

TWO-SIDED MARKETS AND RIDE-HAILING

Can academia hold the keys to industry insights?

Bachelor's Thesis
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Abstract

I conduct a literature review of academic articles surrounding ride-hailing to attempt to glean insights about these platforms. I present multiple papers around topics such as two-sided markets, multi-homing and dynamic platform competition. I show that the literature, both theoretical and empirical, surrounding these topics indeed gives us tools to analyze not only single ride-hailing platforms, but also the industry itself. I use these methods to produce insights from a local and temporal market case study.

1. Introduction

1.1. The growing importance of ride-hailing

Ride-hailing services such as Uber, Didi or Taxify have had a significant and disruptive impact on the way we move in the past few years. Thanks to these services, riders nowadays can request rides using their smartphones instead of hailing taxis on the streets, which used to be the norm in big metropolitan areas (Feng, Kong, & Wang, 2017). It is estimated that currently around 25% of all adults in the US use ride-hailing services as their primary method of transport, and that around 30% of those users do not even own a personal car anymore (Clewlow, Gouri, & Mishra, 2017).

Ride-hailing services are certainly not just an American phenomenon. Uber, one of the first ride-hailing companies, currently operates in over 65 countries and 600 cities worldwide, while currently estimated at a valuation of a whopping \$120 billion (Uber Newsroom, 2018). Companies such as Didi(China), Grab(SEA), Ola(India), Taxify (Europe & Africa) lead their respective local markets (Coqui, Marian, & Xu, 2018).

It seems that this disruptive impact of ride-hailing services is not showing any signs of slowing down. In fact, it seems that the whole industry is still in a massive growth phase as the major players are constantly reporting on new milestones reached. Take for example the fact that Uber just completed its ten-billionth trip in June 2018 (Uber Newsroom, 2018), and that the Chinese competitor Didi completed 7.43 billion rides in just the year 2017 (Chinadaily, 2018).

In addition to showing no signs of stopping, the “giants” of ride-hailing are slowly approaching to valuations comparable to the biggest tech companies in the world. Uber just recently announced its planned 120 billion dollar IPO (Uber Newsroom, 2018). Thus, it can be argued that finding a way to study the workings of these companies and maybe even the industry as a whole is of economic importance. Successfully secreting actionable insights through economic analysis could lead to positive outcomes such as more sustainable growth, more efficient market practices and more researched government interventions.

1.2. A prelude to the relevant literature

To successfully study these ride-hailing platforms, I will turn to academic literature on the topic for help. Most of the academic work explicitly on ride-hailing is quite recent. The works that seem to stand out most are empirical works with a focus on disruption and the concept of a sharing economy (Sundararajan, n.d.). For example, (Cramer & Krueger, 2015)

investigate the efficiency of ride-hailing, specifically Uber, compared to traditional Taxis by comparing utilization rates of Uber drivers to taxi drivers. Their study shows that through the use of this ride-hailing platform, Uber drivers spend a significantly higher fraction of their time and drive a substantially higher share of miles with a rider in their car than taxi drivers do.

In addition to this, academic papers around the topic are very interested in the functionality of the dynamic pricing in these platforms. Some papers studying this include the work of (M. K. Chen & Sheldon, 2015) who study how drivers on the Uber platform respond to these dynamic changes in pricing. The paper by (L. Chen, Mislove, & Wilson, 2015) takes a deep-dive into the inner workings of “surge pricing”, the dynamic pricing method employed by Uber. Another important piece is the research done by (Castillo, Knoepfle, & Weyl, 2016) who show the how dynamic pricing is a way of countering issues that would otherwise spring up in the market.

However, these works are all quite recent and do not offer the macro-level insights that we are looking for. But by searching through theoretical works around ride-hailing (Belleflamme & Peitz, 2018; Lee, 2017; Loginova, Wang, & Liu, 2018) we finally find a common thread in the concept of “two-sided markets”. Thus, it seems to follow that this topic something very worth pursuing if we intend to study ride-hailing in an economic literature context.

Even though ride-hailing itself is quite new, the literature concerning two-sided markets starts in early 2000s with Rochet and Tirole (2003), Caillaud and Jullien (2003) and the term-defining work “*Competition in two-sided Markets*” by Armstrong (2006). In his paper, Armstrong describes two-sided markets as concept where two different agents benefit from each other through the use of a platform. He explains that the difference to normal markets is that in these interesting cases, cross-group externalities are present. This means that the benefit enjoyed by a member of one group depends upon how well the platform does in attracting agents of the other group. So, when more agents join side A, they create an “externality” across the market to the other group on side B. This can also be described as having “*cross-network value*”,

Digging deeper into the specifics of two-sided markets literature, we can see an increasing interest in the notion of single vs. multi-homing agents. Armstrong defines this concept of “multihoming” as being “affiliated with multiple platforms” and “singlehoming” as being “affiliated with only a single platform”. Take for example the classic example of advertising in magazines. Same adverts can be seen on multiple magazines (multi-homing on multiple media platforms), yet certain magazines might have readers that only read that specific

magazine (single-homing). This matter has also been studied in some capacity following the works of both Armstrong and Rochet & Tirole. Papers from Rysman (2009), Roson (2005), Landsman and Stremersch (2011) and others look into matters related to theoretical and empirical studies of multihoming in different contexts. Clearly, multihoming adds an additional layer of complexity to the previous topic of two-sided markets, as Roson puts it: “Adding multihoming makes the formulation and analysis of two-sided markets considerable more complex”. In addition, multihoming pushes the literature of two-sided markets more to from the study of just a single market to actually observing multiple platforms.

Naturally, when multiple platforms are present, competition arises. Thus, the study literature concerning platform competition, namely dynamic platform competition is highly relevant. Lee (2017) surveys past literature to gain an understanding of how multi-homing affects the dynamics of ride-hailing competition. For example, she points out the work of Chen & Tse (2008), who study a dynamic platform competition as modelled by a differential game involving the growth of platform users. They find that a two-sided market is likely to be dominated by a single platform (They call this *winner take all*) when multi-homing tendency is high and in the absence of market segmentation. In *Dynamic Platform Competition: Optimal Pricing and Piggybacking under Network Effects* (Dou & Wu, 2016) dynamic platform competition is studied from a multi-period symmetric duopoly platform model. In their study, platforms subsidize buyers and sellers in the initial period, but the subsidies are reduced on one-side in the subsequent periods. Platforms can also gain competitive advantage at the early stage by importing external users and subsidizing them. Other interesting studies in platform competition are from Cabral, 2011 and Halaburda, Jullien, & Yehezkel, 2016.

So, progressing through the relevant literature in an analytical way presents as with three important topics, each more refined and recent than the previous one.

1.3. Research Questions and Goal

I purport the goal of this thesis as follows: I will examine the inner workings of ride-hailing platforms using the lens provided by the literature surrounding the subject of two-sided markets, multihoming and dynamic platform competition. In this thesis I will answer the following question:

Can we use economic literature of two-sided markets and its subtopics to study and secrete insights about ride-hailing platforms and platform competition between them?

To answer these questions I will provide an analysis with a structure as follows: First I will introduce the concept of a ride-hailing platform to the reader. Then I will conduct a deeper

literature review of ride-hailing as it has been covered in past and recent economics research. Finally, using the insights stemmed from the review of relevant literature, I will present a small example of applying these insights through a case study of the Helsinki ride-hailing market. Thus, I conclude the paper with a synthesis of both literature and real life market analysis.

2. Ride-hailing platforms

In order to build connections between ride-hailing platforms and economic literature, we must first define the key features and components of ride-hailing. This will allow us to establish a common terminology for the rest of the paper.

The concept of ride-hailing is not outrightly new, as Taxis and other forms of private drivers have of course existed throughout the years. However, as analysis by Hahn and Metcalfe (Hahn et al., 2017) points out, this new platform-based ride-hailing could not have become possible without the dawn of the information age, and developments in technologies such as the GPS, smartphones and electronic payments.

In its simplicity, the process of ride-hailing is described as follows (Inspired by Lee, 2017)

- Step 1: A rider uses his/her ride-hailing mobile app to request for a ride by inputting and sending information regarding the trip's origin and destination.
- Step 2: The platform's mobile app instantaneously computes a fare and send the offer fare to the rider. This fare is computed based on demand and supply around the rider location.
- Step 3: The rider has the option of accepting or rejecting the fare. If he or she accepts the proposed fare, this decision is conveyed to the platform.
- Step 4: The accepted proposed set of trip and fare is then transmitted to the nearest driver.
- Step 5: The driver has the option of accepting or declining the proposed set of trip-fare. If the driver accepts the offer, they will then receive instruction on how to reach and pick up the rider.
- Step 6: The transaction ends when the destination is reached. Both the rider and driver are given the opportunity to rate the quality of their experiences.

The key in the ride-hailing process is that both the rider and the driver act as individual agents. Neither of them has a static relationship with the ride-hailing service, but instead

employ a dynamic one. They are both participating in the *platform* through their own choice, making dynamic decisions of entering and exiting the platform at different points of time.

This concept of a *platform* is the key concept behind this new type of ride-hailing.

Technically the platform can be described as the system that calculates the fare, matches riders and drivers, and facilitates the transaction of services and money.

Graphically the platform can be represented as follows:

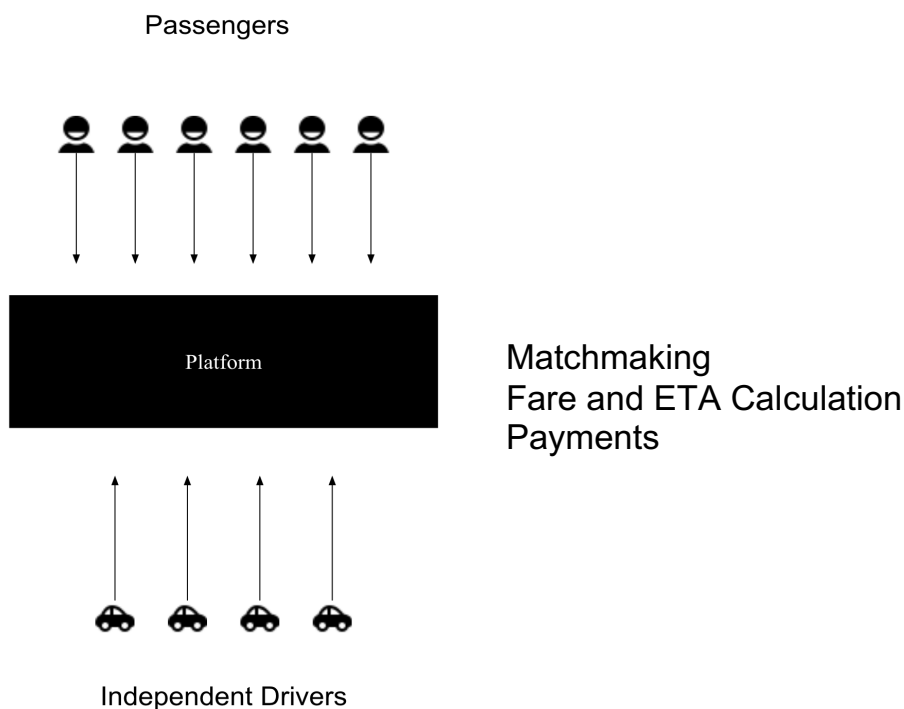


Figure 1: Matchmaking in Ride-Sharing

In economic terms the platform can be described as a market intermediary, that connect buyers and sellers to each other. As there are two sides of the platform, and these two sides hold agents with their own preferences, it's only fitting to employ the name "two-sided market" to depict this concept.

3. Literature Review

3.1. Two-Sided Markets

The seminal work of two-sided markets is that of Armstrong in his paper *Competition in two-sided markets*. He explains two-sided markets as concept where two different agents benefit from each other through the use of a platform. To further refine this definition, I will also define a general framework of a two-sided market based on previous literature. This model's

criteria is mostly based on the work of Weyl (Weyl, 2010) who himself draws from sources such as, among others, Caillaud and Jullien (2003), Rochet and Tirole (2003), Armstrong (2006); and Rochet and Tirole (2006).

In basic terms, a model of a two-sided market emphasizes three main features:

1. **A Multi-product firm:** The platform provides distinctly different services to two sides of the market, which can be explicitly charged different prices.
2. **Bilateral price power:** Platforms are price setters (Monopolistic or oligopolistic) on both sides of the market, and typically set uniform prices.
3. **Cross-group externalities:** The key component. As mentioned earlier, these are effects where the agents' benefit from participation depend on the extent of agent participation on the other side of the market, which varies with market conditions.

In addition to a definition and criteria, examples help us understand two-sided markets in even more detail. Both Armstrong and Rochet & Tirole offer several examples of two-sided markets. Video games consoles and credit card companies are ones given in both works. The analysis of these two examples through a two-sided market framework is simple:

1. A gaming platform offers a way for developer to sell games to consumers. To join the platform, developers need to buy development kits and licenses, while consumers need to buy a physical device. The more developers working on the platform creating more games, the more valuable the platform comes to the consumer. Similarly, the consumers that participate in the platform, the more valuable it is for the developers.
2. A credit card company offers a way for shops to accept payments from consumers. To join the platform, shops need to pay a certain fee per transaction, while consumers usually pay a yearly fee. The more shops that join the platform and accept a credit card, the more valuable it becomes to the consumer. Similarly, the more consumers that own that credit card, the more valuable accepting that card becomes.

Now, taking this to the example of ride-hailing, we can conduct an analysis based on the criteria I just presented and offer it as a modern example of a two-sided market:

A Multi-product firm:

On the rider side, a ride-hailing platform offers different types of transportation pick-up services to consumers.

On the driver side, a ride-hailing platform offers matchmaking and payment services, allowing drivers to connect to close by drivers and not waste time on the hassles of monetary transactions.

Bilateral price power:

For drivers, the pricing usually takes the form of a commission percentage, around 20%, which is taken from the ride price.

For riders, the ride-hailing platform sets a certain trip price depending on the time and distance estimated for that route. However, this is not the price for consumers.

Cross network effects:

Going back to when we described the ride-hailing process, we can identify several occasions when cross network externalities are in effect. They can be summed up as follows:

Drivers: RPH (Rides per hour) is the number of riders a driver receives in an hour. As the popularity of a platform grows, so does the probability of picking up a rider, which ultimately increases RPH. Thus, an increase in platform users will make the platform more attractive to drivers.

Riders: ETA is the amount of time a customer waits until she is picked up by the driver. As the availability of cars at a given platform grows, it will attract riders to use that platform due to shorter waiting time.

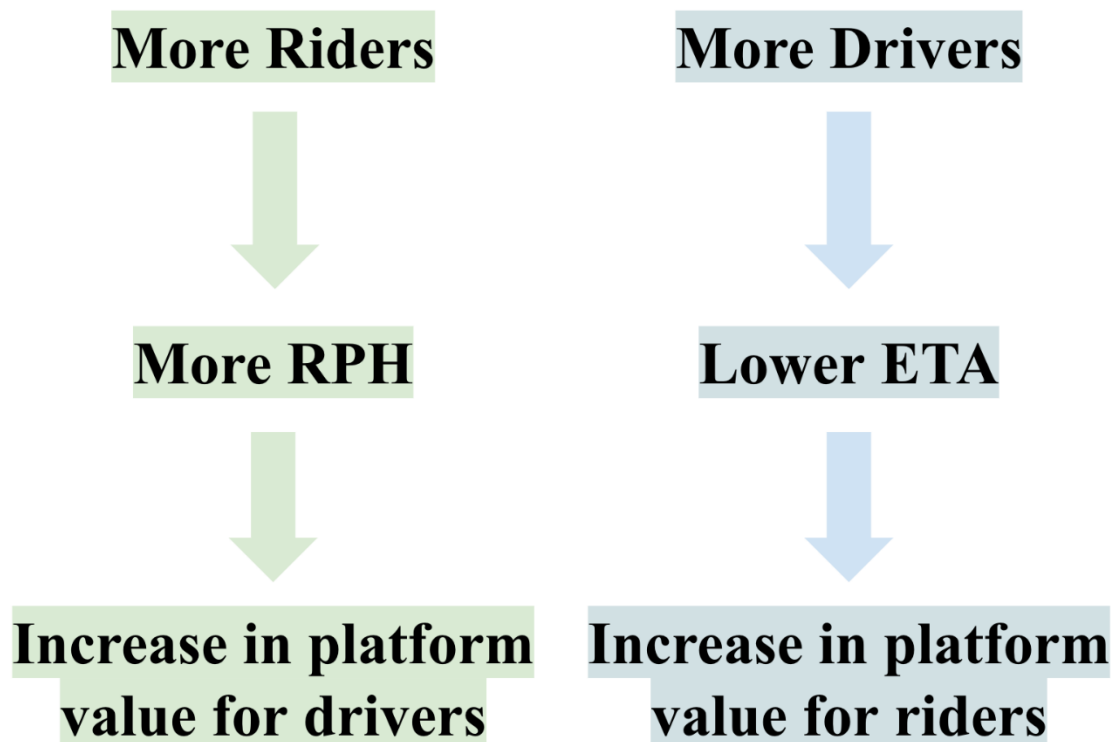


Figure 2a: Simple Network externalities
 RPH: Rides Per Hour. ETA: Estimated Time of Arrival

As we can see, cross-network externalities indeed exist in ride-hailing platforms. Thus, we can formulate TS 1:

TS 1. The increase of agents on one side of a platform increases the platform's value to the other side, and vice versa.

In economic terms this can also be thought of as a representation of the *quality* of the platform (similar to that in the classic hotelling model). So, we know have three terms describing the same thing. An increase in quantity of agents, which means an increase in *network value*, is also a representation of the quality of the platform.

As we know, quality is not the only thing determining the value of something. In addition to using this network externalities based *quality*, agents also make choices depending on *price*. This is the main idea pushed by Roson (Roson, 2005), who reduces the choice of joining the network into two components, price and quality. He explains it through two statements:

If the *price* of entering or participating on a platform is more than the value gained from its *quality*, agents will seek other platforms.

If the *price* of a platform is very low, or even zero, more agents might be willing to participate, even in the absence of strong “*quality*”.

Through this, we can set out the second statement TS 2:

TS 2. The value of a platform is determined by a combination of quality and pricing.

Going forward with the topic of pricing, the work of Wright (Wright, 2001) is highly valuable. In his work, he dives into how the optimal price and fee structure of a two-sided market should be formed. He does this by presenting 8 fallacies that should not be followed, and provides ways to correct each fallacy. This kind of literature device is similar to the “statements” I present in my work. However, his main thesis is this:

TS 3. If the surplus obtained by the agents A from attracting agents B to the club is greater than vice-versa, then an efficient price structure will generally require that the price be lower for B than A.

Wright backs this up with an example about a nightclub: Attracting an additional woman to the club raises the surplus to the existing men more than attracting an additional man to the club raises the surplus of the existing women. An efficient structure of fees will reflect this fact. In contrast, the principle of cost-based pricing is not efficient in such a market.

3.2. Multihoming

Even though the concept of multihoming stems from the same seminal work of Armstrong 2006, recent research has taken it to new heights, especially in topics such as ride hailing. A lot of this recent work has direct theoretical insights into the dynamics of multihoming in a ride-hailing context. Understanding the multi homing tendencies on each side of the ride-hailing market has important strategic implications. It’s clear that knowing which drivers also drive for other platforms provides a tactical advantage.

Theoretical work on multihoming (e.g. Gabszewicz & Wauthy, 2004) has shown that when a group of agents on one of the market choose to multi-home, agents on the other side of the market will prefer to single-home. The reasoning is simple: They can now easily reach the same group of agents independent of which platform they choose.

Thus we reach statement MH 1:

MH 1. Increase of multihoming on one side increases singlehoming on the other side.

In addition to this, the same research gives insight into the difference in competition between single and multihoming agents. When agents have high multihoming tendencies, the competition for them is not intense: They will join multiple platforms anyway. When agents

represent a strong singlehoming culture, however, platforms compete aggressively to attract them. This is because each attracted agent not only strengthens one platform, but also weakens the other (Recall cross-group externalities!). The economic analysis here is that platforms with access to single homing agents start to exhibit a kind of monopoly power (Rysman, 2009). So we reach statement MH 2.

MH 2. Platforms with more single-homing agents exhibit monopoly power

3.3. Platform Competition

We have so far surveyed the literature surrounding two-sided markets, and it's more defined subtopic, multihoming. These topics detail the foundations of platforms, starting from how a singular two-sided market works, moving towards situations of competition between two competing markets. In recent works, a new topic has emerged that encompasses both of the previous topics, while going into a more complex analysis of the actual competition between platforms. This topic, *platform competition* is the key to unraveling insights concerning not only singular platforms, but also competition between platforms, and thus of entire platform industries.

One of the earliest works containing Platform competition (sometimes the word “dynamic” is added, but what competition is not dynamic?) as a topic is the work of Sun and Tse (Tse, 2007) They present a differential game model and use it to analyze platform competition to show what could be the key market characteristics that determine whether a certain scenario depicts a “*winner-takes-all*” phenomenon, or a “*coexistence*” phenomenon. Their results indicate that if one of the two sides has a strong single-homing tendency, then the platform competition will have a “winner-take-all” tendency. This also means that a two-sided market with one side having strong single-homing characteristic will command a first mover advantage to the platform that can capture that side of the market the fastest. As you can see, the topic of single and multihoming is relevant here as well. Thus we can craft PC 1:

PC 1. If one of the two sides has a strong single-homing tendency, then the platform competition will have a “winner-take-all” tendency.

In platform competition, the defining characteristic of two-sided markets takes on an amplified meaning. As we presented in Figure 2a, the cross-network externalities effect of two-sided markets increases the value of the platform to one side of the market as the amount of agents on the other side grow. Taking this a step further, we can think of the externalities effect as a cycle of sorts. When the cross-network externalities of one side increase, it creates a similar effect on the other side as well. This has the potential to become a chain reaction,

with each cross-network effect compounding each other.

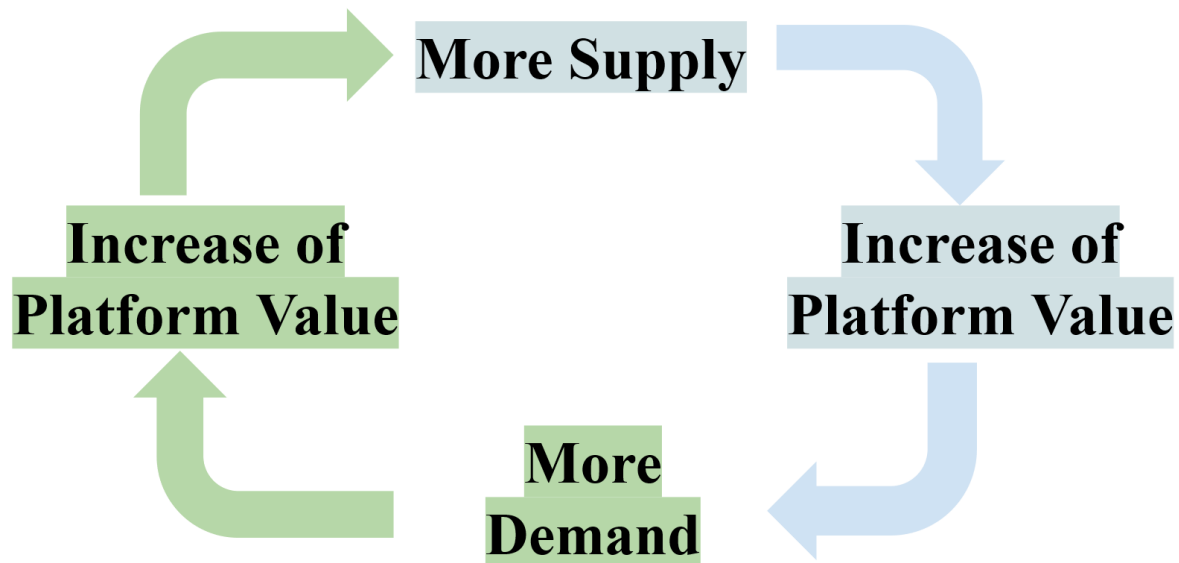


Figure 2b: Simple Network externalities cycle.

From Figure 2b we can take the visualization and arrive at PC 2:

PC 2. Cross-network externalities create a chain reaction that is a combination of a direct and indirect network effect.

Chakravorti and Roson (2005) compare the market equilibrium of a duopoly with the one of a cartel between differentiated platforms. They show that, when switching from the monopolistic cartel to the duopolistic competition, the effect of price reduction dominates the change on the price structure, with non-ambiguous positive effects on welfare, unless the market power of the cartel was already restricted by the nature of the platform (Rochet and Tirole, 2002), or by some other specific characteristics of the market.

This result has a simple, intuitive explanation in terms of indirect network externalities: if a buyer (seller) fee is lowered, the buyer's (seller's) welfare will increase, but also the seller's (buyer's) utility will increase, as more buyers (sellers) will be active on the market. In this way, a platform would attract more agents of both sides, taking them away from the competing platform. As a consequence, monetary externalities operate in the usual, "bertrand competition" way, so that a competitive equilibrium will be characterized by reduced prices on both sides. In simple terms:

PC 3. Platforms competing only with price leads to price war and dissipation of profits for competing platforms.

One of the most interesting areas of platform competition research is definitely that concerning the “chicken and egg” problem. It has been studied already since the first works concerning two-sided markets (Tirole, Armstrong, B Caillaud, B Jullien), and continues to be the focus of constant research. Academic literature provides three methods to beat this paradox.

Firstly, multiple papers (Bayus, 1987; Bucklin & Sengupta, 1993; Clements, 2004; Frels, Shervani, & Srivastava, 2003) cite the concept of a “*critical mass*” that is required for the platform participation to take-off. Take-off is the point of transition between introduction stage and growth stage of a growth curve (Golder & Tellis, 1997). In theory, this critical mass should work as a kickstart for the network effect feedback loop of PC 2 to happen. However, no substantial way has been found to easily discern which side of the market requires this critical mass.

PC 4. Platform’s need to reach critical mass for participation take-off

Secondly there is the idea of the “*seesaw principle*” for platform pricing. When a factor is introduced that is conducive to a high price on one side, to the extent that it raises the platform’s margin on that side, it tends to call for a low price on the other side as attracting members on that other side becomes more profitable. Accordingly, it is quite common for a platform to charge below-cost (perhaps zero) prices to one side and high prices to the other (Rochet & Tirole, 2006). As the seesaw moves, this pricing balance shifts, and the hope is to slowly increase member count on both sides through subsequent repetitions.

Interestingly, Dou et al. (Dou & Wu, 2016) garner new insights to the topic through extending the analysis to a multi-period case and taking into account single- and multihoming. They name the single-homing side as the “money side” and the multi-homing side as the “free” side. They see that just skipping the *seesawing* and going with both-sided subsidies can also be surprisingly effective but point out that the “money side” side subsidy should end more quickly than the “free” side.

PC 5. Seesawing allows platforms to grow by financing subsidies of one side through higher margins on the other.

Additionally, they present the very interesting third concept of “*piggybacking*”, where platforms import users from external networks. Their findings suggest that piggybacking can affect the pricing equilibrium between markets in a significant way. If one platform can suddenly “borrow” agents and increase its count of agents on one side, it creates a sharp increase in the value of the platform to the agents on the other side. This increase in value can replace the slow turn by turn subsidy “seesawing” strategy employed earlier, giving the

piggybacking platform a major cost and time advantage. Dou and Wu give the example of Airbnb, which imported supply side agents from Craigslist to Airbnb. This allowed Airbnb to charge a greater price on the consumer side, while subsidizing the provider side with no fees at all.

PC 6. Piggybacking from another source to increase member count can serve as a shortcut to increased platform value.

4. Case Study: Helsinki ride-hailing market

In this chapter I will present a case of the Helsinki ride-hailing market in two different time-frames. First I will examine the case of Uber operating in Helsinki in 2015-2016. As it is a past event, I will compare the acts Uber did during that time to suggestions provided by the reviewed literature, based on the same context. Second, I will present the newly opened legal ride-hailing market in Helsinki, and present suggestions on what the reviewed literature suggests new market entrants should do.

4.1. Case Overview

The transportation industry in Finland is somewhat of an outlier compared to many other countries. One major difference is the enviable position of Finland's public transport system. Compared to other European countries, the service is very efficient and cheap, with low congestion and high customer satisfaction [source](#).

A second difference comes through its slow adoption of ride-hailing. Ride-hailing platforms have been illegal since before 2018, even though Uber operated in Helsinki for a short while in 2015 (The Guardian, 2017).

The demand of ride-hailing has so far been serviced through the traditional taxi market, with majority of rides being requested through phone calls to central dispatching centers.

In August 2018, Finland passed a new transport act (CNBC, 2018) also containing a new law defining a criteria and a set of rules specifically for ride-hailing platforms (or more aptly, ride-sourcing platforms). This marked the market ripe for the entry of ride-hailing platforms, with Uber re-launching their service soon after.

However, a key difference in the Finnish market is that the competitive advantage of ride-hailing apps over traditional taxis has been severely minimized. While in other markets Uber's strong growth was suspected to also stem from its technological advancements (User-friendly app-based ride-hailing, (Hahn et al., 2017)), this is not the case in Finland. Majority of largest traditional taxi companies also employ web and app based hailing services. Thus, in

Finland the potential advantages of Uber and other ride-hailing platforms stems directly from its nature as a two-sided platform.

Additionally, this new law opens the market for other ride-hailing platforms as well. During Uber's previous operation, the ride-hailing market was systematically a single-homing monopoly. This had several implications on its operation at that time. With recent news coming out, we see that Finland is entering a new form of competition, namely an oligopoly. The Estonian ride-hailing giant Taxify announced its plans to launch in Helsinki in April 2018, and subsequently then launched in Helsinki in October 2018.

4.2. 2015 - Monopoly & Singlehoming

During the year 2015, the American ride-hailing company Uber operated in Finland as a one of its kind. Referring to the literature we reviewed earlier, we can describe this market situation as that of a *monopoly*, with *no possibility of multihoming*¹ (=singlehoming).

A way to look at the pricing in ride-hailing is to make a distinction between the price of participating in the platform, and the price a trip done on the platform. The commission is the price for participating in the platform, for the driver. The price of the trip can be thought of as its own entity, separate from the commission.

If we continue this line of thought, and back our logic with what we have learned about two-sided markets, we can come up with at least these two logical arguments:

1. If the surplus obtained by riders from the platform attracting additional drivers to the platform is greater than vice versa, than an efficient price structure will generally require that the price be lower for drivers than for riders. (TS3)
2. Currently in most platforms drivers pay the cost of participating in the platform, the cost balance should be rearranged.

As this is a monopoly, there is no clear outside price pressure. It then follows that the right pricing structure should reflect the importance of drivers, meaning the cost of using the platform should, according to this line of thought, be more expensive for riders than drivers

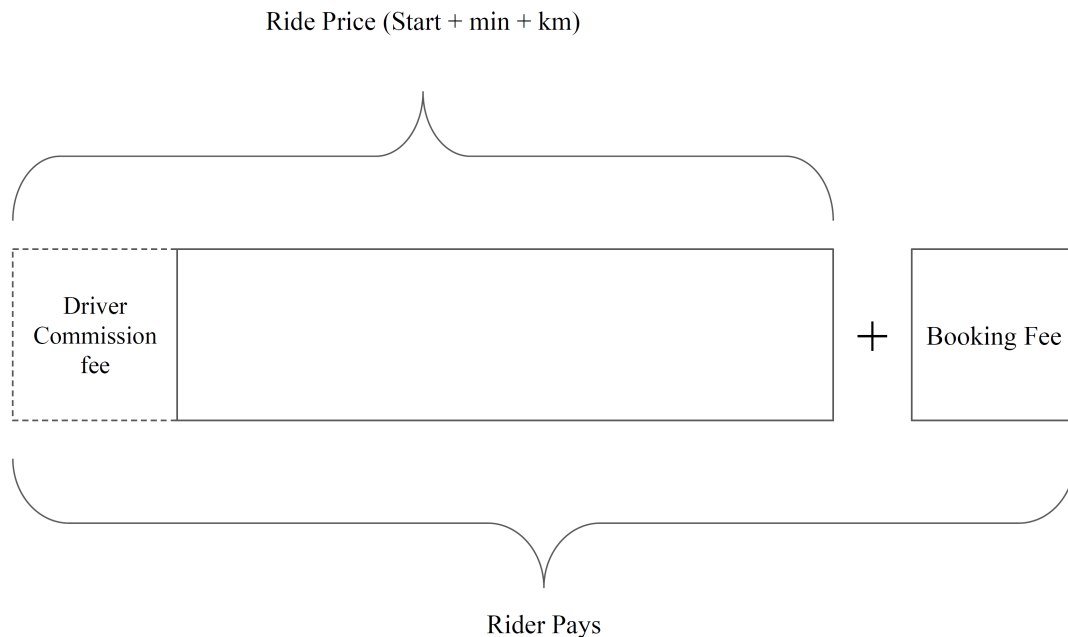
There are multiple ways to introduce this, here are two examples:

- **Monthly fee for riders:** An interesting experiment would be to create a monthly subscription for the ride-hailing platform and use it to subsidize the commission for

¹ This can of course be debated that riders might be able to multihome in a "transportation platform" sense, as they can chose to order traditional taxis as well. However, drivers could not multihome as they were driving without permits and only Uber allowed that.

the drivers. This is already happening in some form, with both [Lyft](#) and [Uber](#) doing experiments in this regard.

- Different “**Booking fee**” style commission for riders and drivers. For example if a price of a trip from A to B is 10€. The booking fee for a rider could be set at fixed 1% (10 + 1€), while the matching fee for the driver could be 10% (10 + 1€)



However, that was not what actually happened. Uber started their operation in Finland by introducing UberPop, with pricing being around [40% cheaper](#) than normal call center-based taxis. This was a clear example of penetration pricing, aiming to establish market share in a new market. Establishing market share as a two-sided market is absolutely crucial, if we think back to TS1. In addition, we can refer to TS2 and remember that the value of a platform can be propped up through pricing, even if quantity of agents is low.

Yet, one thing stands out as peculiar. Why did Uber start with a “high” commission of 20%? If we think back to TS3, the cost should be carried by the agents that gain relatively more surplus. We established earlier, that generally in ride-hailing platforms, the value of a single new driver is more valuable than a rider, similar to women and men in the nightclub example. Then it follows that the commission should not have been set this high.

However, there might still be good reasons for this. Firstly, it could be side-factor caused by the penetration pricing so as to keep the operations profitable. Secondly, because of a monopoly, there was no price pressure as such. Thirdly, and this might be the reason, is that 2015 was still a time of the majority of ride-hailing competition being against Taxis, not other platforms. Thus, driver partners had no possibility of multihoming as entrance to taxi

companies was highly regulated. Instead, customers could freely multihome and call a taxi if needed. Now suddenly, this “high commission - low prices” strategy feels quite fitting to the conclusions of the reviewed literature.

This monopoly situation also gives us a clear view of some intense network effects exhibited by a two-sided market. Earlier in Figure 2b, we showed how the cross-network externalities in ride-hailing functioned. However, we did not completely finish the figure.

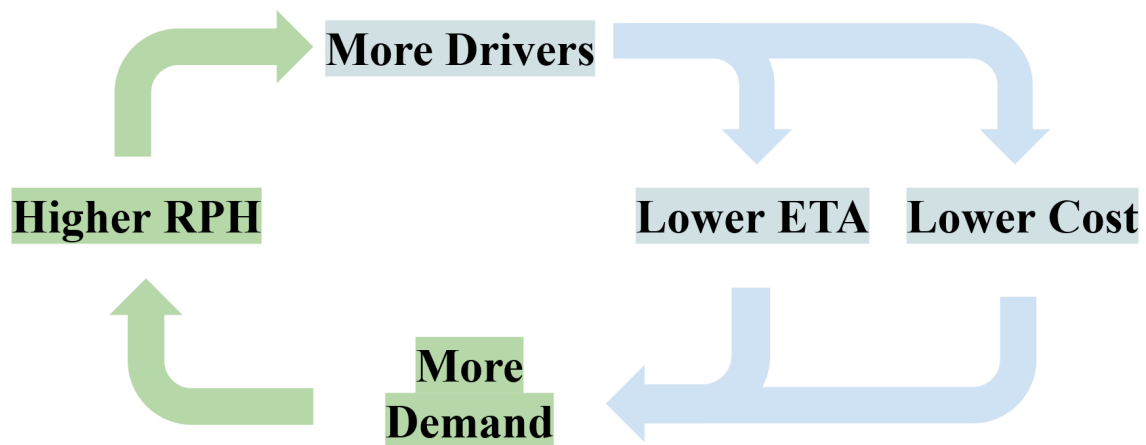


Figure 2c: Simple Network externalities cycle.
RPH: Rides Per Hour. ETA: Estimated Time of Arrival

I propose that additionally, in ride-hailing there is also a **secondary loop**: A greater amount of availability of cars can also present an opportunity for the platform to exert downward pressure on the price of rides. This is because of two effects: 1) An increase in supply might increase the efficiency of the system, allowing for cheaper ride prices 2) The positive demand effect of a price decrease might actually be net positive for the driver as well if demand grows more in proportion. Another thing to note is that this might suggest that ride-hailing has a strong preference of being a winner takes it all market as described earlier.

4.3. 2018 - Oligopoly & Multihoming

On July 1st, 2018 the The Ministry of Transport and Communications of Finland welcomed a new Transport Services act, opening up the long regulated taxi industry (YLE, 2018a). “The aim of the project is to support new service models and to better meet the needs of users,” the Ministry writes. “Further aims are to review the transport system as a whole, make market access easier and promote the interoperability of the different parts of the transport system.” The most important parts of the change can be summed as follows:

1. Varied pricing. Old system of set maximum prices (which all cab companies met) was abolished. Now each driver can set operate on their own pricing structure. **This means now each driver always has the possibility of not using any platform.**

2. Removal of geographical restrictions. Removed the restriction of “patrol areas”, which forced drivers to only drive in certain geographical regions. **This removes locality based natural monopoly power.**
3. Qualifications loosened: Change from having a training/study requirement to a qualifications-based requirement. Also, number of permits is no longer restricted. **No artificial supply restriction, increase in supply side agents.**

Following this new law, several new players have entered the ride-hailing platform market. Instead of being an Uber monopoly, new entrants are joining the market at a quick pace. The European Taxify was first to join (ERR, 2018), with the Russian Yango joining third (YLE, 2018b). Several smaller app-based platforms have also debuted.

Is ride-hailing a winner-takes-all market?

What does academic literature tell us about the future market scenario that awaits Helsinki?

One of the biggest questions is the matter of competition equilibrium. Is ride-hailing a winner-takes-all market? As we mentioned earlier in the paper, ride-hailing platforms do exhibit the network effect capabilities of two-sided markets, as in PC 2 with the added second feedback loop, using network effects to increase platform value and decrease prices simultaneously. In addition to this, ride-hailing fits the description by Carballa & Smichowski about exhibiting low product differentiation, with the core function just being the act of ordering a ride from A to B (Carballa Smichowski & Bruno, 2018).

However, there is also a wealth of contrasting evidence. According to the reasonings behind PC 1, ride-hailing does not fit into the characteristics of a market with winner-take-all tendency. Both sides of the market have strong multi-homing tendencies, as users use have a low cost of using multiple apps and drivers also gain from using two platforms simultaneously. So, smaller networks can survive and co-exist as multihoming riders and drivers look for new platforms to join. Similarly, one could reason that the network effect loop has its limitations as it can quickly exhibit diminishing returns: Costs can only go as low as gas/car prices, and the decrease in wait time from adding a single new driver quickly drops. So, it seems like a conclusion on a ride-hailing market equilibrium is still lacking.

Market Entrant Strategies

As this is the first time ride-hailing is legal in Finland, a host of new entrants are surmised to join the market. Here I will summarize potential strategies for market entry based on literature. As we presented earlier, PC 4, PC 5 and PC 6 gives three different strategies to grow a platform.

1. Critical mass. New entrants to the market might withhold market participation until they reach a critical mass of agents on both sides of the market. For example Taxify released with 200 drivers, while Yango released with 300.
 2. Seesawing. New entrants to the market will need to carefully choose which side to subsidize first, or if they should do the costly act of subsidizing both. At this moment it seems Uber is only lightly subsidizing drivers, while also keeping prices low. However Taxify has made a choice of heavily subsidizing both riders and drivers, offering 50% cheaper than taxi prices, and 10% commission. Yango has gone a step further, offering same prices, but 5% commission and driver earnings bonuses.
 3. Piggybacking. New entrants to the market might seek out other sources to quickly add agent count. Potential sources could be traditional taxi companies or other ride-hailing platforms. This has already been seen happening, with Taxify and Yango both using different tactics to capture a big portion of multihomers in the market.
- ### Winning Strategies

As we know from MH 2, platforms with more single-homing agents exhibit a proportion of monopoly power. Increasing the amount of single-homing agents allows for platforms to gain an upper hand, especially in a market such as ride-hailing where multihoming tendency is high.

Another way is by introducing nonlinear pricing, or subsidies, for the side with more multihoming tendency. Suggestions include driver bonuses, where companies give out extra payouts based on certain ride metrics such as acceptance rate, trips done, and customer ratings (Loginova et al., 2018). Similarly the rider side could be persuaded through some kind of loyalty program, such as the one [Uber recently announced](#). Only the future will tell how the Helsinki market will progress. A lot of things can still change, and there is no ruling out the option of even more competitors entering the market.

5. Conclusions, Discussion & Future

The purpose of this research was to set on path through ride-hailing literature, delving deep into the background of recent works to see if one could find “root topics” that could provide insights about ride-hailing markets and the industry as whole. It seems clear that even before ride-hailing platforms became an international phenomenon, there has been a lot of research done on similar topics. Additionally, I have shown that this research could be applied to ridehailing as well, however there is no certainty of their functionality yet.

The literature I have reviewed present multiple suggestions and “rules-of-thumb” for ridehailing industry players. For example, a platform looking to cement their place as a market leader could take note from MH ² and realize the need for more single homing agents. This could be done in a multitude of ways, for example by starting to brand cars with their own logos. Similarly, a new entrant might review the literature on platform competition, and get idea on how to enter the market successfully. As you can see, the results can be interpreted and implement in many different ways.

Of course, the paper has some limitations. As many of this research is adapted into the mold of ridehailing, it might not apply as well in empirical testing. Ridehailing is a dynamic complex system, meaning that strict rules rarely work out, and even then, these “rules” are temporal at best. Another quite interesting limitation of the research surrounding ride-hailing stems from the paradox of the combination of data availability, research grants and objectivity. A lot of recent research is either done or funded by companies like Uber or Lyft (Hearing N). Even if the funding is independent, a lot of research use models based on data that is provided by ride-hailing companies, raising some doubt of its objectivity.

Even though at this moment ride-hailing is a two-sided market, its biggest companies are doing everything they can to change that. Research in autonomous cars seems to be the golden goose for multiple ride-hailing giants - insert stats here. Ultimately replacing human drivers with robotic ones would certainly change the industry completely. Could this effect be researched in more detail to gain insight on a new type of transition from two-sided to one-sided market?

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² Platforms with more single-homing agents exhibit monopoly power

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