

# Student essay: Taxi Regulation and Its Impact on User Experience in European Countries

*Astala, Niklas & Valtonen, Ville, candidates for Master of Science, Sustainable Urban Mobility Transitions, Aalto University*

## Abstract

The taxi industry is one of the few industries where quantities and maximum fare prices are still strictly controlled. However, even though large-scale shifts in regulatory structures are happening across the world, the impacts of these changes are still largely unknown. The aim of this article was to get a narrow picture of the potential effects of deregulation of the taxi industry in a European context by investigating and comparing the observed effects in two European capitals. When talking about the taxi industry, we refer to the “traditional” European taxis, meaning that digital taxi services such as Uber, Bolt etc. are excluded. The article provides an overview of the background to the regulation of the taxi industry and the most common justifications of regulation. According to the findings, deregulations of the taxi markets can have varied results even in cities with very similar regulatory structures and no specific framework for effects caused by deregulation could be made. However, the contention of whether taxi regulations are beneficial mainly focuses around quantitative and economic regulations.

## Introduction

Traditionally, two different modes of transport have been distinguished from urban transportation: public transport and private transport. Both modes have their own characteristics. Private transport is known to offer convenience, flexibility, and door-to-door service, while public transport focuses on regular services, which are generally cheaper than private transport (Boutueil et al.

2019). However, there is a service that does not fit into the traditional framework of either public or private transport – taxis. Although taxis are classified as public transport, they are very close to private transport as they offer door-to-door service as well as plenty of flexibility. Taxis, therefore, provide a service that other modes of public transport cannot offer, and because of that, they are a significant supplement to the mass transit system.

The term ‘taxi’ is widely used in many services including physical mobility, however; this article only considers road vehicle services which are reservable both in advance and right away. Limousine-type services are, therefore, excluded. Taxis also have a significant role in the functions of welfare society, such as transporting children to school and the elderly to health care services, often with subsidised fare prices. These public sector contracts account for more than a quarter of all trips in several countries and in rural areas, their shares may be even higher. (Bekken, 2007; Gwilliam, 2005.)

Boutueil et al. (2019) introduce three distinct ways that conventional taxi markets can operate. The first one is called the “rank” which refers to designated places for taxi drivers and passengers to meet. These usually operate with a “first in, first out” principle (Gwilliam, 2005). Another way is the “hail” which refers to situations where drivers cruise on the streets looking for new customers. The rank and hail segments are unique and cannot be found anywhere else than in the taxi industry (Bekken, 2007). The third segment is called the “pre-booked”, where customers order the ride, for example, by phone or app from the company or a dispatch centre. The advantage of pre-booking is that the ride can be booked to start immediately or some specified time in the future.

However, the taxi industry is one of the few industries where quantities and maximum fare prices are still strictly controlled, mainly by limiting access to taxi licences. This article, therefore, looks at how

these regulations impact the operations of taxi industries in European settings as well as how they correlate with user experiences.

## **Background**

There has been a long history of regulation in the taxi industry. Historical documents show that the number of hackney carriages in London and Westminster were regulated to avoid congestion as early as 1635 (Toner, 2010). However, the taxi regulations, which we focus on in this article, became more common in the early 20th century United States. The Great Depression in 1929 caused a global economic downturn, followed by mass unemployment. (Harding et al., 2015.) Because of that, several people began selling rides to make some money, resulting in fierce rivalry in high-demand locations. Many new drivers entered the taxi industry illegally and without regard to quality regulations. As a result, supply and demand did not match anymore. In some cases, the mismatch of supply and demand led to disputes – and even violence – between drivers. Customers were also not satisfied, and the taxi authorities received plenty of complaints about unqualified and dishonest drivers. (Cetin & Deakin, 2020.)

As a result of all these negative effects, cities began to regulate the taxi industry. The details of regulation varied from city to city but many of them were based on restrictions of price or the number and quality of taxis. It was also not uncommon for drivers to be required to have several years of driving experience, sufficient local knowledge of city streets, public buildings, and popular destinations. In some cases, the regulations were extended to cover even the driver's dress code, and personal behaviour regulations were also issued for the age, appearance, and equipment of taxis. A driver's photograph, name, and licence number must also be displayed prominently on the vehicle. (Cetin & Deakin, 2020.)

In the late 20th century, it became apparent to regulators and the public that the taxi industry was in some areas too tightly regulated, and the necessity of market entry and price regulation of the taxi industry began to be increasingly questioned. (Cetin & Deakin, 2020.) Often, the idea behind deregulation was that it could improve the quality of service and achieve more competitive fare prices (Boutueil et al. 2019). The objectives were, therefore, the same as with the regulations before. However, it cannot be said that regulations had failed, because the need for deregulation was more due to changes in the environment and policy in general.

There are a few different ways to divide the elements of taxi regulation. Harding et al. (2016) introduced the QQE (Quality, Quantity and Economic controls) framework that has become the standard regulation model for the taxi industry. Quality control includes all regulations related to quality, such as the regulation of the condition of the driver and the vehicle. The most common quality standards are criminal record check, requirements regarding professional competence, and financial requirements (Bekken, 2007). Quantity control, on the other hand, refers to methods for regulating the number of taxis on the road. Typically, quantity regulation is accomplished through a licensing system. Finally, economic controls cover fare price settings designed to provide fair compensation for operators and drivers, and stable fare prices for passengers. The differentiation of different regulatory methods can be seen in Table 1.

Regulatory type	Regulatory method
Qualitative	Driving qualifications of the driver Medical condition of the driver Geographical knowledge of the driver Criminal background check Mechanical condition of the vehicle Features/qualities of the vehicle Emissions regulations Financial competence of the service provider
Quantitative	Regulation of the number of taxi licences
Economic	Regulated fare price (minimum or maximum)

*Table 1. Examples of differentiation of qualitative, quantitative, and economic regulatory methods.*

Another well-known classification of taxi industry regulation was presented by Bekken (2007) where methods were divided into direct barriers to entry, indirect barriers to entry and fare price regulations. This classification differs from the QQE framework in the first two points. While quality and quantity controls were different points in the QQE framework, Bekken has classified them both in the same class as direct barriers to entry. According to Bekken, both a limit on the supply of services and a “cost of entry”, as he calls quality restrictions, are how states and cities directly regulate taxi market access. Therefore, before being licensed to practice as a taxi driver, both quality and quantity standards must be met. Because of several distinct regulations, there are also indirect barriers. The most common indirect barrier to entry is taxi driver requirements, such as driving skills and region knowledge. Those requirements are not directly related to the taxi industry, but you must have them to operate in the market. (Bekken, 2007.)

## **Regulatory justifications**

Throughout the years there have been multiple arguments both for and against regulation and as with the regulatory methods mentioned above, the reasonings for those methods can be divided into quantitative, qualitative, and economic reasons. In the case of arguments for regulation, these reasons mainly revolve around congestion, income, quality, and safety of service, dealing with monopolies and other market failures as well as general socio-economic goals of the government. Surprisingly, a lot of the arguments for deregulation are based on similar reasons but mainly involve misconceptions in the arguments for regulation and the idea that similar results could be achieved with better, less intrusive methods.

### **Arguments for regulation**

Congestion caused by the rapid increase in taxi vehicles due to deregulation is often cited as a reason to not deregulate an already regulated market. The congestion arguments are often divided into two distinct problems: congestion in the streets and congestion at the taxi ranks (Barrett, 2010; Cetin & Deakin, 2019). Proponents of the street congestion argument state that the influx of new vehicles into the system will cause increased congestion for everyone (Cetin & Deakin, 2019; Gwilliam, 2005). These arguments could be raised in places where the usage of the driver's own vehicle is prohibited, and new entrants would have to purchase currently non-existent vehicles. The argument of congestion at the taxi ranks is more of a market specific problem. Barrett (2010) notes that the influx in new taxis in the market will lead to congestion in the most popular areas to wait for customers, mainly airports.

Another argument involves the changes in the income of the drivers who already exist in the market. Barrett (2003, 2010) raises the

question of the new entrants saturating the market which leads to reduction in the overall income of the drivers. However, according to Harding et al. (2016), this is only an issue if the demand for taxi trips does not increase at the same rate as the supply for taxi trips. The reduction in income can be due to a couple of reasons. Firstly, if prices are not regulated, increased competition should theoretically lead to reduced fare prices and potentially lower income, while attempting to avoid the reduction in pay by increasing one's fare prices will lead to a reduction in demand. Secondly, if fare prices are regulated, then the increase in supply, if not accompanied with the increase in demand as Harding et al. (2016) mentioned, will lead to reduced number of trips per shift and a reduction in income.

While Barrett (2003) as well as Cetin and Deakin (2019) give the argument for a more general concept of increased safety due to regulation, Barrett (2010) elaborates in his later work by bringing up potential increases in accidents due to an increase in the number of taxis as well as potential altercations between the drivers due to heightened competition for scarce customers. In the end, the arguments based on safety can be generalised by attempts to improve both the safety of the drivers as well as safety of the passengers due to an influx of potentially unvetted drivers.

The quality concerns mainly focus on the qualifications of the driver and the physical and mechanical requirements of the vehicle (Barrett, 2003; Bekken, 2007; Bouteil et al., 2019; Cairns & Liston-Heyes, 1996). Barrett (2003) notes that governmental officials are required to regulate the market to make sure that the quality of service remains at a desirably high level. The arguments to why this is the case vary from “destructive competition” that will lead to reduction in quality due to incentives to reduce costs to maintain profits while fare prices drop, to driver performance declining automatically over time after deregulation (Cetin and Deakin, 2019; Gwilliam, 2005). Barrett (2010) mentions the age of the vehicle, size of the luggage capacity and

physical dimensions as potential aspects of the vehicle to be regulated. On top of these, potential reasons to regulate the quality of the vehicle is to ensure the safe operation of said vehicle and the cleanliness of the vehicles. The quality requirements can also be extended to entire taxi service providers. One of the reasons given why entire providers should be regulated instead of just individual drivers is due to previous experiences where financially unqualified providers were unable to pay compensation to victims of car crashes in their own vehicles leaving them to pay their medical costs themselves (Harding et al, 2016).

Of the market related reasons, avoiding monopolies is one of the most common arguments. Barnett (2010) warns about monopolistic dispatch companies taking over the taxi market while Cetin and Deakin (2019) point out arguments for natural monopolies rising due to deregulation. The idea is that dispatch companies, or large taxi companies, will have an advantage over the new entrants, especially if there are higher monetary requirements to enter the market. The dispatch company monopoly is further exacerbated by the fact that dispatch centres in many countries have regional monopolies (Lanamäki, 2020). Other market related reasons include the taxi market being an experience or credence good and the asymmetric information problem arising from it (Cetin and Deakin, 2019; Harding et al., 2016; Gwilliam, 2005). Experience goods are those where price, quality or some other attribute remains unknown until purchase. In the case of taxis, in foreign cities, a customer might not be able to estimate the quality of the consumed service even after the ride, making it a credence good.

In both cases, the driver does have knowledge of market prices and the optimal routes which the consumer might not have. This asymmetric information stifles the operation of free markets. Hence regulating the taxi market could protect customers from exploitation (Gwilliam, 2005). Another reason is taxi markets being a thin market



and its impact on competition (Harding et al., 2016). Thin markets are markets where there are a small number of buyers and sellers in a specific place at a specific time. As Cairns and Liston-Heyes (1996) point out, the lack of a large pool of supply and demand means that the market cannot be fully competitive, which might lead to problems down the line if left unregulated.

Of the socio-economic reasons, the most often cited one is coverage of service. In this context coverage refers to the spatial, temporal, and economic coverage of the service, meaning where, when and who the taxi market is willing to serve. Barrett (2010) as well as Cairns and Liston-Heyes (1996) point out the issue of getting service during off-peak hours. According to Cairns and Liston-Heyes (1996), in an unregulated market during off-peak hours the cost of refusing a taxi due to high fare prices is a high-cost decision for the customer, since there are no guarantees that a taxi will come by anytime soon. Barrett (2010) also points out the problem of lack of service in less popular areas. Similar problems will also rise in rural areas, however; the problems are not limited to off-peak hours. Finally, governments might want to ensure that the taxi services are available to every person in society, especially low-income and disabled people (Cetin and Deakin, 2019). Other similar reasons governments have used to justify taxi regulations involve environmental issues, such as air and noise pollution, and ensuring a good quality transportation system to improve tourism. (Cetin and Deakin, 2019.)

### **Arguments against regulation**

Of the arguments against regulation, the most popular arguments relate to the functioning of the market. These include increasing the supply of taxis, innovation in the taxi industry as well as market efficiency (Harding et al., 2016; Bouteil et al., 2019). All the reasons pertain to increased competition. Increasing supply, especially if demand increases simultaneously, will move the taxi market from a

thin market more towards a thick market which in turn increases competition. According to Harding et al. (2016) policies to increase the thickness of the market would mitigate the need for quantitative regulations. Increased supply also improves the overall accessibility to taxi services. From a free market perspective, efficient and innovative markets are usually the most competitive ones. Traditionally, competition forces companies to innovate, to provide better quality products or service at the same price, or same quality at a lower price. This, in turn, would lead to markets efficiently finding themselves in a position where quality improves while costs decrease. Bouteil et al. (2019) bring up new entrants into the market as an anti-monopoly deregulatory method due to increased competition. Bekken (2007) also notes that regulations mainly protect incumbent drivers from competition. On top of this, while the proponents of regulation cite deregulation as a potential threat to the income of existing drivers, proponents of deregulation view the reduction in fare prices as a good thing from the point of view of the customer. Bouteil et al. (2019) and Harding et al. (2016) point to fare prices becoming more competitive and affordable so that more people can utilise the service.

Other reasons given for deregulation include improving the quality of service. The most often used argument for deregulation is a reduction in wait times (Harding et al, 2016). As the number of taxis increases, the number of available taxis increases. This means that customers should be able to get a taxi faster than previously. Deregulation would especially help the rural areas as Bekken (2007) notes, that currently with tightly regulated jurisdictions in the taxi market, drivers who end their last trip outside their jurisdiction often return to their jurisdiction as soon as possible. Since drivers are only allowed to start trips from their own jurisdictions, new drivers tend to sign up in the densest ones. This means that many of the taxis would have to decline trips in the less dense areas. (Gwilliam, 2005.) Some legal reasons for deregulation have also been mentioned. For example, according to Barrett (2003), a person's right to work in a market they're qualified

to work in as well as the public's right to service were brought up in support of deregulation in Ireland.

However, a lot of the arguments for deregulation stem from experiences of previous deregulations and the findings that the reasons given for regulation do not actually stand in the real world. For example, Cetin and Deakin (2019) found that taxi markets are not natural monopolies. This would indicate that deregulation itself should not lead to monopolies. Also, the arguments to regulate due to possible congestion might not be viable. Almost anywhere normal private motorised vehicles vastly outnumber taxis, so it is unlikely that an uptick in the number of taxis is going to greatly increase congestion on public roads (Barrett, 2010; Harding et al., 2016). Congestion at taxi ranks could, however, increase. Cetin and Deakin (2019) also argued, the effects of quantitative regulation could be achieved with less intrusive methods. For example, pollution can be reduced by reducing the number of taxis in the system, but pollution can also be reduced by regulating vehicle emissions.

### **State of taxi regulation in two European cities**

Taxi regulation is applied differently in different countries. In addition, there are large regional differences within countries. Comparison between countries is not straightforward due to differences in social and political environments, however, the most significant differences can be identified. Therefore, we will consider experiences with regulatory changes in two European cities: Stockholm (Sweden) and Dublin (Ireland). Stockholm is considered to be a landmark case of taxi deregulation, and while Dublin is similar in many ways, it had a completely different outcome. Due to this difference, we examine the deregulation in these two cities. Differences in regulatory systems and results of deregulation can be seen in Table 2 and Table 3.

## **Stockholm, Sweden**

Stockholm is the capital of Sweden and the largest urban area in Scandinavia. The city is home to about 975,000 people and the urban area has more than 1.6 million people. The Swedish taxi industry is characterised by many small operators, as 70% of taxi drivers are owner-drivers. In Stockholm, the proportion of owner-drivers is even higher. Taxis are widely used for public purposes in Sweden, and public sector contracts cover up to over than half of all taxi trips throughout the country. (Bekken, 2007.)

Sweden was one of the first countries to systematically deregulate the taxi industry. Previously, the country or city authorities had jurisdiction over taxi traffic. In July 1990, the entire taxi industry was liberated by deregulating, for example, operating areas, maximum fare prices, and the number of operating licences (Boutueil et al. 2019.) The main reasons for deregulation were the desire to make the taxi industry more efficient and to find a balance between supply and demand (Bekken, 2007).

Because of deregulation, more taxis entered the market but, at the same time, the efficiency of each vehicle decreased. This led to a reduction in drivers' salaries by up to 25% in Stockholm. Due to simultaneous economic recession, this decrease in income led to the bankruptcies of several taxi operators and the dominance of the sector by a few large players. Taxi fare prices also rose significantly. (Bekken, 2007.) Because of these negative effects, the taxi industry has again slowly started to be regulated. For example, in 1995, a special taxi driver licence was introduced to limit the number of taxis. Currently, Sweden has one of the world's strictest rules related to that licence. Regulations for reducing fare prices have also been introduced, such as requiring drivers to inform passengers before the journey if the ride should cost more than SEK 500. Fare prices must also be displayed both inside and outside of the taxi. (Boutueil et al. 2019.) Power flowed to a few key players who managed to dominate the taxi

industry of Stockholm. Again, the dominance had to be limited by regulation.

The case of Stockholm is one of the first and most important examples of deregulation. Decision-makers sought to make the taxi industry more efficient through deregulation, but the result was quite the opposite. Power flowed to a few key players who managed to dominate the taxi industry of Stockholm. Again, the dominance had to be limited by regulation. Afterwards, it could be argued that the regulations should have not been eliminated instantly but, instead, piece by piece.

### **Dublin, Ireland**

Dublin is the capital and largest city of Ireland with a population of about half a million. Further, The Greater Dublin Area, which covers the Dublin urban area and nearby suburban towns, is home to almost two million people representing 40% of the population of the whole country. Ireland has an extremely high number of taxis per capita when compared to other European countries. Like in Sweden, there are very few hired drivers in Dublin, which means that most of the taxi operators are independent owner-drivers. The taxi market of Dublin is dominated by the hail segment. (Bekken, 2007.)

In Dublin, access to the market as well as fare prices were tightly regulated. For instance, the value of a taxi licence increased from 4,400 € in 1980 to 114,000 € in 2000. In Dublin, however, there was no such practice, meaning that every new entrant had to buy a licence, which made it practically impossible to enter the market. As a result of the mismatch between supply and demand, the government decided to increase the number of taxis by attaching extra vehicles to existing licences. However, the decision was not agreed by new entrants, and they took it to the High Courts, which completely deregulated market access in 2000. (Barrett, 2010; Bekken, 2007.)

Because of deregulation, the number of taxis increased significantly. During the first two years, the number of taxis more than tripled in Dublin (Barrett, 2003). Between 2002 and 2008 the number grew by further 70%. There was also a significant change in waiting times, as the proportion of passengers who had to wait for taxis only ten minutes or less rose from 58.3% to 85.7%. In addition, passengers were very satisfied with the level of service. (Barrett, 2010.) Due to the large increase in the number of taxis, there may be a risk that supply, and demand will not always match, but in general, the deregulation of the Dublin taxi industry has been successful. The biggest winners of deregulation have been passengers and new entrants. After deregulation, the taxi industry has become a major part of the public transport sector in Dublin.

	<b>Regulations</b>	
<b>Location</b>	<b>Entry</b>	<b>Fare prices</b>
Stockholm, Sweden	Deregulated	Deregulated
Dublin, Ireland	Deregulated	Regulated

*Table 2. Differentiation of the deregulation methods in Stockholm and Dublin.*

	<b>Effects of deregulation</b>		
<b>Location</b>	<b>Number of taxis</b>	<b>Fare prices</b>	<b>Waiting time</b>
Stockholm, Sweden	Increased at first, but no impacts in the long run	Increased	Decreased
Dublin, Ireland	Significantly increased	-	Significantly decreased

*Table 3. Observed impacts of the methods of the deregulation in Stockholm and Dublin.*

As can be seen, regulation and its impacts vary between different cities. The effects of regulatory changes depend on multiple factors, such as length of the regulatory period, how deregulation was implemented, and how close to market prices were the regulated prices. It is also important to consider different market characteristics and geographical differences. (Bekken, 2007.)

Bekken (2007) has identified some key factors that affect the functioning of regulation. Deregulation of market access will lead to an increase in supply. However, according to Bekken (2007), more supply is not necessarily better. It is more important to find a balance between fare prices, quality, and availability (Bekken, 2007). A balance between all these three elements would benefit both customers, drivers, and operators. As a rule, only customers benefit from a large supply and better availability.

Case studies show that, although deregulation often aims to decrease the fare prices, the result can be quite the opposite. According to Bekken (2007), this is since regulated fare prices are below the free-market price and deregulating the market will cause the prices to bridge this gap. However, the fare price being dictated by market forces will allow the price to fluctuate between peak and off-peak hours to incentivise using taxis throughout the day. Bekken (2007) has also noted that regulation of the quality of service does not in of itself have significant effects, but its importance seems to increase when entry and/or fare prices are deregulated. This is because even low-quality standards always reduce the effects of deregulation by erecting barriers to entry.

Bekken (2007) presents two suggestions that he believes will help to improve the effects of taxi regulation. The first step should be to tighten the quality requirements for both operators and drivers, while the quantitative regulations should be repealed. Second, fare prices should be always regulated by setting maximum fare prices. Because

the performance of the taxi industry is affected by several factors, the effects cannot be known with certainty under any circumstances.

## **Conclusion**

Even though the taxi industry is one of the few industries where quantities and maximum fare prices are still strictly controlled, large scale shifts in regulatory structures are happening across the world. The impacts of these changes are still largely unknown. Therefore, the aim of this article was to get a narrow picture of the potential effects of the deregulation of the taxi industry by investigating and comparing the observed effects in two European capitals.

As can be seen from the arguments provided as well as the examples analysed, the question of taxi regulations is more complex than it might initially sound like. Not only are there multiple ways to regulate the market, but there are also multiple entities that can be regulated. And as was noticed in the examples of Sweden and Ireland, even similar regulation or deregulation strategies can lead to wildly different outcomes. The variables that affect the outcomes of the regulatory decisions are so varied that making clear distinctions of the effects of different deregulatory practices is near impossible. However, the government officials involved in the regulatory decisions agree that the emergence of ridesharing services, such as Uber and Bolt, means that decisions one way or the other must be made. Gwilliam (2005), in turn, points out that finding optimal regulations is a difficult task, mainly for the reasons mentioned above. This lack of information makes it hard for governments to take necessary action due to not wanting to upset the powerful taxi lobbying infrastructure. Lobbying groups can also control the markets themselves by aggressively controlling its members, negating the need for regulation by a governing body. However, if this was always the case, there would not be a need for governmental regulations in the first place. On top of these, there is also the question of how to deregulate, whether to do



it in one go or in stages. There are arguments for both and no clear answer on which would be better if either one.

However, the contention of whether taxi regulations are beneficial or not mainly focuses around quantitative and economic regulations. The qualitative regulations such as the competence of drivers, safety of the vehicles, and clearly visible fare prices do not seem to inhibit innovation, competition, or the ability to access services. However, there are certain qualitative regulations, such as knowledge of the area or the age of the vehicle, that could act as barriers to entry which could effectively undermine the desired result of the regulation. Therefore, to maximise the competitiveness of taxi markets without risking reductions in service safety and quality, a focus on the qualitative regulations over quantitative and economic regulations would be the correct thing to do.

## References

Barrett, S.D. (2003). Regulatory Capture, Property Rights and Taxi Deregulation: A Case Study. *Economic Affairs*, 23(4), 34-40. <https://doi.org/10.1111/j.1468-0270.2003.00441.x>

Barrett, S.D. (2010). The sustained impacts of taxi deregulation. *Economic Affairs*, 30(1), 61-65. <https://doi.org/10.1111/j.1468-0270.2009.01975.x>

Bekken, J.T. (2007). Experiences with (de)regulation in the European taxi industry. (De)regulation of the Taxi Industry. OECD, Paris, pp. 31-58. <https://doi.org/10.1787/9789282101155-en>

Bouteil, V., Quillerier, T. & Voskoboynikova, A. (2019). Benefits and Pitfalls of Deregulating Taxi Markets: Can Contrasted Case Studies Help Inform the Debate? *Transportation Research Record: Journal of the Transportation Research Board*, 2673(11), 726-736. <https://doi.org/10.1177/0361198119847974>

Cairns, R.D. & Liston-Heyes, C. (1996). Competition and regulation in the taxi industry. *Journal of Public Economics*, 59(1), 1-15.

Cetin, T. & Deakin, E. (2019). Regulation of taxis and the rise of ridesharing. *Transport Policy*, 76, 149-158. <https://doi.org/10.1016/j.tranpol.2017.09.002>

Gwilliam, K.M. (2005). Regulation of Taxi Markets in Developing Countries: Issues and Options. *Transport Notes Series*; No. TRN 3. World Bank, Washington, DC.

Harding, S., Kandlikar, M. & Gulati, S. (2016). Taxi apps, regulation, and the market for taxi journeys. *Transportation Research Part A: Policy and Practice*, 88, 15-25. <https://doi.org/10.1016/j.tra.2016.03.009>

Lanamäki, A., Väyrynen, K., Laari-Salmela S. & Kinnula, M. (2020). Examining relational digital transformation through the unfolding of local practices of the Finnish taxi industry. *The Journal of Strategic Information Systems*, 29(3), 101622.

Liston-Heyes, C. & Heyes, A. (2007). Regulation of the Taxi Industry: Some Economic Background. (De)regulation of the Taxi Industry. OECD, Paris, pp. 91-113. <https://doi.org/10.1787/9789282101155-en>

Toner, J.P. (2010). The Welfare Effects of Taxicab Regulations in English Towns. *Economic Analysis and Policy*, 40(3), 299-312. [https://doi.org/10.1016/S0313-5926\(10\)50031-6](https://doi.org/10.1016/S0313-5926(10)50031-6)