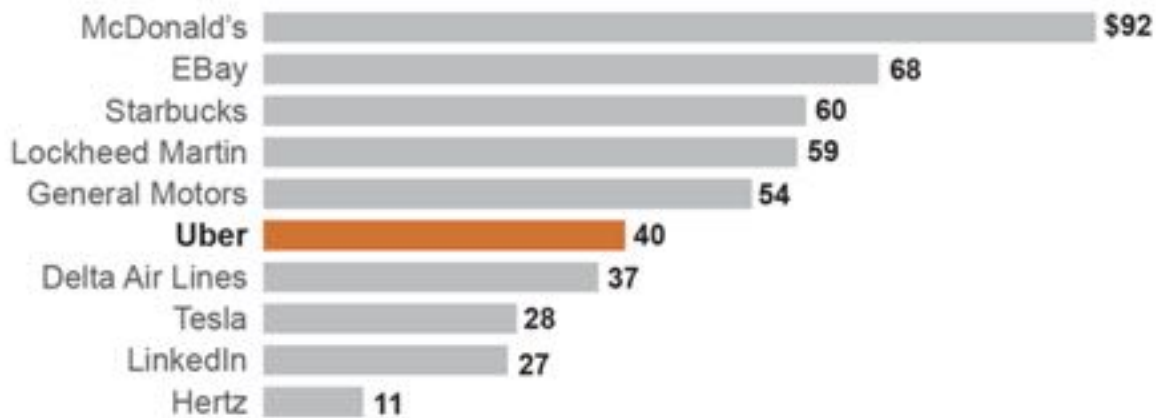
Significance of Uber

Uber's effect on the transportation system is already significant.   In areas where Uber has been fully developed, taxi rides are significantly down. For instance San Francisco has a 65% decline in taxi rides over the last two years [*Refer to Appendix F*]

Based on their $40 billion valuation, they are successful. By studying their use of technology, marketing, and understanding of economics, we can learn from an example of a successful technology-based service company. Also due to their size, we should follow their vision of the future because they have enough money to bring their vision to reality.

The $40-billion start-up

Uber upended the taxi industry by linking passengers with drivers through an app. Uber is now worth more than Delta Airlines and just less than General Motors.

Market capitalization (in billions)

Company	Value
McDonald's	$92
EBay	68
Starbucks	60
Lockheed Martin	59
General Motors	54
Uber	40
Delta Air Lines	37
Tesla	28
LinkedIn	27
Hertz	11

Source: FactSet   Lorena Elebee / @latimesgraphics

[3]

It is considered as the highest-valued technology startup company as of December 2014 [See Appendix D].

Technology used by Uber

Mobile phones are the technology key to making Uber work. Every aspect of communication, connecting people, and routing occurs using the mobile phone. These include:

•Riders have mobile phones which report their locations to the servers.

•Using sophisticated bayesian models, Uber adjusts the prices of the areas based on demand of the riders [11].

•Drivers have mobile phones which report the location of the driver to the servers.[12]

•Drivers are informed where more profitable places (surge pricing) are.

•Riders request to be picked up using their phones.

•Drivers use mobile phones to locate the riders.

•They also have up to date markers on the driver's maps showing the location of the rider, traffic slow downs, and the pickup location

•Drivers also use texting and phone calls to keep in touch with the rider before pickup.

•During the ride, the driver and the passenger see the route being taken.

•At the drop-off the driver indicates on his phone that the drive is done.

•At the drop-off the passenger is informed that she has been charged for the drive. No money changes hands..

•Afterwards, the rider rates the driver and might comment on the ride. If there is any issue (no matter how slight) the Uber company looks into the issue and has a talk with the driver to improve performance.

•After the drive, the driver rates the rider.

Although the mobile phone is not a completely new technology, the use of it in so many ways was innovative and radical. Lately the taxi companies have also moved to using similar technology. [2]

Conclusion

The key take-aways from this study of Uber are:

1. ZipCar and Car2Go are filling in gaps in the car rental industry to allow short term and short distance car rental. [*Appendix H*] Car2Go fills the need for a quick trip within a city. ZipCar fills the need for a trip of a few hours to less than a day anywhere that when you are done, you return to your start location.

2. Uber is filling a gap in service between the passenger and taxi cabs. They try to find a price where supply and demand meet, so that anyone can find a ride if they are willing to pay for it.

3. Uber, ZipCar, and Car2Go all are service businesses which allow people to on demand get a vehicle to use. This changes the transportation system from owning a car to paying for the service of a car. If these companies' visions were to be fully in place, then the ownership of a car would be dematerialized to an app on your phone.

4. Uber has changed the perspective of working at a specific time, place, and price to allowing the worker to determine her own schedule and how much she will work for, often on the spur of the moment.

5. Uber is using the mobile phone in a unique way to provide a radical technological change to the transportation industry.

References

1 - https://www.youtube.com/watch?v=sa0I6sBU0E8

2 - Joseph Rose, "Portland cabbies turn to apps as they prepare for battle with Uber ride-sharing", The Oregonian, September 10, 2014

3 - Tracey Lien et. al., "Now worth $40 billion, upstart Uber outraces other tech models", Los Angeles Times, December 4, 2014

4 - https://www.mycommutesolutions.com/Public/PublicPage.aspx?ItemName=RidesharingFAQ&FileType=HTML

5 - http://www.bnl.gov/rideshare/benefits.asp

6 - http://en.wikipedia.org/wiki/Real-time_ridesharing

7 - http://en.wikipedia.org/wiki/Zipcar

8 - http://www.prnewswire.com/news-releases/car2go-reaches-1000000-members-marking-its-spot-as-the-largest-carsharing-company-in-the-world-300007578.html

9 - http://www.zipcar.com/universities/how/technology

10 - https://toolbox.car2go.com/index.php?id=480&L=1

11 - http://blog.uber.com/passenger-destinations

12 - http://www.huffingtonpost.com/david-fagin/life-as-an-uber-driver_b_4698299.html

Appendix

Appendix A: Methodology

The following sources were used to research this paper.

Internet Articles

In-person interviews
        Brooke Steger – Manager of Oregon & Washington Uber
        10 Uber Drivers in San Francisco & 1 in Portland
        Cab Drivers in San Francisco & Portland
        Frank Dufay – City of Portland Transportation Manager

In-person government meeting
        Transportation Task Force

Publications
        Oregonian
        Uber Article on distribution algorithms
        Portland Business Journal
        Washington Post
        City of Portland reports on Taxi and Car-For-Hire Regulations

YouTube Interviews
        Travis Kalanick – CEO, Founder
        Thuan Pham – CTO

Appendix B: Detailed Case Study of Car2Go

Many are familiar with those "cute little blue cars" that now frequent city streets, the almost iconic car2go Company has become a key member in the car sharing industry. This innovative earth friendly company may seem like its powered by a grass root startup however, car2go is in fact a subsidiary of automotive and now mobility giant Daimler. The Daimler Company has been continually investing in innovations to create alternative technology to make zero emission driving a sustainable possibility for long term use. The company, which is most famously known for its Mercedes Benz Company, also produces a wide range of battery and fuel cell powered vehicles, answering the call for alternative fuel and zero emission options. Daimler understands that as a powerhouse company they have to hold themselves accountable for their environmental impacts and they are "willingly accept the challenge of meeting [their] responsibility towards society and the environment" [1]. However, Daimler took their social responsibilities and created a one of a kind free-floating car-sharing brand out of it.

Daimler launched car2go in the form of a pilot program in the southern German city of Ulm on October 24, 2008. Car2go chose to launch in Ulm because this science centered city provided the perfect environment for such a new mobility solution. The first car2go fleet consisted of 50 smart fortwo cars and initially it was only available for the private use of Daimler AG employees. This controlled launch and use of car2go would allow the company to collect the practical experience data and tendencies of the car2go driver [2]. Following the successful implementation of car2go in Ulm, Daimler expanded car2go and launched in the United Sates; making the city of Austin, TX its first international partner of the company. In November of 2009 car2go introduced Austin to its first North American fleet of 200 smart cars. Again, the pilot program was only designated for a defined group of users but in 2010 they car2go would expand and make this unique free-floating car-share system available to the general. After being made available for public use car2go proved wildly successful gaining close to 15,000 active members who drove over 300,000 miles over 100,000 rental periods that year. [3][4] The response from both pilot cities exceeded Daimler's expectations and opened the European and North American markets to this alternative method for relieving emission and congestion problems in busy urban areas.

The selection of cities that Daimler chose to run pilot programs in were not chosen by accident. In order for such a new and exclusive mobility platform to be successful car2go required the collaboration of forward thinking cities. Both Ulm and Austin were willing to work in with the car sharing company in order to alleviate some of the inevitable problems of urban growth and transportation. Car2go was offering a progressive solution to problems like street congestion cause d by both moving and standing cars but it was also offering an environmentally friendly solutions as well. However, this fresh approach to car-sharing also presented hardships of its own. The success and most importantly the profitability of the company required car2go to come to profitable negotiations that in turn would create a sustainable solutions for this increasing mobility problem.

The success of the car2go pilot system allowed them to gather relevant customer feedback about what changes and further innovations were necessary for their future expansion. Proceeding their one year anniversary in Austin car2go introduced the new "smart car2go edition" vehicle--the world's first car specifically designed and manufactured for car-sharing. The new specially designed smart cars boasted designs that only enhanced the company's low emission and earth-friendly appeal. The car's rental procedure, which is done entirely through technology, was made more convenient and secure with necessary hardware updates. Car2go also addressed customers' other requests by upgrading the car's radio and navigation systems as well as customized wheel and seat size to make their customers were more comfortable during their car-sharing experience [3]. The introduction of the "car2go edition" vehicles, which were first used in Hamburg, Germany, was only the first step taken by car2go in order to keep the momentum and gain the interest of more cities. Car2go soon launched in other European and North American cities and tried to keep up with each city's expectations of alternative travel options. As car2go expanded they enticed their customers further with better eco-friendly technology--the zero-emission fully electric smart car.

Cities that were either previously equipped with or willing to install convenient electric charge stations were offered fully electric vehicles from car2go. In attempts to become the nation's "electric vehicle capital" San Diego was fully open to utilizing car2go's new zero emission technologies and as a result were chosen by car2go to become the first city in the North American market to offer a fully electric car-sharing program. Nicholas Cole, President and CEO of car2go North America, stated that "The launch of an all-electric vehicle fleet marks a new era

in car sharing in North America. San Diego is a forward-thinking city determined to meet the future transportation demands of it residents [5]". The vehicles that car2go chose to use were directly tied to their eco-friendly platform, which set them apart from other car-sharing companies but what truly revolutionized their company was the free-floating aspect of their car-sharing program.

Daimler tapped into uncharted territory when it offered customers a one-way destination car-sharing scheme. Car2go was the first membership based car-sharing program of its kind and this transformation was widely accepted by urban areas and city dwellers alike. As mentioned before car2go is not stationed based like other companies. Instead the cars are sporadically located throughout the greater downtown area of the city. The cars do not have designated parking spots or terminals, alternatively they are parked in any city authorized parking space that the user finds near the fleet's "home area". In most cities, car2go has been able to negotiate special parking rules and exceptions for car2go vehicles. For instance in many cities, like Portland, OR, car2go users do not have to pay for parking in metered spots throughout the city and park beyond posted limits. Of course, drivers are expected to adhere to the rules of specially marked parking spots i.e. loading zones, taxi zones, and spots that convert traffic lanes. However, all car2go users must park their vehicle within the "home area" once their trip is complete." [6]

The city's home area is a designated vicinity of its downtown district and generally extends to other inner city areas just outside the city center. The size of car2go's home area varies from city to city some have a large area while others are much smaller than the perceived "downtown district". Cities that provide a larger home area seem to be simultaneously increasing the number of cars they provide. While there is no empirical data I believe the size of a home area could be seen as a reflection of the city's motivation and willingness to collaborate with car2go in order to lower emissions and relieve urban congestion. Each location's specific car2go website clearly posts a map of the user's designated "home area" on its homepage, eliminating any ambiguity of where to park and locate a car2go vehicle. The mobile app also provides a map to assist its smart phone users. The company is also sure to advise its users to check the specific parking regulations they must adhere to. This intrinsic yet fundamental element of Daimler's car2go company allows car-sharing customers to experience something never offered before—easy one-way travel. [6]

The availability and freedom of car2go vehicles are the most unique traits about the car2go program however, they also provide their customers with low and competitive prices for the use of their services. Car2go is a members-only service however, they only require a one-time membership fee rather than an annual dues. This membership fee ranges from $35 in the North American market to roughly $20 USD in the European market. [6] Upon paying this initiation fee users will receive their personal membership card, which is equipped with a RFID chip that enables the user to access the city's car2go fleet. Car2go also advertises that it fairly calculates its rates and is often in favor of the members. Users only pay for the time that they use the vehicle, which car2go has gotten down to the minute. There are no additional fees added to the user's bill and the standard fee includes insurance and fuel costs as well. The only charges that a member may have to pay would be a result of user error. For example, a car2go user may incur fees if they park the car illegally and the car was towed. The user would be liable for the towing fee as well as the amount the car2go company has set forth in its list of "other fees". These added charges seem to be in place to make drivers accountable during their use of a vehicle and to ensure that all car2go members receive the same high-quality service and ease. Car2go offers users three price points; users can pay by the minute, hourly as well as daily. Charging drivers by the minute is yet another new concept in the realm of car-sharing schemes. Members can use the car for as little or long as they would like giving car2go user the mobility freedom to use car-sharing services without the worry that they will not benefit from an hourly or daily rate which is how traditional car-sharing services operate. Rates by the minute range from .33 to .47 USD; hourly range $14.99 to $19.19 USD; and daily rates range from $58.15 to $84.99 USD. Again, there are no added costs for insurance, fuel, or deposits. Car2go has been pretty successful at maintaining low costs only having to raise prices twice in the North American market. Overall, minute rates have only seen a .06 increase from its pilot price of .35 and hourly rates increased $2.00 from its $12.99 starting point. The largest price increase was made to daily rates, which increased $20.00 from its piloted $64.99 price point. [7][8] However, this price is still competitive with mainstream rental companies especially since there are no fees and the smart car technology greatly reduces gas consumption resulting in much better gas mileage. Free parking is also a huge perk for all day car2go users. Variation in pricing alongside reasonable pricing adds to the simplicity of the car2go experience.

Car2go hopes to entice people to try car-sharing through its unique concept as well as its cost effectiveness but they have made their product and technologies very user friendly to ensure it doesn't alienate any users who may be weary of the company. The process is simple and straight forward. After the user has conveniently signed up for a membership, via online application, and receives their individual card they are able to enjoy the worry free car2go experience. There is no reservation required when the member chooses to use a vehicle. The loose structure allows members to access any vehicle without prior stipulations. If a member cannot easily locate a vehicle by just looking around they can simply pull up the app on their mobile device, tablet, or desktop and check vehicle availability in their location. Members can also reserve the car 30 minutes prior to when they need it, alleviating the stress of locating a car and getting to their destination in a timely manner.

 Once the user has located a vehicle they hold their membership car in front of the card reader on the windshield, unlocking the vehicle. At this time a red light also flashes indicating the beginning of the trip. Once inside the user is able to locate the key and start the car. Before the car can be used the user must put in their designated pin into the navigational touch screen. The screen proceeds to ask the user about the current condition of the car i.e. its cleanliness, whether or not it was locked or if it was parked in an approved spot in the home area. After the user answers these questions they are on their way. When the user has reached their destination the have two choices. They can either leave the car there as long as they are parked in an approved parking space in their home area. Alternatively, car2go offers a stopover feature in some of its cities. Stopovers keep the users trip active during their absence but it guarantees the car will still be there upon their return. To completely end their trip and release the user places the key back in its designated spot and follows the touch screen prompts. Upon exiting the vehicle the user once again swipes their membership card in front of the card reader until it displays "trip complete". This locks the car and successfully ends the user trip. At this point the minutes are added to the user's account and charged at the end of each billing cycle [6]. Car2go has condensed it user process as much as possible in hopes to alleviate any unnecessary hassle that may otherwise dissuade people considering the car-sharing scheme. Recurring user complications could also potentially deter current customers from repeat or frequent use of the program. Car2go has managed to keep its customers satisfied throughout the development and

growth of this revolutionary company. However, customer satisfaction is not the only factor that deems the car2go company successful.

Up until recently the Daimler company measured success in terms of car manufacturing and sales however, the shifting economy in conjunction with changing attitudes have made it clear that mobility innovations are necessary for car manufacturing companies. The disparity between car ownership of past and present generations only seems to reiterate the call for alternative transportation. Previously, it was common for households to own multiple vehicles but today, there is a growing trend of shared economies. This trend has been very apparent amongst millennials, which also account for much of the current transportation demographic. The slow economic growth following the 2008 recession has left a disproportionate amount of millennials directly affected by the weak economy. [9] This directly affects car manufacturing companies because the biggest factor that deters millennials from car ownership is cost.

Car ownership requires continuous financial upkeep, a luxury most millenials cannot readily afford. Therefore, younger generations have been forced to look for and rely on alternative modes of transportation such as public transit or ride sharing. Baxandall, of U.S. PIRG, points out that, "certain generational habits formed at a young age tend to stick, such as the thriftiness imbued in those who grew up during the Great Depression of the 1930s. Before you have settled into middle age, you've experienced that you don't need a car. That could shape your expectations in the future [9]". The current millennial generation has altered the realm of car manufacturing simply because they are not buying cars as frequently, so rather than lose that demographic car manufacturing companies, like Daimler, realize that in order to increase revenues in the current generational market they must transform their products and services to reflect this change.

Profits are the one of the main factors that measures a company's success and car-sharing schemes seem to be beneficial for its users however, the question on the lips of many is whether or not the concept is financially beneficial for these companies. In response to this question, manager of Daimler's mobility media relations, Andreas Leo stated that, "we [Daimler financial] want to make money. This is not a marketing gag or charity concept [10]" Clearly Daimler only launched the car2go company sole purpose of raising profit margins in an economy that has

resulted in a decline in the demand for luxury cars. And according to Leo four of the thirty car2go locations were already reporting as profitable in the summer of 2013. Daimler reached profits much more rapidly than predicted but the company's goal is to further capitalize on the economic success of this company.

The rapid and overall success of car2go led parent company, Daimler Financial Services AG to create a designated mobility subsidiary. Currently the car2go company as well as any other mobility developments now operate under Daimler Mobility Services GmbH. Following the consolidation of Daimler's mobility services the company is now operating as a separate entity with the expectation of becoming a profitable service that reflects the changes in car use and purchase. Daimler GmbH continues to revolutionize and further customize its mobility platform, making sure that is remains set apart from other car-sharing companies. As an independently operating financial service Daimler GmbH is able to develop and add services that improve both the use and profitability of their mobility services. [12]

In 2013 the car2go parent company acquired the moovel application as a new component for their mobility services. The moovel app, which is currently only functional in European destinations, works in conjunction with the application centered Car2go Company. Moovel is self-advertised as the only app needed for urban mobility and claims that it finds its users the best possible option for getting from point A to point B, in respect to alternative transportation outside of private vehicle transportation.

The moovel app allows customers to compare travel time and costs of various alternative transportation services including taxis, ride sharing services like BlaBlaCar and Carpooling.com, public transportation, and car2go service. The success of car2go scheme paved the way in Daimler GmbH's expansion of integral components. Moovel is a representation of this expansion and the app's full integration of various innovative mobility services of both public and private sectors proves to be its main advantage [13]. Daimler's moovel app has the potential to become a company platform in gaining car2go users but it also acts as incentive for Daimler GmbH to research and develop additional mobility services to further appeal a viable option for alternative transportation.

It does not appear that Daimler will eliminate other alternative modes of transportation by creating a monopoly in mobility services. Car2go's success also somewhat relies on its easy coexistence with other transportation options, like public transportation. In a discussion about car2go's relationship with public transit North American Daimler GmbH CEO, Nicholas Cole, mentioned that the presence of car2go has in fact complemented city's public transportation rather than dominate it. For instance, cities that are experiencing rapid growth often create a number of difficulties for city governments; especially in respect to population growth and urban mobility. Cities, like Seattle for instance, are trying to figure out how to repurpose their streets in order to move people more efficiently [14]. This is where car2go has been beneficial however, due to the limits of the vehicle's home area many who live outside of the city find it most beneficial to drive rather than be at the mercy of public transit day after day. Car2go offers an alternative to the dichotomy of a commuter's "last mile". With a car2go membership commuters can take public transportation into town and still have on demand access to a vehicle when they need it. Through car2go they are able to avoid the high costs of other downtown mobility services, like taxi service. Daimler doesn't assume that car2go will act as a replacement for private car ownership but rather an affordable transportation option.

As mentioned before, car2go offers an unprecedented service that vastly differs from other companies. There are a number of companies, like zipcar, getaround, or uber, which cater specifically to people's car-sharing needs. The latter two mentioned are actually peer-to-peer and taxi like car sharing services so they do not operate as freely and fluid as car2go. Bigger car rental companies like Enterprise and Hertz have also implemented semi on-demand service to adapt to the changing environment. Both car2go and its competitors cater to different trips, occasions, and markets. Factors such as, trip length, rental periods, active necessity for alternative transportation, and the spontaneity of a trip all determine which service is best suited for every individual customer. Daimler understand that their smart cars are not ideal for a cross county camping trip, especially since they only offer two seats and little cargo room. In some cases it would make sense to rent from a different company other than car2go. The technology and ease of using car2go expanded their rental pool but there are a number of limitations car2go presents as well.

However, car2go has looked to address some of these limitations in order to encourage further growth. Recently car2go announced that members could use car2go memberships interchangeably in other cities and they opened their service even more by now allowing vehicles to travel to other car2go cities and everywhere in between. Their recent advertising scheme focuses of this new aspect to car2go. They have posted people's 14-day car2go adventures hoping to illustrate that there are virtually no limitations to car2go's use. The ads feature hip and adventurous 20 something's having the time of their life, which demonstrates a new "cool kid" allure to the company. Car2go has also been in the process of further expanding its mobility services to reach an even larger demographic and clientele.

Daimler GmbH has recently introduced a new brand to the car2go scheme it has replaced one of the eco-friendly company core distinctions. Rather than using the standard smart car fleet, some car2go users now have access to black b-class Mercedes Benz cars. This service, operating under the "car2go black" brand, allows users to access larger and higher luxury vehicles that may be required for both urban and leisure transportation. By introducing larger vehicles to the car2go company, Daimler is slowly eliminating some of the differences and barriers separating car2go from other car-sharing companies. Car2go black only operates slightly different than the traditional car2go fleet. Members can still locate these vehicles on short notice however, they must rent the car from a dedicated reserved parking spot unlike traditional car2go vehicles that can park freely within the city's home area. This new brand requires designated spots like other car-sharing services but car2go black users still maintain a little more freedom because they are not required to return the car back to the same dedicated stop; continuing to offer an easy one-way travel solutions for its customers. Following the traditional model car2go users can use the Mercedes Benz b-class for an unlimited amount of time and they still do not require users to commit to a return time. This new brand will still be reliant on smartphone technology as does the traditional car2go brand. The car2go black brand provides customers with a more luxurious car-sharing experience. These vehicles run on diesel fuel with a 7G-Tronic automatic transmission. The vehicles also boasts a built-in navigation system, air conditioning, and heated leather seats. Currently Daimler has only launched 100 car fleet in Berlin and Hamburg, but hopes to expand to all members this spring. Following the company wide launch car2go black will also begin to work on long-term reservations for rentals. Alongside this new car2go brand Daimler has also introduced its newest mobile service, "park2gether". This is a new contact

forum that brings together providers and users of city parking spaces. [15] Car2go's recent shift enters the company into a larger realm of car-sharing and has expanded its potential clients. This new brand is also very attractive to businesses as they too look for alternative and innovative company car-sharing choices.

The future of car2go seems to be an endless potential for growth. I believe they have developed a company that answers pressing problems for urban transportation. The fact that they have expanded their brand into uncharted territory in response to low sales shows the company's initiative to rebrand itself in order to appeal to the changing transportation demographics. Car2go is also constantly innovating its company without derailing much from their marketing platform to offer a reasonably priced low-emission on demand car sharing service. Daimler recognized the need for change amongst the millennial generation however, there is also research surrounding the potential benefits car2go can offer to the elderly demographic as well. They are presenting car2go as an easy and viable option for all city dwellers. I also believe the car2go will continue to grow and expand because it works in cooperation with the cities it inhabits and reaches mutual terms in order to sustain its urban presence. The car2go company continually reflects the needs and demands of the individual cities it operates within. For example, Portland is a very bike centric city and car2go recognized that these particular users may benefit from new bike rack hardware but in other places this may be an irrelevant change. If car2go keeps expanding its brand, like car2go black, and focuses on how it can improve its services at an individual level Daimler GmbH could easily reclaim lost profit margins—and then some.

References to Case Study of Car2Go

[1] Daimler Financial Services, "Daimler.com," [Online].

[2] Daimler Group, "Daimler," Daimler Board of Management, 2015. [Online]. Available: https://www.daimler.com/company. [Accessed 6 March 2015].

[3] PR Newswire, "car2go Austin Celebrates First Anniversary with Approximately 15,000 Registered Members and Fleet Extension," PR Newswire Association LLC, New York City, 2010.

[4] PR Newswire, "Video: car2go goes USA - Daimler Introduces Innovative Mobility Concept in Austin, Texas," PR Newsire Association LLC, New York City, 2009.

[5] just-auto.com, "US: car2go announces first all-electric carsharing fleet in North America," AROQ Limited, Bromsgrove, Worcs United Kingdom, 2011.

[6] Daimler , "Car2go.com," Car2Go N.A. LLC, 2015. [Online]. Available: car2go.com. [Accessed 13 March 2015].

[7] S. Blanco, "Car2go raises prices for U.S. carsharing network," autoblog.com, 2012.

[8] S. Blanco, "Car2go raises carsharing prices in most North American cities," autoblog.com, 2013.

[9] J. Moore, "Millennials point transit in new directions; Economics push young adults to expand their transportation menu beyond the automobile," *Star Tribune [Minneapolis, MN],* p. 1A, 30 November 2014.

[10] S. McGrane, "Car Sharing Grows with Fewer Strings Attached," *The New York Times,* p. B1, 26 June 2013.

[12] Daimler , "Daimler creates subsidiary for innovative mobility services," Daimler Financial Services, Stuttgart, 2013.

[13] "Daimler," Daimler AG, 2015. [Online]. Available: www.daimler.com/company. [Accessed 13 March 2015].

[14] B. Nourish, "Interview with Car2Go CEO Nick Cole," seattletransitblog.com, Seattle, 2013.

[16] India Automobile News, "Daimler Corporate communications: Car2go Black: Carsharing with the Three-Point Star," Athena Information Solutions Pvt. Ltd, New Delhi, 2014.

Appendix C: Taxi Company Motivation
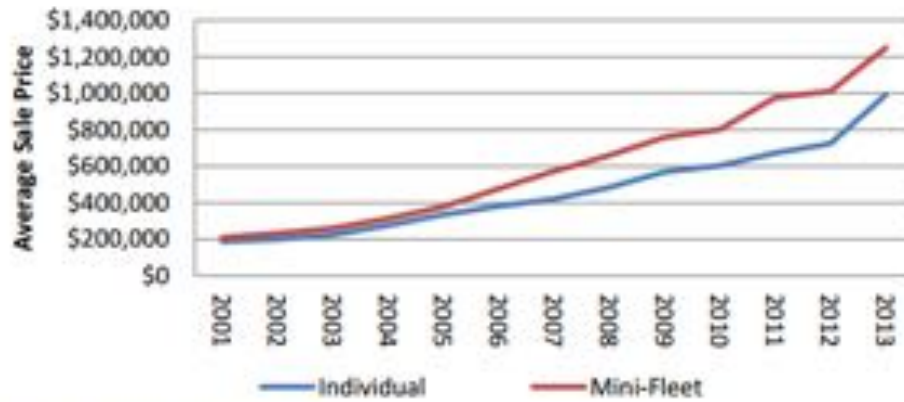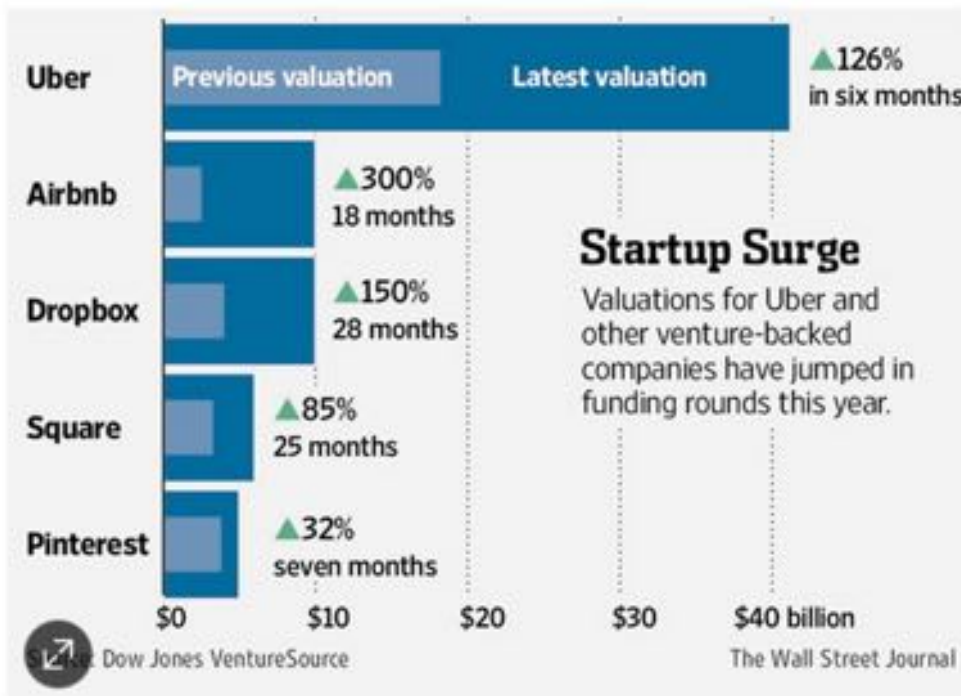

Independent and Minifleet Medallion Sale Prices

Figure 12 Taxi Medallion Average Annual Sale Prices
Source TLC Transfer Data 2001-2013

http://www.nyc.gov/html/tlc/downloads/pdf/boro_taxi_market_study.pdf

Appendix D: Uber Valuation

Uber — Previous valuation — Latest valuation — ▲126% in six months

Airbnb — ▲300% 18 months

Dropbox — ▲150% 28 months

Square — ▲85% 25 months

Pinterest — ▲32% seven months

Startup Surge

Valuations for Uber and other venture-backed companies have jumped in funding rounds this year.

$0 $10 $20 $30 $40 billion

Dow Jones VentureSource   The Wall Street Journal
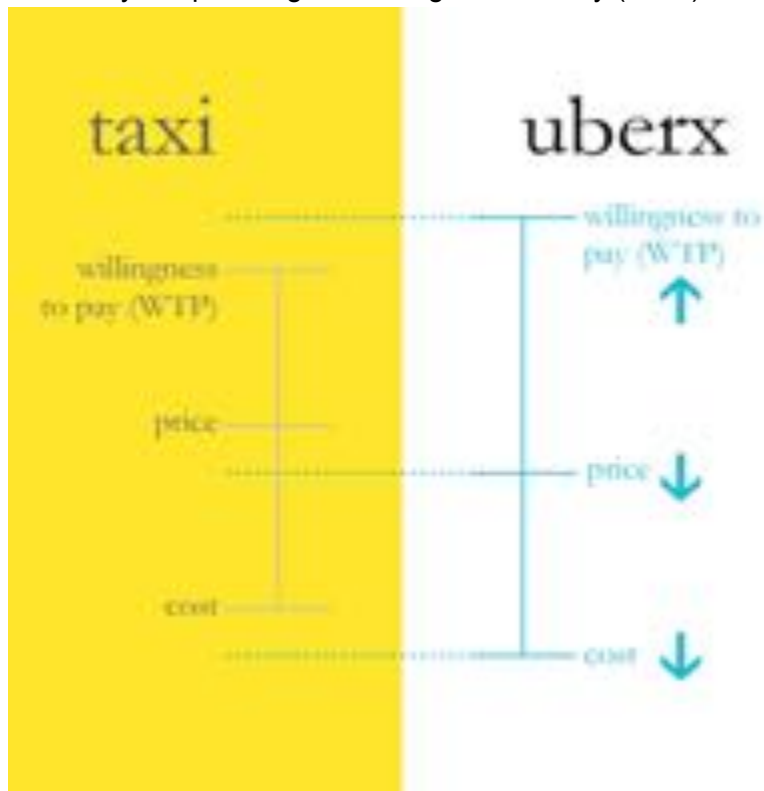
The Wall Street Journal, "Uber Snags $41 Billion Valuation", by Douglas Macmillan et. al., December 4, 2014

Appendix E: Attitude of Passengers
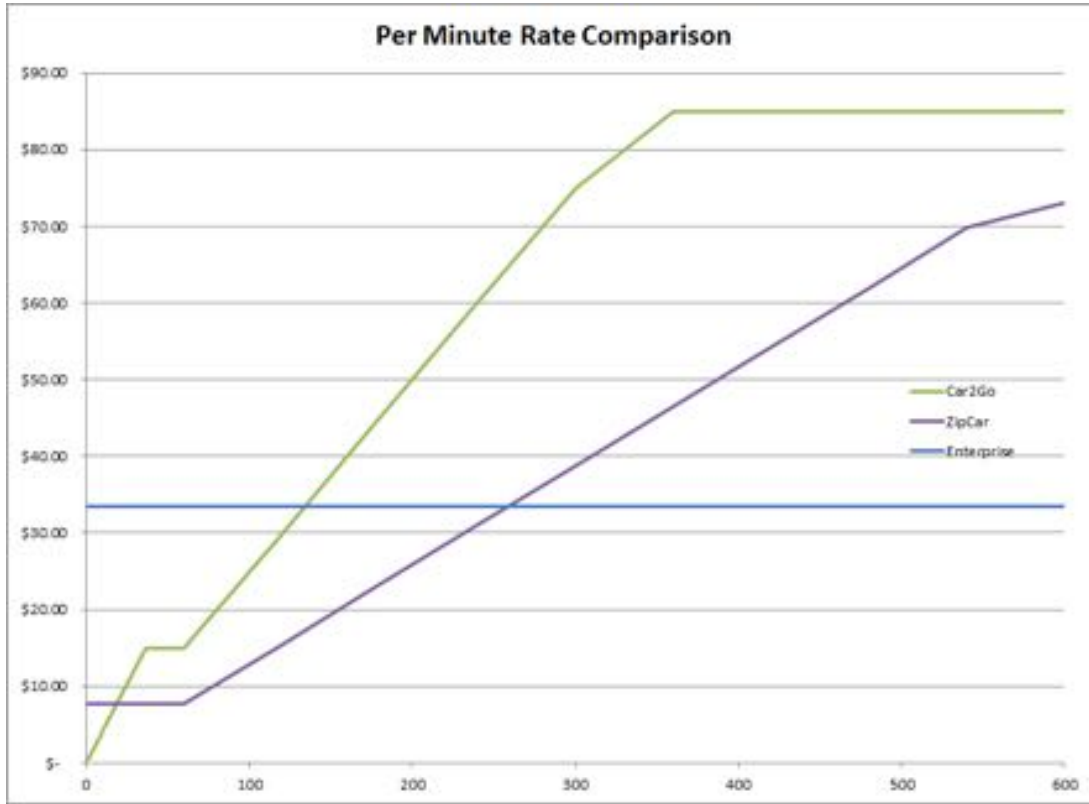
Adding value is increase by the passenger's Willingness To Pay (WTP)

http://www.tofurious.com/marketing-tips/uber-competitive-strategy-vs-taxi/

Appendix F: Rate Comparison of Zipcar, Car2Go, and Enterprise

Above figure shows simple per minute rate comparison between Car2Go (Green), Zipcap (Purple), and Enterprise (Blue).

Per Mile Rate Comparison within the City

Legend: Car2Go Cost, ZipCar Cost, Enterprise

Above figure shows per mile rate comparison traveled within the city limit (home area for Car2Go). Travel times is calculated with 20 mph average speed, and spending 30 minutes at the destination. Per mile increase in Enterprise rate is based on $2.50 per gallon of gas with average 35 MPG.

Time Spent at Destination
Rate Comparison at 5 miles
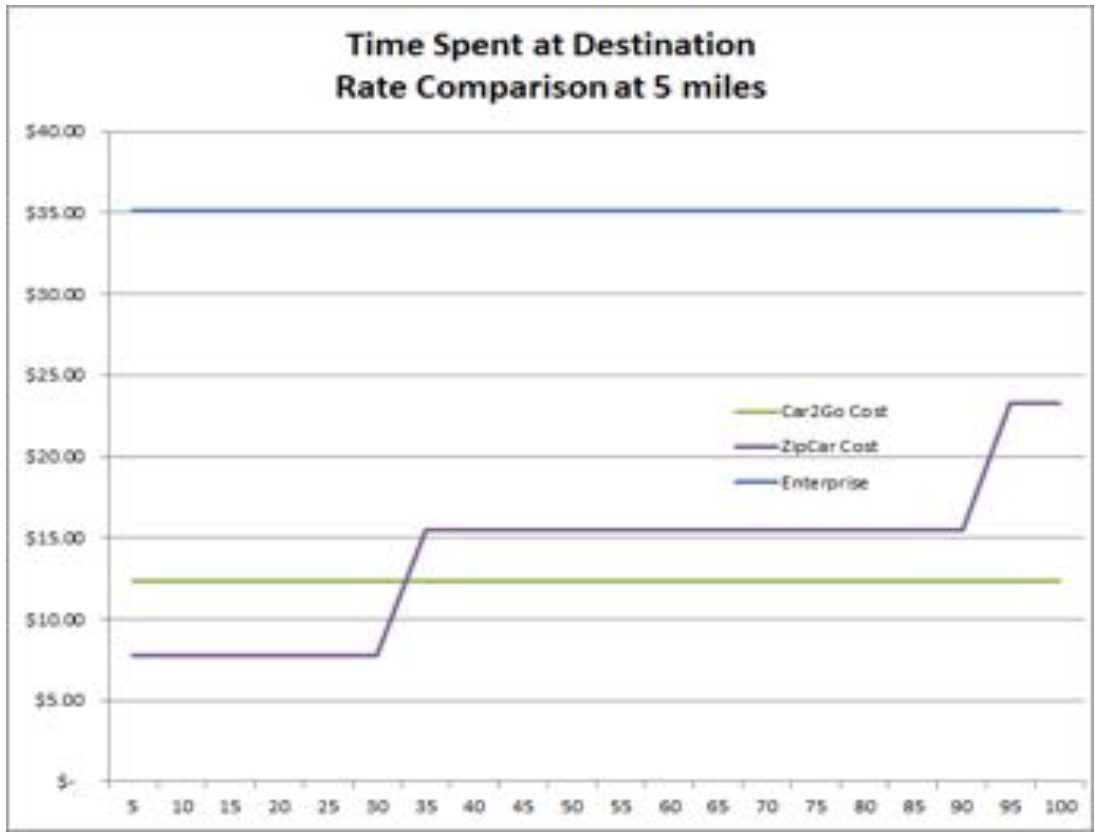
Above figure shows per minute rate comparison of Car2Go, Zipcar, and Enterprise within the city limit. Calculation is based on 5 miles travel distance with 20 mph speed.

Per Mile Rate Comparison Outside the City
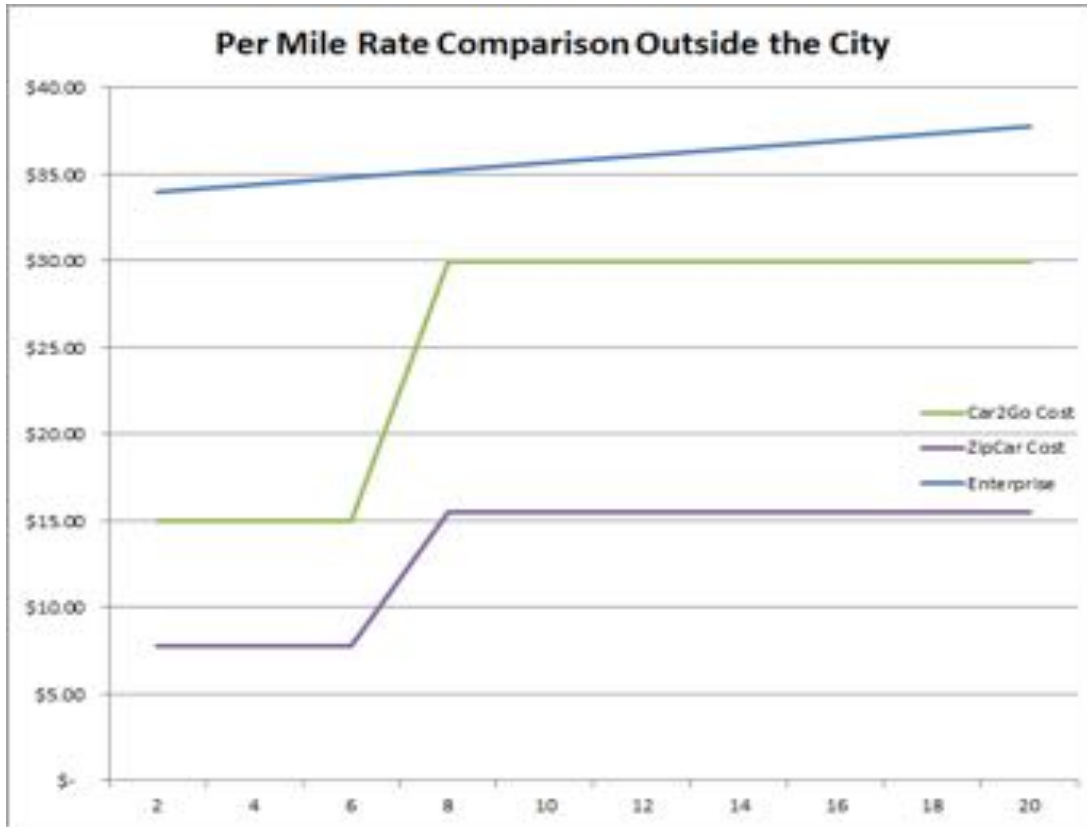
Above figure shows per mile rate comparison of Car2Go, Zipcar, and Enterprise outside the city limit (home area for Car2Go). Calculation is based on 30 mph and 30 minutes spent at the destination.

Time Spent at Destination
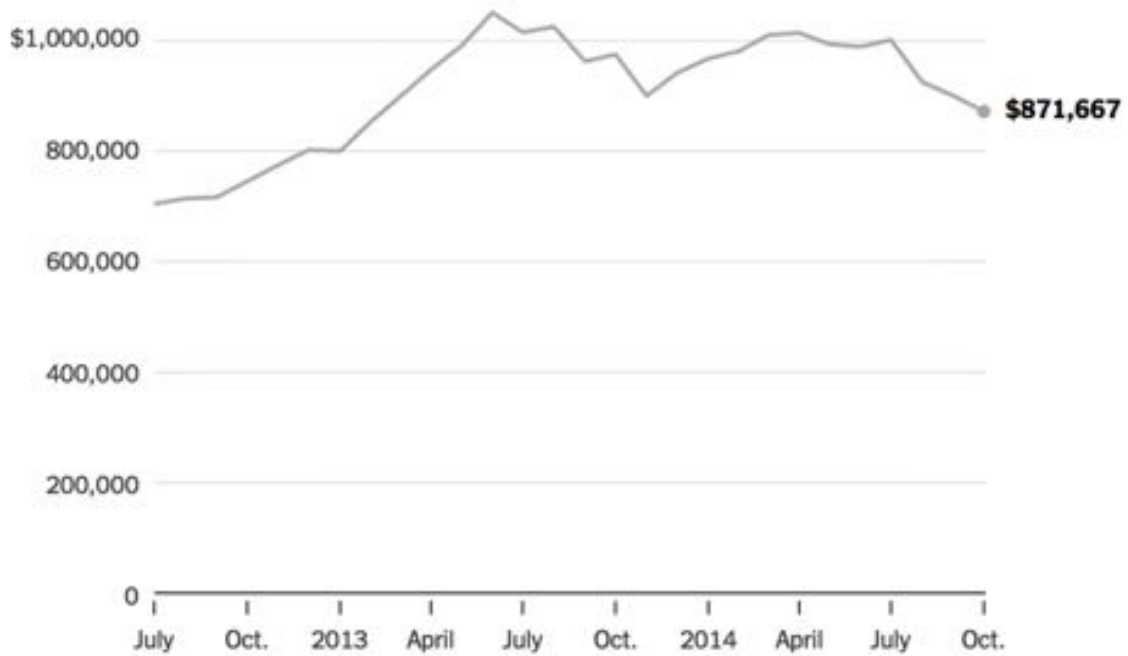**Rate Comparison at 5 miles**

Above figure shows the time spent at destination rate comparison for Car2Go, Zipcar, and Enterprise. The calculation is based on travel distance of 5 miles and 35 mph average speed.

Appendix G: Uber's impact on taxis

Million Dollar Medallions No More

After decades in which it seemed taxi medallion prices could go only up, prices in New York City have slumped below $900,000.
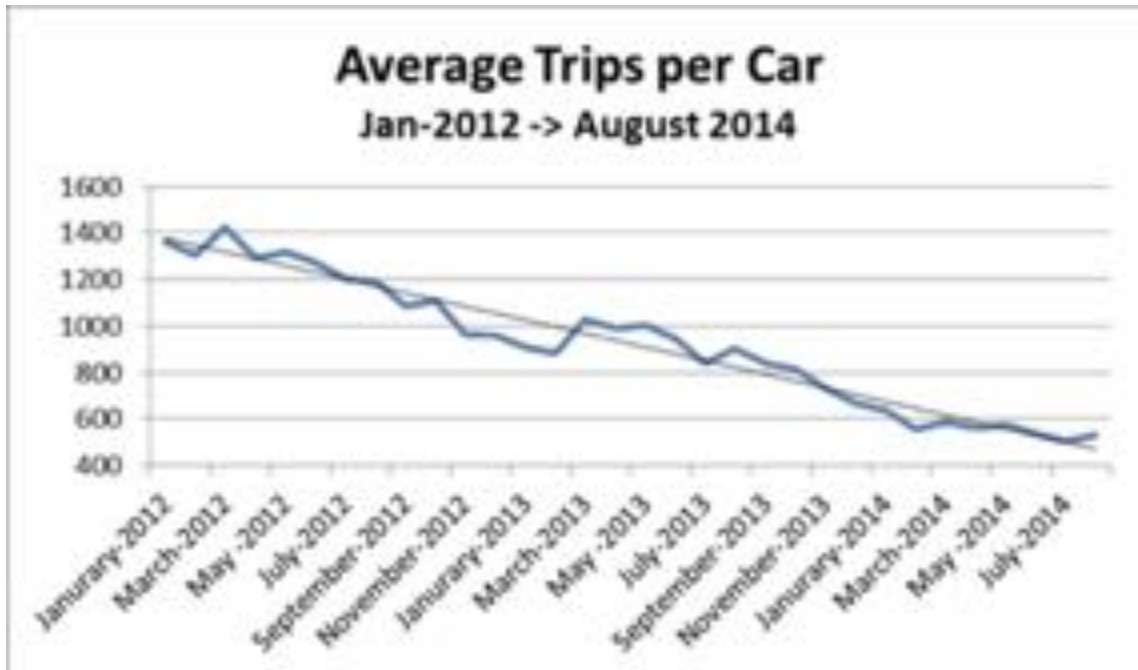
Monthly average price for an individual (nonfleet) medallion:

Source: New York Times calculations based on Taxi and Limousine Commission data

http://www.yellowcabnyctaxi.com/wp-content/uploads/2014/11/nyctaxi-medalliion-pirce-1024x810.png

Average Trips per Car
Jan-2012 -> August 2014

http://www.theatlantic.com/technology/archive/2014/09/what-uber-is-doing-to-cabs-in-san-francisco-in-1-crazy-chart/380378/

Taxi cab riders are down 65% in San Francisco, due to Uber.

Appendix H: Uber can save commuter money if they give up their 2nd cars

Annual Savings to the Commuting Consumer Based on Uber Utilization and Driver Wage

	40%	50%	60%	70%	80%	90%	100% Uber Utilization
$7.5	$ (4,749)	$ (2,288)	$ (646)	$ 526	$ 1,405	$ 2,089	$ 2,636
$10.0	$ (6,374)	$ (3,588)	$ (1,730)	$ (403)	$ 593	$ 1,367	$ 1,986
$12.5	$ (7,999)	$ (4,888)	$ (2,813)	$ (1,331)	$ (220)	$ 645	$ 1,336
$15.0	$ (9,624)	$ (6,188)	$ (3,896)	$ (2,260)	$ (1,032)	$ (78)	$ 686
$17.5	$ (11,249)	$ (7,488)	$ (4,980)	$ (3,188)	$ (1,845)	$ (800)	$ 36
$20.0	$ (12,874)	$ (8,788)	$ (6,063)	$ (4,117)	$ (2,657)	$ (1,522)	$ (614)

Uber Drive Wage/Hr

https://medium.com/@sri_batchu/an-uber-world-could-we-really-give-up-our-cars-44f4accdc385