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Taxi: different solutions in different segments

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Abstract

Taxis are solving a niche in public transport. They provide a door- to- door service, flexible and available to the general public. But in contrast to most public transport they are not subsidized.

Even though the service that they provide is very similar all over the world, taxis are regulated in very different ways. In this paper we will first provide insight into some of the reasons why there are differences. Then we describe the impacts of these differences by developing a typology model of the different market segments. The typology is based on a discussion of different characteristics of market segments and is differentiated by traditional market segments, such as hail, rank, pre-book and contracts, in combination with distinctions based upon geographical and demographical components, such as land use and population density. The typology is further developed by a discussion of how different regulatory regimes can and will be economically optimal in different market segments.

Based on this rather theoretical and economically dominated typology we discuss how other major tasks served by the taxi services will be carried out in different markets. In this discussion we will draw upon a series of empirical studies conducted in different Norwegian regions. In this discussion we will show that real world situations will include elements from two or more of the “ideal solutions”. We conclude by showing both that, and in what way, real world mixed typologies present a challenge both to the regulator and other public authorities who are dependent upon the taxi industry for various services. In addition to the empirical studies the paper will be based on a review of international literature.

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1. What are taxis?

Taxis provide a point- to- point service available to the public and as such a part of public transport. This is so even if the lack of regular schedules, routes set stations and subsidies characterizing the main part of the public transport, gives it a semi-private character. As fixed service systems cannot support all travel demand, they are dependent upon taxis to be able to give full area coverage. Taxis are a necessary component for making the supply of public transport function in accordance with the public demand. In some areas and contexts the taxi industry is the only public transport available. Taxis also constitute an accessibility component, in that they provide mobility for persons who, for geographical or disability reasons cannot use the conventional public transport system.

Even if the taxi industry has this central function in the public transport system, it is often overlooked and receives little attentions from planners and policy makers, especially compared to other modes of public transport.

A consequence of not being on top of the political agenda is that taxi regulation often is made ad hoc to address specific real or imagined problems, rather than being a result of a taxi policy with specific objectives

In the following “taxis” are used in the meaning “a vehicle with a driver available for hire for the general public”. These vehicles are smaller than buses or coaches, typically registered for nine persons or less. This is not the only definition of taxis. Typically there will be a local definition of the exact properties that constitute a taxi (see Cooper et al. 2010). These properties may vary slightly from country to country and in some cases city to city. For example some definitions exclude the pre-book market segments (as is the case of UK). One important starting point for understanding “the taxi market” is to recognise that taxis are operating in different market segments and that these market segments have different properties.

This paper starts by looking at elements of production within the taxi market (chapter 2). This includes a description of the different market segments and their properties, seen from an economic perspective. In chapter 3 we look at the traditional arguments for taxi regulation. In chapter 4 we introduce the geographical dimension and argue that this is key to understand the taxi markets we observe. Finally we conclude by pointing at further extensions of this research.

2. Taxi market form and modes of production

There are four major market segments in the taxi industry; the hailing segment, the taxi rank segment (together called “street segments”), the pre-book segment and the contract segment. The hail and taxi rank segments are unique for the taxi industry. However, the pre-book and contract segments have overlaps with non-taxi industries. The form and extent of the overlap will depend upon regulation.

2.1. Hail

With hailing we here think of flagging down/ hailing a taxi on the street. When a taxi is vacant it is driving around in the city looking for new trips. The hailing segment is most prominent in larger cities with high taxi densities. In order to function it needs a certain density both of passengers and taxis.

The economics of the hail segment is studied in several empirical studies, such as Schaller (2007). From the literature we find an agreement that the hailing market segments need regulation. This is based upon the observation that, when a taxi meets a customer the customer is faced with a temporary monopoly supplier (Dempsey, 1996). For the customer, choosing to wait means uncertainty, as he or she does not know when the next vacant taxi is coming or what that taxi charges. This gives bargaining power to the taxi driver. In addition, in an unregulated market one would expect the prices to rise and be unpredictable. Further pushing in this direction is the fact that as there is little or no economics of scale in operating taxis in this market segment. The capital need is a car. Consequently, one would expect high number of taxi vehicles, high fares and low salaries, quality and profits as a free market solution. Many, cities find or have at a point in history found, this solution unattractive and impose regulations. These regulations can take different forms. Typically, they include licensing, restricting the number of vehicles allowed, restricting the type of vehicle, requiring the drivers to have certain proof of qualification etc.

2.2. Rank/stand

A taxi rank or stand is a place where taxis stand to wait for customers. These ranks are typically located outside major transport hubs such as airports, railway stations, other transport nodes, hotels and government buildings and in city centres. In a taxi rank taxis wait for hire or passengers wait for taxis. In most cities, the taxi ranks are organized on the basis first in first out. Even when this is not the case there is a strong tendency for people to choose the first taxi in the rank.

From an economic perspective, the rank has many of the same properties as the cruising market segments. However, it does not need such high taxi densities to work, as the taxis are located at hubs rather than spread over a large surface area. There is a tendency for prices to be pushed up in a free market situation, as customers are faced with a monopoly supplier in most cases, even if there are taxis from different companies offering taxis. There are little or no economics of scale in offering the service. The barriers to entry are low. In an unregulated market, this will result in a high number of vehicles, low wages, low profits, and as follows a push towards cutting corners and reducing quality. Therefore, the free market solution is found not to be attractive by most western cities. This market segment is often regulated. Typical regulations include licensing (you need a license in order to drive legally), restricting entry (cap on number of licenses, unmet demand test etc.), quality requirements for drivers (local knowledge, language etc.) and vehicles (technical specifications, accessibility, etc.) and regulated prices (and/or price information).

2.3. Telephone / pre-book

From an economic point of view, the telephone market is very different from the “street” markets. Here, the customer or someone acting on behalf of the customer orders a taxi from a dispatcher. This dispatcher then allocates a vehicle to the particular trip. In many cases, this is done automatically. In these market segments there are significant economies of scale, as there is economics of density and a need to keep often expensive computer infrastructure and a round the clock telephone service. This induces fixed costs, which are large compared with the street market segments. However, in this market segment a potential customer can quite easily call different companies and compare prices and availability. It is also easier to build up a set of experiences with different companies, as there will be fewer. As a result, this market can function quite well with much less regulation than the street markets. However, some regulation, such as quality requirements (on vehicles and drivers) to ensure safety and requirements on opening hours, to ensure availability, may still be called for.

2.4. Contract

In many cases, public authorities and private companies have a reoccurring need for taxi services. For the public authority this may be in the form of transport of schoolchildren, elderly, disabled and so on. For private companies it may be to transport personnel on a regular or semi-regular basis. In both cases, buying these taxi services can be an economically attractive alternative to producing such services in house.

In these market segments, the taxi industry will normally face competition from other industries, depending upon the legal framework. In the same way as with the pre-book market segments, this segment can function quite well with little regulation.

2.5. Shared taxis

Shared taxis are common in many developing and several developed countries. They can be seen either as a form of street market taxi, a separate segment or as part of conventional public transport. The mode occurs in many different forms with varying degrees of regulation and legality. Shared taxis are a form of public transport, between ordinary taxis and mass transit systems. In some places it operates on predefined lines, as an unscheduled bus service, in other the taxi pick up passengers along the way after the first passenger give the direction. A further variation is the dispatcher controlled shared taxi. Here the dispatching company collects trips with roughly similar origins and destinations, and group them in to shared vehicles, at reduced fares compared with metered fares in conventional taxis. In developed countries, this service is formalized in several ways, including “dial-a-ride” types

of semi-scheduled services in low traffic periods or areas. When the local authorities organize this transport, it becomes part of the contract market segment. Where the taxi companies provide the transport and the local authorities schedules and financing.

The vehicles used in these services are often larger than private cars and smaller than conventional buses, typically they are 8 – 20 seats. Shared taxis will typically have larger overlapping market segments with scheduled public transport than metered taxis.

3. Why regulate taxis?

Taxi regulation has a long history. Gilbert and Samuels (1982) and others, point at the 1630s for the origins of modern taxi regulation. The need to regulate taxis in some way seems to be well established. Motivating this is mainly consumer interest. In some cases references to public safety is used, in others congestion, further market failures, in particular related to the street market segments are used, also city image is used as an argument. In some countries, it may also be a legal requirement.

There are several arguments used for and against different forms of taxi regulation, in particular the quite common quantitative regulation. However, entry regulation is not the only form of taxi regulation. The most commonly used academic description include three elements; quality, quantity and economic regulations (QQE). Quality regulations typically address the operator's fitness for operation, standards of vehicle, insurance, driver knowledge etc. Quantity regulations will address the number of vehicles available. Economic regulation will relate to the fares.

3.1. Licensing (qualitative)

The primary argument for licensing is to ensure public safety by only allowing qualified vehicles and drivers access to the taxi markets. Licenses can be set up in a number of ways, depending on local regulation.

Licenses for vehicles may require that the vehicles to meet certain technical standards, such as meeting certain safety requirements and being instantly recognisable as a taxi. This can also include details on livery, and type of vehicle. From a transport economics point of view a safety requirement is recommended, but livery requirements and vehicle type requirements are more ambiguous. However, this does, not mean that such requirements always are out of place. It can be argued that such requirements are justified, as they are part of the city experience. They can also help to prevent fraud, illegal operators will be easier to spot, it can result in better information from the demand side view, but it limits the possibilities for service differentiation.

Licensing drivers can also mean many things. Typical safety requirements include the need to have a valid driver's license, and a clean criminal record. In addition, a documented knowledge of the local area may be called for. To what extent is debated. Knowledge of the local language and in cases where this is a minor language, also knowledge of an international language can be considered necessary. The details on how these requirements are formulated and implemented will to a large extent influence the outcome of the system.

3.2. Price regulation

An economic mind will expect prices to fall, if excess capacity is introduced into a market. Paradoxically the opposite is observed in the taxi industry. This has been the experience in the US (see Dimpsey 1996, Nelson /Nygaard 2008), Scandinavia (Longva et al. 2010) and the Netherlands (Bekken and Longva 2003). Bekken and Longva (2003) present a table where different deregulation processes are compared, where the countries/cities that have deregulated both entry and fares are found to also have experienced an increase in fare levels. So why is the experience not in line with standard economic theory?

In particular on the street market segments (hail and rank), there are economic incentives for the individual taxi owner, company or driver to push up the prices as described in section 2.2. This is a result of a series of market imperfections. One of these imperfections is that competitive shopping is impractical; it can induce significant transaction costs, in the hail and rank market segments. As noted by Shreiber (1975) an individual cab operator, acting independently, cannot gain more passengers if he alone reduces his price below the going market rate. However, Shreiber also notes that there is elasticity between taxi and other public transport modes. As a result, in a

taxi market without fare regulation; the upward pressure on the price from the individual taxi driver may lead to a lower market share for the taxi industry than in a market with fixed or maximum fares.

The practical solution to this problem is that regulation should take the form of price caps. Stating the maximum price the taxis are allowed to take, at least in the hail and rank market segments. That means that if the market price is below the regulated price, the market price will be used, if it is above the regulated price, the regulated price will be used. It is however very difficult to set a “correct” regulated price. From the taxi industry, one would expect that they would lobby for a higher fare. However, the public and politicians will typically want a lower fare. A regulated maximum fare will also protect the public from arbitrary high fares charged by opportunistic taxi drivers, who expect that they will not encounter the same passenger again, and that if the passenger complains, he or she will not be able to pin a complaint to the particular driver in question. However, it will still allow a driver or company to give discounts, if the market fare is below the regulated fare. A maximum fare is preferred to a fixed fare.

In the pre-book market segments, it is difficult to find good economic arguments for price caps, except in the cases where the taxi industry is organized as a monopoly. Also in such cases there will, most likely, still be a form of intermodal competition, limiting the fare levels. Only in the case where the taxi service is a true monopoly, that is if it is the only viable public transport option (this can be the case in rural areas or niche market segments), one would expect a pre-book service to charge monopoly prices. Even in these cases, the requirement for retaining such a pricing policy will be the requirement to maintain the taxi company’s role as a monopoly supplier.

3.3. *Entry regulation*

If we assume that licenses are issued for vehicles and drivers, the question remains on how to distribute the licenses. There are two main approaches to this, one limiting the number, and the other allowing all qualified to enter. Again, the outcome will be determined by how each of these solutions is implemented.

There are several rationales used for limiting entry into the taxi market. One is to prevent crowding at stands or in city centres, a second is to keep profitability (to compensate for other duties, as 24 hour service requirements or specific quality standards) a third is to protect workers, as one typically finds lower wages and longer working hours for the drivers in open entry system. It has also been claimed that entry regulation prevents overcharging (Nelson/Nygaard, 2008).

The main arguments against entry regulation are 1) that entry regulation creates economic rent and 2) that such restrictions are not a market solution. The UK Law Commission (2012) points at the two different market segments in taxi regulation, the hail and rank, and the pre-book and argue that these segments should be regulated differently. It also points at the lack of success in markets which have deregulated entry, without treating the different market segments differently, referring to the example of the Netherlands.

Bekken (2007) point to the fact that much of what is written on the topic of taxi regulation is coloured by the writers’ general political view on what should be the role of government. He further states that to make theories more powerful, they should be based upon empirical findings. Bekken (2007) also points at the scarcity of good empirical studies of the taxi industry. Most empirical studies are case studies looking at a city or regional authority’s specific situation, and not designed to form the basis of a new theory. Cooper et al. (2010) state: “It is quite likely that no absolute answer can be derived as whether to regulate or deregulate the supply of taxis. We do however, identify that certain forms of regulation appear to serve the operation of specific markets better than others. In other words that the most appropriate forms of regulatory control remain inexorably tied to the forms of supply desired, forms of supply apparent, and forms of supply experienced in the past.” (Cooper et al., 2010:174).

3.4. *What are the alternatives?*

In defining the taxi market two general approaches dominates in the literature. There is the one-tier system, including all market segments into the taxi regulation. And there is the two-tier (or multi-tier) system, where the on the street markets are regulated differently from the pre-book markets.

3.4.1. *Single-tier system*

A single-tier system is a system where the hail, rank and pre-book market segments are regulated in the same way within some definitions the contract markets are also included here. This means that the regulation must address

the challenges that are experienced in all market segments. This approach is used in several European countries, including the Nordic countries and the Netherlands. The advantages of this system are its relative simplicity, and that it opens more possibilities for economics of scale. The disadvantages are related to the inability of a single system to be tailored to meet the needs of the different market segments.

3.4.2. Two-tier system

A two-tier system has separate regulations in place for the street and pre-book market segments. The main advantage of such a system is that it will be easier to treat the needs of the different market segments differently. Typically, stricter regulation is due for the street market segments, than the pre-book markets. This is because of the particular market failures on the street market segments. A disadvantage from this organization is that there is less possibilities from economics of scope. A vehicle which technically could operate in several different market segments, in response to demand, is legally restricted against doing so, as in London. This creates inefficiencies. This may not be of great importance in larger markets, but can be a real problem in smaller markets, as you find in rural areas.

4. Introducing the geographical dimension

In our opinion these two approaches, like the general descriptions of the industry presented earlier, lack a central aspect of the nature of taxi industry. Analyses of the taxi industry have to take into account that every act done to supply taxi services has its counterpart in some sort of demand from individuals. Influenced by economics we think of this as the basic market situation (or the core relation of the taxi market situation). Our main point is that this relation takes place. It is always situated in space, which, again, means it has a geographical dimension. The implication of this is that space is inherent in any analyses of the industry. In a way, this is obvious to an industry producing movements in space. Nevertheless, is it our opinion that this geographical dimension has been overlooked, at least not been treated systematically, in the general approaches towards the taxi industry.

4.1. Introducing a simple geographical model

Introducing a simple two-dimensional geographical model illustrates that space matter, and how space can be used as an instrument for more informative empirical analysis. Our two dimensions are the classical division between centre and periphery. In this paper, the dimensions simply describe a division between urban and rural districts, but without any clear-cut definitions of the borders between them. The main characteristics include density and the availability of alternative modes of transport. We argue that there are differences between the two dimensions. This is for instance the case when it comes to the importance of the different market segments/modes of production, differences with empirical implications for the regulations of taxi markets, among others. Considering the geographical dimension is a core to understanding the taxi markets and regulations.

4.2. Opening up the black boxes called marked segments

As we have demonstrated earlier in this paper, introducing different market segments or modes of production in relation to the taxi industry is also an introduction of differentiation. Thereby it is a step towards a more nuanced understanding of the mechanisms influencing the industry. By introducing the geographical dimensions we continue this path.

When it comes to the hail segment our model encourages us to look at the different impact this segment (or mode of production) has for the taxi industry in peripheral (rural) and central (urban) areas. While hailing might be a popular and convenient way to get a taxi in the centre of a town, it is of little use in rural areas where the taxi density is low. This segment plays a marginal role in the composition of the rural taxi market. Osland et al. (2010) point at non contract markets combined in rural areas, constitute less than a third of total revenue, of which majority is pre-book, not hail. Another implication of low density, not only of taxis, but also of potential customers may very well be a change in the relation of power in the monopolistic situation described as a feature of this segment earlier. It might be that the situation is conceived more as an interdependent relationship than a monopolistic market situation, and that the knowledge of treating a former customer will reduce the taxi drivers bargaining power in these (rare)

situations. As we already have seen: In the urban districts it probably will be much more tempting to heighten the prices for random trips like those in the hail segment. In addition to this comes that this segment probably is a much more important economical element for the industry located in these areas.

For the rank/stand segment the situation is similar to the hail: While it might be of significant importance for the economic result in urban areas, it probably plays a minor role in rural districts. This is due to the general lack of traffic generating hubs that are present in more urban areas. For rural (or semi-rural districts with transport hubs like airports, this segment might be of some importance, but here certain regulations may have some impact. Here we can point at the example of Trondheim airport, which is located in a different county than the city it serves, and therefore different taxi regulating authority than the city of Trondheim (Aarhaug et al. 2012). This situation creates challenges for both the regulatory authority in the county where the airport is located, as well as the airport authorities and authorities in the city of Trondheim. For practical reasons special arrangements is called for, (i.e. allow city taxis to take return trips from the airport, as well as driving to the airport).

When it comes to the Telephone/pre-book segment, the situation is different. This segment pays a major role for the industry in rural areas. Darbera, (2010) points at the significance of the pre-book markets in urban areas as well, given that these are defined as taxis. Nevertheless, even if there are some similarities based on the economic role, there will be large differences between urban and rural modes of production in this segment. While we in more urban districts will have the number of taxi companies (dispatchers) to provide a competitive situation, this will seldom, be the situation in rural districts where only a few taxis will be available, and typically, due to the cost structure of a taxi dispatcher, they will be organized by the same company or taxi dispatcher.

Characteristics of the rural taxi markets are that there are long distances, low population density and low taxi density. In combination with economic interests, this means that there will not be a large number of taxis in these districts. Probably the situation will be quite the opposite: because of decreasing population, long working days and already low income for both the taxi drivers and the owners, the periphery might get problems with recruiting, and staffing taxis to serve those district markets. One important component for this area is the last production segment mentioned above; the contract market.

While the contract marked, characterized by large contracts regulating special brands of public transport as transport for people with special needs and the transport of patients, usually will be an important component of the total market in central areas there will often be some taxi companies operating without taking part in the contract marked. In the periphery on the other hand, the contract market is a crucial element for the taxis operational basis and in this way a guarantee for a basic outcome for the taxi owners.

4.3. Analysing one type of regulation using the geographical dimensions

So far, we have seen that different market segments operate differently in different geographical areas. To demonstrate the fruitfulness of the geographical dimension we will make a brief analysis of regulation of taxis by regulating the number of taxis. This form of regulation is widespread and one tricky point is to come up with a number of taxis that balances the need for income and, following the trend for more free markets, the need for competition between different taxi companies.

As mentioned earlier, one reason for this regulation is partly a fear for a harsh competition between the companies in the cities with low income for the workers and partly a necessity for introducing obligations like 24-hour service requirements as a guarantee for the availability of taxis also when the traffic is low.

When analysed along the centre- periphery dimension this regulation will have different impact, for instance in accordance to the importance of the different market segments. In addition, the effects of geographical limits to the zones where the entry regulation is practices will be affected along this dimension.

As already described, both hail and the rank and stand market has some structural properties that makes it difficult to establish well-functioning market situations and they are in need of some regulation to prevent perversities. At the same time the market segment referred to as the phone market has potentials for being a well-functioning market, at least as long as the taxi density is high. The fourth segment, the contract market, may, function as a market independent of the geographical dimensions as an isolated system. One possible conclusion to be drawn from this analysis may be that, there are two sets of regulatory interests that differ systematically in accordance with the centre-periphery dimensions. In the central districts, there is an interest in regulating the market to protect both the consumers and the workers from market distortions, while in the periphery the regulation interest is to protect the taxi owners from a situation where a market may not exist at all.

When this insight is used, for instance as a point of departure for a critique of the regulatory regime used in Norway, i.e. competitive tendering, introduced by public authorities, regardless of local context. It is clearly demonstrated how this tendering model works against the regulatory interests in peripheral districts. However, that this same model works well in the central areas. The centre – periphery model also demonstrates that this contradiction between interests affect the probably most central element in the operational basis of the taxis in the periphery, the need for an economical basis for maintaining service.

5. Conclusions and findings

In this paper, we have used the fact that the taxi market is composed of different market segments as a starting point. These segments are well documented in the taxi literature. We argue that these segments are interconnected and therefore needs to be analysed in context. An analysis focusing at the street market segments are likely to miss important points drawn from the pre-book segments and vice versa.

In addition to the market segments, we see a need for bringing space into the analysis. Every act takes place and we argue that place is of high relevance for different qualities of the taxi markets. By introducing space and place into the analysis, we also get a tool organizing the impacts from the different market segments. To demonstrate the usefulness of this model for approaching taxi markets by analysing the effects of regulating number of taxis, we suggest that such analysis may have implication for a critique of the widespread practice where public authorities use tendering as the sole model for buying transport services.

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