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Procurement of publicly reimbursed taxi services

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Abstract
Publicly reimbursed taxi trips play an important role in the taxi markets of several European countries. In Finland, publicly reimbursed trips account for around 40% of the entire market. The Finnish taxi market was heavily reformed in July 2018 when the private market was completely deregulated with respect to prices and market entry. Simultaneously with the market deregulation, the country's largest public financer of taxi rides began tendering regional dispatch centers and their prices through public procurement. In this study, we examine the effects of these procurements on prices and expenditures of publicly reimbursed taxi trips. We show that the first two procurement rounds have led to significant cost savings due to the increased competition, especially in the second procurement round. Altogether, we estimate that the procurements led to total savings of around 132 million euros (12.1%) in the first 4.5 years. Our results also show that when passengers have a choice of two dispatch centers, local and established centers have on average higher market shares. Finally, we show that four years post deregulation the publicly procured prices were fairly similar to private market prices in large cities, but lower in small and medium-sized municipalities.

Keywords: Public procurement, Deregulation, Taxi market

JEL classification: C54, D47, H57, L98, R48

1 Introduction

Publicly reimbursed taxi trips play an important role in the Finnish taxi market, as they account for around 40% of the entire market turnover (Traficom 2020). These reimbursed taxi trips consist mainly of school transportation, trips granted to individuals with disabilities, and trips to a health-care provider. In this study, we concentrate on the publicly reimbursed taxi services for passengers who travel to a public or private health-care provider because of an illness, pregnancy, childbirth, or rehabilitation. These trips are organized by the Social Insurance Institution of Finland (Kela), the single largest public financer of taxi trips in Finland. In 2022, the the total cost of the Kela taxi trips was 217.2 million euros, and 182.2 million euros (~84%) of the total cost was publicly subsidized.

The Finnish taxi market was heavily reformed in July 2018, when the private market was completely deregulated with respect to prices and market entry. At the same time, Kela began using public procurement to contract regional dispatch centers, which are responsible for providing the Kela taxi trips. Prior to the liberalization of the taxi market, Kela contracted the largest dispatch center in each region, and the prices of the reimbursed trips were based on the same maximum fares as in the private market. In the procurements, the dispatch centers offer a discount percentage to the maximum fare set in a government decree. The first procurement round was organized in spring 2018, and the contracted dispatch centers began operating the reimbursed taxi services in the beginning of July 2018, at the same time as the entire taxi market was opened for competition. The second nationwide procurement was organized in fall 2021. The contract period for the second procurement started in 2022 and will last until December 2024.

In this study, we examine the effects of the procurements on the costs and prices of the publicly reimbursed taxis reimbursed by Kela. First, we examine competition *for* the market by analysing how the discount percentages have evolved in Kela's dispatch center procurements. We show that the first two procurement rounds have led to significant cost savings due to increased competition. Cost savings are especially significant in the second procurement round in 2021, when the number of contracted dispatch centers increased from one to two in each procurement region. For example, the first procurement in 2018 attracted only one bid in several procurement regions, mainly from the incumbent providers, while the 2021 procurement attracted at least three bids in all regions. The average contracted discount percentage increased from 7% in 2018 to 23% in 2021. The results indicate that the dispatch center market evolved and matured during the first 3 years after the market was opened for competition.

Second, we use individual-level data on all trips reimbursed by Kela, and calculate how much public and private money has been saved as a direct result of the discounts received through the public procurements. In practice, we compare the realized costs to a counterfactual scenario, in which the prices of the reimbursed trips are solely based on the maximum fares similarly to before the reform. Altogether, we estimate that the procurements led to total savings of around €132 million in the first four and a half years. In 2022, the first year of the second contract period, the savings amounted to around €72 million, which highlights the benefits of the increased competition in the 2021 procurement. Kela reimburses around 84% of the total costs, and passengers pay a small part of the costs as a deductible. Thus, the increased discounts of the procurements have also brought direct financial benefits to some passengers. We estimate that the savings to passengers amounted to around €1.7 million in 2022. We also show that the savings have not been diluted by simultaneous increases in the maximum fares, but that the procurements have pushed the prices closer to production costs.

Third, we analyse how competition *in* the market worked in 2022, the first year when two dispatch centers operated in each procurement area. The market share of the larger dispatch center varies substantially between regions. In 2022, the lowest market share was 50.1%, i.e., nearly equal between the two dispatch centers, whereas the largest market share was 92.5%. We show that local dispatch centers had a significantly larger market share in areas where only one of the dispatch centers was local in 2022. In addition, incumbent dispatch centers had on average larger market shares than the largest dispatch centers of other regions. This implicates that passengers tend to book a taxi from a local and established dispatch center they are familiar with.

Fourth, we analyze how the prices of publicly subsidized taxi trips have evolved compared to those of private taxi trips 4.5 years after the reform by utilizing data on private taxi market prices from 2022. There are no large differences between the procured prices and the private market prices in large municipalities: The prices of Kela rides are slightly higher than private rides for shorter trips and slightly lower for longer trips. However, in smaller municipalities, Kela taxi prices are consistently lower than the private prices for the same distances.

Our study adds to the empirical literature on the Finnish taxi market reform in 2018. The private market was deregulated with respect to entry and prices, and it also sparked changes in the publicly financed side of the market. Although this full deregulation was a substantial policy change and received a lot of publicity and sparked debate, empirical academic literature on the reform is fairly narrow. It is important to also note that the high proportion of publicly financed trips can affect the

behavior of taxi firms and cause the effects of the deregulation to differ from what prior literature predicted (Marell & Westin, 2002). Jääskeläinen et al. (2023) find that the deregulation in Finland led to higher offered prices overall but lower realized prices in the largest municipalities. In smaller municipalities, realized prices have increased significantly but firm profits have decreased, which leads the authors to hypothesize that one reason for this might be a reduction in the prices of publicly funded trips.

There is no clear consensus in the literature on the effects of taxi market deregulation on consumer or firm outcomes, and results seem to be somewhat context dependent. Taxi markets have, to some extent, been deregulated for example in Ireland (Barrett 2010), the Netherlands (Bakker 2007), New Zealand (Gaunt 1996), Sweden (Marell & Westin 2002), USA (Teal & Berglund 1987), and most recently Norway (Aarhaug et al. 2020) with varying effects on prices and availability. Schaller (2007) argues that deregulation may lead to very different results in street hail/cab stand and dispatch markets, and consequently, the effects of deregulation on market outcomes may depend on which segments of the market are the most substantial. To account for this, some countries have implemented two-tier systems, where regulation differs between different market segments (Aarhaug & Skollerug 2014). To our best knowledge, no study has extensively addressed the effects of taxi market deregulation on prices of publicly financed taxi rides.

Taxi markets are characterised by high search costs. Physically searching for trading partners creates matching frictions in the market (Fréchette et al. 2019). Search costs are high especially when the market density is low, which is the case in most areas of Finland. The task of the dispatch centers is to solve this problem by connecting customers to available taxis. Therefore, most taxis in Finland are affiliated to a dispatch center, and, consequently, price competition in the market happens mainly between the dispatch centers. The emergence of ride-hailing platforms, which have partly replaced the traditional dispatch centers, has been the most substantial change in the taxi market in the 21st century. Multiple ride-hailing platforms have also started utilizing dynamic pricing, where the price changes with respect to changes in demand. Applications that use surge pricing, where prices increase when and where demand is high, can be a solution to many problems in the market (Castillo et al. 2016). Furthermore, these applications may lead to efficiency gains, as taxi drivers spend less time riding idle (Cramer & Krueger 2016). In many countries, the emergence of these ride-hailing platforms has led to a decreased market share of the “traditional” dispatch centers.

This study also relates to the wider literature on procurements in publicly financed transportation services. Procurement mechanisms have been used in public transportation, such as in bus and train operations, in many Western countries. Empirical studies have generally found that competitive procurements have led to significant public savings (Hensher & Wallis 2005). However, procurements after the initial round have usually not produced more cost savings. Instead, some of the benefits obtained in the first round have been lost (Nash & Smith 2020). We find significant cost savings in the taxi market, which is well-aligned with prior literature. Furthermore, we find that the savings after the second procurement round are even more substantial than those after the first round. This might be because the dispatch market matured during the first few years after deregulation and because the nature of the procurement changed when Kela decided to choose two dispatch centers to contract in each region instead of one.

Ridesharing has received a lot of attention both in the academic literature and among policymakers as a practical tool to reduce travel costs and other negative impacts of taxi trips, such as traffic congestion and air pollution (Hosni et al. 2014; Santi et al. 2014; Santos & Xavier 2015). Kela has also combined passengers' trips, which has decreased the reimbursed travel costs significantly (Antikainen et al. 2018). However, previous literature on publicly subsidized taxi services has not considered public procurements as a complementary tool to achieve the same goals with very little effort. In this study, we fill this gap and analyze the benefits of moving from administratively set maximum fares to prices determined in a public procurement.

2 Institutional background

2.1 Finnish taxi markets

The Finnish taxi market went through a complete deregulation in July 2018. The deregulation was part of a broader reform, the purpose of which was to create preconditions for digitalization and enhance competition in the passenger transportation market. Before the reform, the taxi market was strictly controlled with respect to maximum fares, entry, and operating areas and times. Regional authorities controlled the number of taxi licences per area, and licences were tied to a specific area. This meant that taxi drivers were required to wait for potential customers at their assigned taxi rank on specific hours of the day. The deregulatory measures abolished the quantity restrictions on licences, and if specific criteria is fulfilled, anyone can obtain a licence[1]. Licences were made national, meaning that a taxi driver was allowed to operate in whichever area they want. The requirements for waiting for specific hours at the specific taxi rank were similarly abolished.

Before 2018, prices were controlled by annually set maximum fares, confirmed by the government. Although it was possible to charge less, there was no incentive to do so, and the maximum fares were the prevailing fares in the market. The fares consisted of a starting fare and a kilometer-based driving fare depending on the number of passengers. If the taxi was driving slow enough due to traffic congestion or had to wait for the customer during the trip, they were able to charge a time-based waiting fare. In addition, separate fares were charged for extra assistance, such as helping a customer with a wheelchair. Table A1 in the Appendix shows the maximum fares prior to the reform between July 2016 and June 2018. After the deregulation, pricing became completely free for privately paid trips. However, the law still requires that pricing principles are transparent and easily obtainable for the customer. Nowadays, virtually all dispatch centers have incorporated both kilometer-based and minute-based fares. Some mobile applications, e.g., Uber and Bolt, also use dynamic pricing.

The annual turnover of taxi rides in Finland is about €1 billion, 40% of which comes from publicly financed rides. Publicly financed trips can be highly important for taxi companies and independent drivers, especially in smaller and sparsely populated areas. Currently, publicly subsidized rides are organized by Kela and the municipalities. Kela reimburses travel costs for trips to health care, which make up approximately half of all publicly funded trips. The municipalities organize and finance free taxi or bus trips for children if the distance from their home to school exceeds 5 kilometers. Traditionally, municipalities have organized the school transportation by tendering the routes

[1] The specific criteria for obtaining a taxi driver's licence can be found from Traficom's (Finnish Transportation and Communications Agency) website https://www.traficom.fi/en/services/taxi-driving-licence

separately or as a whole. In 2019, approximately 110,000 children used a taxi or bus for school transportation, and the total costs of the trips were around €213.2 million (Sjöström et al. 2022). During our study period, the municipalities were also responsible for organizing transportation services for individuals with disabilities[2]. These services were received by 90,681 individuals, and the costs were approximately €149.3 million in 2019 (Sotkanet 2023). Furthermore, the municipalities also organized taxi trips for low-income individuals who are unable to use public transportation because of an illness or other reason and who have not been granted transportation services. The latter two types of taxi services were often procured at the same time.

The taxi market is characterised by high search costs. The task of the dispatch centers is to solve this problem by connecting customers to available taxis. Thus, most Finnish taxis are affiliated to a dispatch center. Before the market reform in 2018, there was no price competition between dispatch centers, and they typically had a very strong market position in their own area. However, the deregulation sparked a new form of competition also between the centers. Although new dispatch centers have entered the market post-deregulation, the erosion of these strong market positions might take time, especially in the most rural areas. On the other hand, ride-hailing platforms such as Uber, Yango, and Bolt have been able to capture some of the market share in large cities.

2.2 Publicly reimbursed Kela taxis

Based on the National Health Insurance scheme covering all permanent residents in Finland, Kela reimburses travel costs to a public or private health-care provider if the reason is an illness, rehabilitation, pregnancy, or childbirth[3] (see Kela 2023). Kela's reimbursement is based on travel from the passenger's permanent home to the nearest place of treatment with the least expensive means of transportation, which typically means public transportation, for example a train, bus, or tram. If a person cannot use public transportation because of health issues or difficult travel arrangements, they can also be reimbursed for using their own car or a taxi. A certificate from the health-care provider is required when using a taxi for health reasons. Furthermore, if a person uses a taxi because of difficult travel arrangements, they need to provide specific reasons when booking the taxi.

In 2022, nearly 75% of all trips reimbursed by Kela were taxi rides. Altogether, Kela reimbursed 3,067,654 trips to 411,480 passengers. The total cost of these trips was around €217.2 million, €182.2

[2]The Finnish health and social services reform transferred the responsibility for organizing taxi rides for individuals with disabilities from municipalities to wellbeing counties in January 2023.
[3] Kela also reimbursed travel costs for Covid-19 vaccinations between March 2021 and June 2023.

million (~84%) of which was reimbursed by Kela. Thus, the average cost was around €71, and the average reimbursement was €59 per trip. Of the reimbursed trips, more than 70% were travelled using a regular taxi, around 25% using a wheelchair-accessible taxi, and around 3% using a stretcher taxi. Kela's reimbursement for taxi rides applies to travel costs that exceed a fixed co-payment, which has been up to €25 per each one-way trip and €50 for a return trip since 2016. The annual maximum for co-payments is €300 for all covered trips per individual. Kela reimburses all costs above the co-payment ceiling, and no co-payment is charged from the passenger once the annual out-of-pocket maximum has been reached. In 2022, passengers paid around €35 million in out-of-pocket payments.

Several issues changed regarding the reimbursed Kela taxis when the Finnish taxi market was deregulated in July 2018. Most importantly, the prices of reimbursed trips were previously based on maximum fares annually set by the government for the whole country (see Table A1). After the reform, the prices have been based on fares determined in regional public procurements of taxi dispatch centers that are responsible for providing Kela's reimbursed taxi services in their areas. These procurements are described in more detail in Chapter 2.3. If a passenger chose not to use the responsible dispatch center prior to the reform, the co-payment was doubled, and the trip did not accumulate to the passenger's annual co-payment ceiling. Since July 2018, the passenger has had to order the taxi from the dispatch center by 2 p.m. the day before the trip to receive the reimbursement. Finally, round trips were charged in a specific way prior to the reform. Essentially, the taxi charged the customer solely for the time the taxi waited for the passenger in the place of treatment instead of billing for the return trip. Since the reform, round trips have been considered as two one-way trips, and the waiting time is no longer included in the reimbursed price.

Kela may also reimburse travel costs for accompanying persons or family members if the treatment staff believes an accompanying person is necessary. Some passengers are entitled to use a wheelchair-accessible or stretcher taxi instead of a regular taxi. In addition, some passengers, such as children who receive treatment regularly and travel alone, have the right to use the services of a regular taxi driver. In some cases, part of the trip may be done by public transportation and the rest by taxi. In addition, some trips are ride-sharing trips, i.e., several passengers who are reimbursed by Kela[4] and travelling to a health-care provider share a taxi. Ridesharing may increase the waiting and travelling times but reduces the number of separate trips and kilometers driven. Antikainen et al. (2018) estimated that ride-sharing decreased travel costs by around 8% in 2015.

[4] Ridesharing was halted between March 2020 and August 2022 because of Covid-19 pandemic.

Taxi operators with wheelchair-accessible taxis or stretcher taxis typically drive both Kela rides and rides for persons with disabilities. Furthermore, there is an overlap in terms of customers: Many people use rides for persons with disabilities in their everyday life and Kela taxis for travelling to health-care services, e.g., weekly rehabilitation. Thus, Kela rides and their procurement may have some influence on other public taxi rides and their procurements and vice versa. However, we do not have data on other public organizers' procurements, which is why this study focuses on the effects of the deregulation and dispatch center procurements on publicly subsidized Kela rides.

2.3 Kela's dispatch center procurements

The dispatch centers are responsible for providing Kela's reimbursed taxi services in their areas. Since the Finnish taxi market reform in July 2018, Kela has selected the regional dispatch centers through a public procurement. Prior to the reform, Kela had centralized the taxi services to one dispatch center in each of the 19 regions (hospital districts). In 2017, Kela had a contract with 14 different dispatch centers that operated in the 19 regions. In practice, Kela contracted the largest dispatch center in each region, and the center handled more than 80% of the region's trips. Because Kela taxis account for a large share of the total market in some regions, this practice may have further strengthened the monopoly position of the selected dispatch center prior to the taxi market deregulation.

Since 2018, Kela has acquired the dispatch centers via competitive bidding in 17 different regions (counties). Kela organizes the procurement as a first-price sealed-bid auction. In practice, the centers offer a discount percentage in relation to the maximum fare of a single taxi trip that is reimbursed under the national health insurance. The government still sets this maximum fare in an act. The reimbursed price is based on the discount offered by the provider and may, therefore, differ between procurement regions. Table A1 shows the maximum taxi fares prior to the reform between July 2016 and June 2018 and the reimbursed fares after the reform in July 2018. Kela controls the quality of the reimbursed trips by setting minimum quality requirements that each dispatch center must meet in the procurement. The requirements include, for example, an electronic direct compensation system and a minimum number of available taxis defined for each region based on the estimated demand. Since the beginning of 2024, Kela has required that each driver has completed a compulsory training regarding passengers with disabilities.

Kela organized the first dispatch center procurement in spring 2018. The contracted dispatch centers started operating the reimbursed taxi services on July 1, 2018, the same day the Finnish taxi market

was deregulated. There was very little competition in the first procurement: The 17 regions received 36 bids, only 19 of which met the minimum criteria[5]. Furthermore, 11 regions received only one bid that met the criteria, and three regions did not receive a single bid that met the criteria. After the procurement, Kela negotiated a contract with the bidders that had not met the criteria in the three regions. Altogether, 11 of the 17 contracted dispatch centers were new operators in organizing the reimbursed taxi services in their area.

The first contract period lasted 3.5 years, ending in December 2021. However, Kela had to renew the procurement five times in four different regions during the contract period. First, the contracted provider faced problems in fulfilling the terms of its contract in Uusimaa region, and Kela renewed the regional procurement already in fall 2018, only a few months after the new dispatch centers had started operating the services. Second, Kela was forced to renew the procurement in four regions in autumn 2020, including Uusimaa region again, because of legal issues related to the actual procurement. The five renewed procurements in 2018 and 2020 attracted 33 bids, 19 of which met the minimum criteria. As a result, each of the four procurement regions received a new provider.

The second nationwide procurement, for the contract period of which extends from January 2022 to December 2025, was organized in fall 2021[6]. In this second round, Kela revised the procurement practice by selecting *two* dispatch centers instead of one in each of the 17 regions. The aim of the change was twofold: to increase competition in the market by giving customers the freedom to choose the provider, and to increase the security and availability of taxi services in case one of the dispatch centers faced difficulties during the contract period. Both dispatch centers were required to have a minimum capacity of available taxis that corresponded to around 70% of the estimated demand in the area. This meant that the capacity requirement for each individual provider decreased, but the total capacity of Kela-taxis in each region increased. In 2021, Kela received 91 bids, 73 of which met the minimum criteria. Compared to the 2018 procurement, there was a threefold increase in both the number of bids and the number of bids that met the minimum criteria. All 17 regions received at least three bids that met the minimum requirements. Out of the 34 contracted dispatch centers, 28 were providers that did not hold a contract from the previous procurement in the area. Thus, the turnover rate was large in all of the procurements.

[5] Most bidders that did not meet the minimum requirements in the procurements had an incomplete project plan or too few taxis under contract compared to the requirements.
[6] The length of the second contract period was originally 2022–2024, but the contract period was extended with options until the end of 2025 with a joint agreement of all dispatch centers and Kela in January 2024.

Three main factors explain the increase in competition in the procurements from 2018 to 2021. First, increasing the number of contracted dispatch centers from one provider to two per region may have influenced the attractiveness of the procurements. This is because the probability of winning might have seemed higher, but also because smaller dispatch centers could have found it easier to participate, since they were not obliged to be the only service provider. Second, the Covid-19 pandemic had a greater impact on private taxi markets, while the publicly reimbursed Kela rides continued operating with a relatively small decline in demand in 2020 and 2021. Kela rides were most likely seen as a stable option because of the uncertain situation in fall 2021. Third, the dispatch center market has also evolved after the Finnish taxi markets were liberalized in 2018. New providers have entered the market and old providers have expanded into new regions. In 2021, the 91 bids came from 24 different providers, and 34 contracts were made with only 14 different dispatch centers.

3 Data and methods

We use data from two different sources: Kela and the Finnish Transport and Communications Agency (Traficom). First, we collected the procurement data on the dispatch center procurements in 2018 and 2021 as well as the renewed procurements in 2018 and 2020 from Kela. These procurement data include information on all bidders' discount percentages and whether they met the minimum requirements and signed a contract with Kela. Second, we used Kela's trip-level register data on all trips reimbursed by Kela between January 1st, 2017 and December 31st, 2022. From the register data, we used information on each trip's date, dispatch center, taxi company and passenger identifiers, costs, co-payments, distance, vehicle type (regular, wheelchair-accessible, stretcher taxi), and ride-sharing status. Third, we obtained aggregate-level data from Traficom on median realized prices of private taxi trips in selected municipalities from April to August 2022.

To calculate the cost savings from the 2018 and 2021 procurements, we link the procurement data to the trip-level register data based on a unique dispatch center identifier. We analyze the direct impact of the discount percentages on the costs of Kela rides by calculating what the costs would have been if they were based on the maximum fares without regional discount percentages. Naturally, the cost savings differ by region, as the discount percentages are based on the regional procurements. In addition, the discount percentages have differed by dispatch center since the beginning of 2022, when two providers started operating simultaneously in the same region. We begin by calculating the counterfactual *cost without procurement*$_{tjp}$ for each trip *t* in a contract period *p* operated by a dispatch center *j* in the following manner:

$$cost\ without\ procurement_{tpj} = cost_{tpj} / (1 - (discount\ percentage_{pj} / 100)). \quad (1)$$

For example, if a trip cost €50 in 2022 and the selected dispatch center offered a discount of 10%, the cost without procurement would be around €55.50. After this calculation, the total savings for each trip are simply calculated as the difference between *cost without procurement*$_{tjp}$ and *cost*$_{tjp}$. In the example, the savings would be around €5.50.

The difference in costs between the counterfactual scenario and the actual costs can be divided into passenger savings and public sector savings. We calculate the savings for passengers and the public sector as follows: First, the cost savings go to the passenger if the cost of the trip is below the fixed co-payment (€25.00) and the passenger's co-payments remain below the annual travel reimbursement ceiling (€300.00). To identify the trips with passenger savings, we calculate the annual cumulative

co-payments for each passenger and flag those who do not reach the annual ceiling of €300.00. However, we only have data on taxi rides, but passengers can also travel by other means of transportation, e.g., bus or train, that accumulate co-payments towards the annual ceiling. To address this data issue, we also flag passengers whose annual co-payments have not reached the ceiling of €300.00 but whose co-payment for a trip is zero. We allocate cost savings from all trips costing less than €25.00 and made by flagged passengers to passenger savings. In addition, passengers also accumulate savings if they do not reach the annual reimbursement ceiling, the counterfactual cost of the trip exceeds the fixed co-payment, and the actual cost of the trip is under €25.00. Finally, we allocate the rest of the savings to the public sector.

Table A2 in the Appendix presents descriptive statistics from Kela's register data. The mean distance of a trip has decreased from 43.4 kilometers before the procurements to 35.3 kilometers in the first contract period and 36.6 kilometers in the second contract period. The decline in the share of shared taxi trips from 2017 to 2022 is explained by the suspension of ride-sharing in publicly subsidized taxi rides between March 2020 and August 2022, a measure taken in response to the Covid-19 pandemic. The average cost of a trip was €59.50 before the procurements, and it subsequently increased to €62.40 in 2022. The mean co-payment (€13.10 in 01/2017–06/2018 and €12.00 in 2022) and the share of trips where some amount of co-payment was paid (56% 01/2017–06/2018 and 54% in 2022) have remained relatively stable between the two time periods. Similarly, the share of trips made by wheelchair-accessible taxi or stretcher taxi has remained stable, ranging 23% to 25%.

Furthermore, Table A2 shows the number of cancelled trips during both contract periods. In the first contract period, the number of cancelled trips was around 5,600, which is roughly 0.05% of the total number of trips. In 2022, there were around 8,300 cancelled trips (0.23%). These are trips that were ordered from the dispatch centers, but the centers were unable to arrange. The information regarding cancelled trips is retrieved from reports summarizing monthly data required from the dispatch centers by Kela in the procurements. We do not have access to trip-level data of cancelled trips, only the annual reports summarizing the period between July 2018 and December 2022. Unfortunately, we do not have this information available from the period before the procurements.

4 Results

4.1 Competition for the market

Table 2 shows descriptive statistics regarding the discount percentages in Kela's dispatch center procurements in 2018 and 2021 as well as in the five renewed procurements during the 2018–2021 contract period. In 2018, Kela received only 36 bids, 19 of which met the minimum criteria. The mean discount percentage of the contracted dispatch centers was just under 7%, and the regional discount varied from 0.01% to 24.25% in 2018. The number of bids per procurement region increased heavily already in the five renewed procurements during the first contract period, as Kela received 33 bids, 19 of which met the minimum criteria. The average discount percentage of the contracted providers increased to nearly 16% in the renewed procurements for the remainder of the contract period. The 2021 procurement attracted 91 bids, 73 of which met the minimum criteria. The average discount percentage continued to increase in the 2021 procurement both for all bids (19.55%) and especially for the contracted dispatch centers (22.89%).

Table 1. Discount percentages in the procurements.

	N	**Mean**	**SD**	**Min**	**Max**
2018					
All bids	36	6.92	5.44	0.00	24.25
Minimum criteria	19	6.69	5.68	0.01	24.25
Contracts	17	6.81	6.01	0.01	24.25
Renewed procurements					
All bids	33	12.12	6.37	1.00	27.11
Minimum criteria	19	12.27	5.44	1.00	20.41
Contracts	5	15.97	4.44	1.00	20.41
2021					
All bids	91	19.55	5.35	7.68	34.00
Minimum criteria	73	19.74	5.47	7.68	34.00
Contracts	34	22.89	4.85	13.98	34.00

Figure 1 shows the highest discount percentage and number of bids within each procurement region, illustrating the importance of competition in the procurements. Only one region received more than three bids in the 2018 procurement, while in 2021, all 17 procurement regions received at least three bids. Because Kela contracted two providers per region in the 2021 procurement, it is important that the regions received more bids than in the first procurement in 2018. Finally, Figure A1 (in the Appendix) shows the distribution of discount percentages regarding all bids and contracts in the 2018 and 2021 procurements, showing the shift in the distribution of all and contracted bids to the right where discounts are greater.

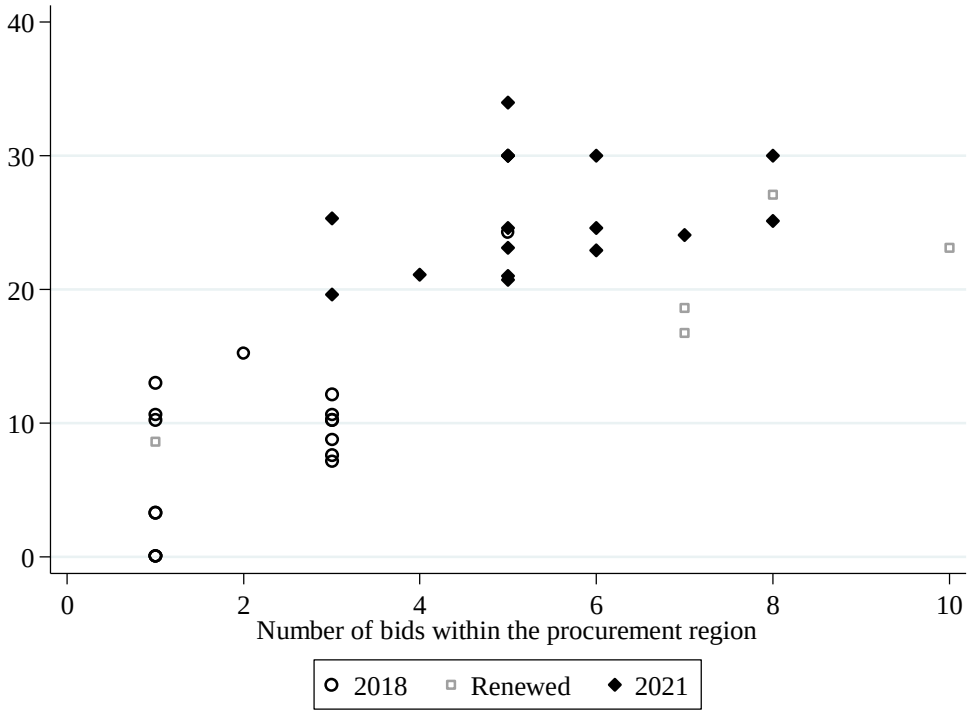

Figure 1. Highest discount percentages and numbers of bids within the procurement regions.

4.2 Comparison to fixed maximum fares

Figure 2 shows the quarterly mean costs and simulated costs (costs without procurement) of Kela taxi trips before procurements and for both contract periods. Throughout 2017, the mean cost of trips remains relatively stable at roughly €60.00. Naturally, both cost variables are identical before the procurements. In June 2018, the observed average costs experienced a slight decrease to approximately €57.00. The simultaneous increase in the mean of the simulated costs shows that in the absence of the 2018 procurement, the average cost per trip would have increased to approximately €64.00. The large increase in both means in early 2020 is most likely explained by the aforementioned suspension of ride-sharing in Kela taxis due to the Covid-19 pandemic. The continued increase of the average discount percentage in the 2021 procurement, reported in Table 2, is further demonstrated by the widening gap between the mean costs and mean simulated costs in the beginning of 2022. The difference increases from roughly €7.00 at the end of 2021 to approximately €20.00 in 2022.

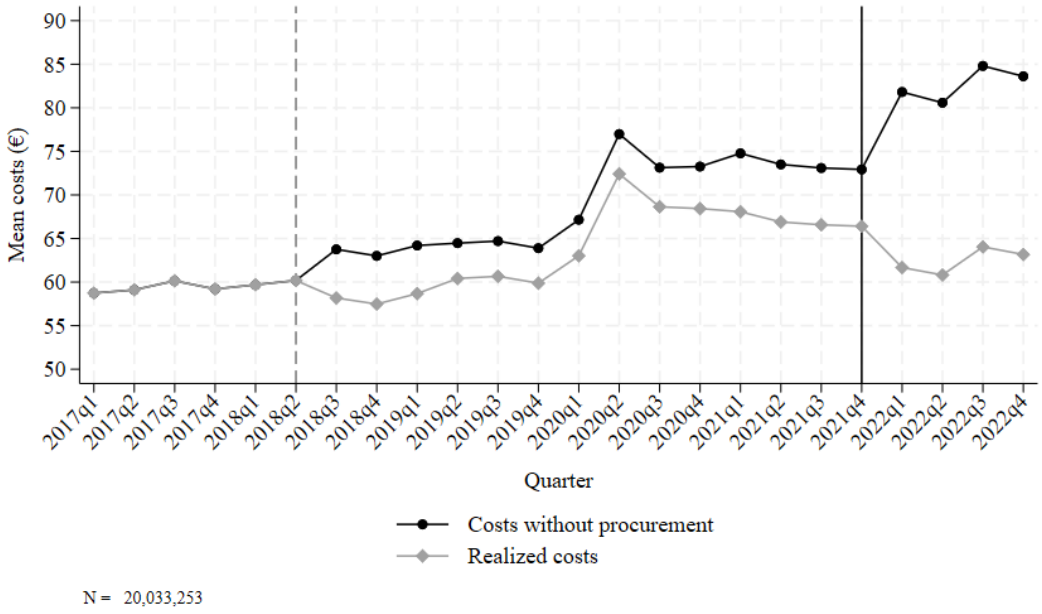

Figure 2. Quarterly mean costs and mean costs based on maximum fares of Kela-taxi trips.

Notes: Dashed and solid vertical lines show the beginning of the first and second contract periods, respectively.

Table 2 shows realized costs, costs without procurement, passenger savings, public sector savings, and total savings before the procurements during both contract periods and in total. The aggregate quantities shown in Table 2 have been calculated by summing the respective trip-level quantities within each period. The realized costs totaled around €734 million in the first contract period. We have calculated that the cost would have been around €795 million without the discounts from the 2018 procurement. This results in total savings of roughly €61 million over the span of 3.5 years. In 2022, the realized costs were approximately €221 million, while our calculations show that the costs without procurement would have been approximately €293 million. Therefore, the increased competition in the 2021 procurement resulted in total savings of around €72 million already in the first year of the second contract period. Based on these calculations, the estimated total savings from the procurements were €132.3 million between July 2018 and December 2022. That is around 12.1% of the €1.09 billion, which is what the costs would have been without the two procurements. The €129 million in public sector savings represent 97.8% of the total savings, while the estimated passenger savings were only €1.9 million.

Table 2. Total costs and total costs based on maximum fares of Kela-taxi trips.

	7/2018 - 2021	***2022***	**Total**
Realized costs	734,100,305	220,944,409	955,044,714
Costs without procurement	794,658,147	292,728,398	1,087,386,545
Passenger savings	1,209,274	1,689,968	2,899,242
Public sector savings	59,348,568	70,094,022	129,442,589
Total savings	60,557,842	71,783,989	132,341,831

As mentioned, we compare the realized taxi trip prices to the maximum fares set in the government decree, i.e. the prices without the discount percentage. This would pose a problem for our findings if maximum prices were increased to account for the expected decrease in prices resulting from increased competition. The maximum prices for taxi transportation have historically been determined to some extent by changes in the costs of taxi transportation. These costs consist of wages, vehicle-related expenses, as well as insurance, interest rate, and fuel costs. We have plotted the cost index for taxi transportation and maximum prices as an index in Figure A2 in the Appendix. Maximum prices are obtained from the government decrees on maximum fares of publicly reimbursed taxis (Table A2). We have also added an index for the maximum prices of Åland, where there was no change in the legislation in 2018. Åland's maximum price index thus represents the development of maximum prices in the case where there were no changes in the legislative framework of taxi markets, neither private or publicly reimbursed. Figure A2 shows that both maximum price indexes have followed the cost index before and after July 2018. The worry that savings estimates would be biased due to the government changing their pricing strategy because of procurement is therefore obsolete. We can conclude that the procurements have pushed the prices closer to production costs, and the savings are not driven by changes in maximum fares.

4.3 Competition in the market

The 2021 procurement brought competition into the market for the first time. In the initial 2018 procurement, Kela chose one dispatch center per region to be the service provider for Kela taxis, but in the 2021 procurement, the number of contracted dispatch centers per region was increased to two. This change had a few different objectives: Firstly, having two providers ensures that the customer has some freedom in choosing the dispatch center. Secondly, the availability of taxi services is secured even if one of the dispatch centers faces difficulties during the contract period.

Since the number of contracted dispatch centers per region was increased to two, we are able to study the competition within the market. First, we evaluate the market concentration by mapping the market

share of Kela taxis of the largest dispatch center within a region. Figure A3 in the Appendix shows the situation in 2022. The share varies substantially from 92.5% in Central and Northern Ostrobothnia to 50.1% in Southern Savonia. Multiple factors, which we explore in this section, may explain the large variance in market concentration.

Before the taxi industry reforms, dispatch centers tended to be local. In a procurement of two dispatch centers, there is feasible concern that the older, more established dispatch center might have an advantage in the market. Some dispatch centers bid to offer Kela taxi services also in regions outside of their private market operating area. Out of the 17 regions, nine had a local dispatch center operating the Kela rides in 2022. In eight of these regions, the local dispatch center is also the one with the highest market share, while in Uusimaa both dispatch centers are local with fairly even market shares. This strongly implies that passengers tend to book their Kela taxi from a company they are familiar with: Out of the eight local dispatch centers that had the larger market share in their regions, six are also incumbent firms from previous procurement in 2018.

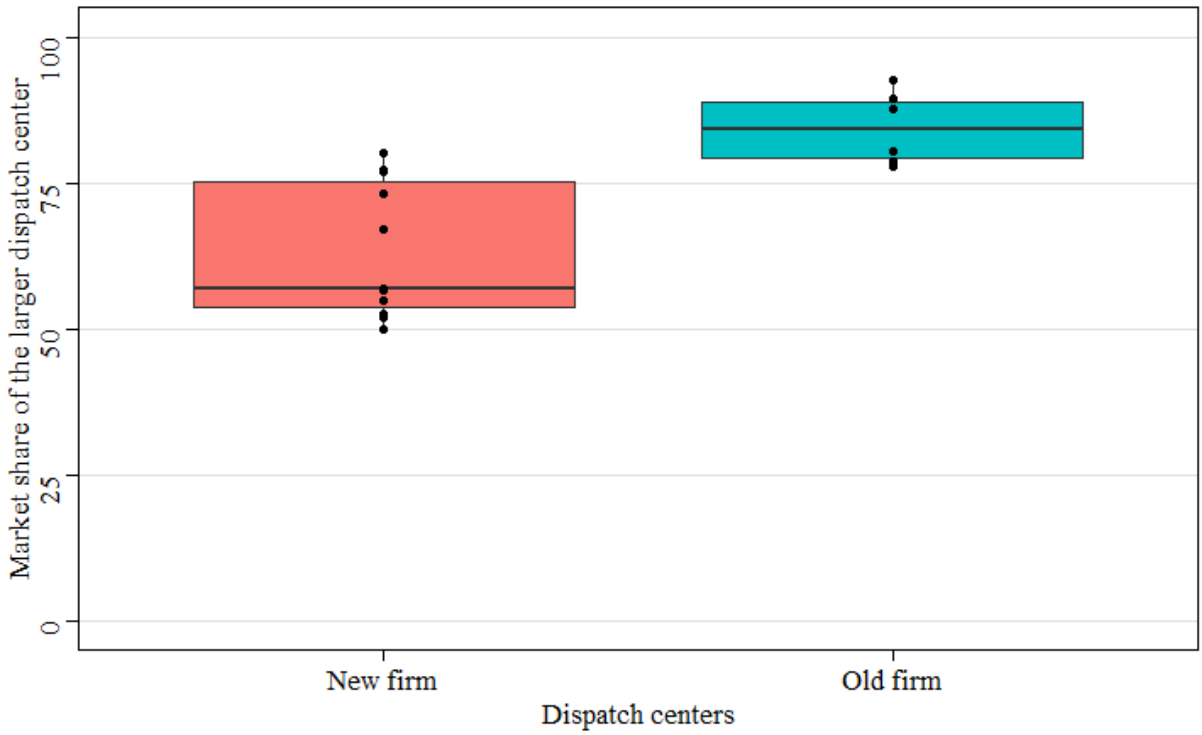

Figure 3. The market shares of the largest dispatch center of each region by incumbent status of the dispatch centers before the procurement.

Figure 3 shows the distribution of market shares of the largest dispatch center in regions where the larger dispatch center is or is not an incumbent firm. With a mean market share of 84.5%, the incumbent local dispatch centers have on average larger market shares than the largest dispatch centers of other regions. This suggests that customers may choose the local dispatch center they are familiar with. However, the market shares of the larger dispatch centers are particularly high in Satakunta (80.1%) and Kymenlaakso (77,0 %) even though they are non-local and non-incumbent to our best knowledge. Meanwhile, the market share of the largest local dispatch center in Etelä-Savo is merely 50.1 %. However, the local dispatch center in question started operating in 2018 and, as such, was not necessarily a well-established brand before the reform.

Some taxi firms and drivers might be affiliated to multiple dispatch centers. The amount of multihoming, defined as the share of taxi firms who drove trips received through both of Kela's regional dispatch centers, varied from 2.9% to 24.9% in 2022 (see Figure A4). As publicly financed taxi rides are a substantial part of the taxi market in many areas of Finland, it may be that taxi firms have an incentive to be affiliated to one or both regional dispatch centers to gain access to the Kela taxi market. However, the dispatch centers may have incentives to prevent the multihoming on purpose or with practical obstacles such as requiring taxis to have tapes showing the logo of the center.

4.4 Comparison to private market prices

In order to understand how the procured Kela taxi prices have evolved with respect to the prices of private taxi trips, we obtained data on the realized prices from Traficom. This is aggregate-level data, i.e., we have the median realized prices of taxi rides of specific distance separately for large municipalities and small and medium municipalities. This division is useful because previous literature has found differences in the functioning of the taxi market with respect to the size of the municipality (see, e.g., Jääskeläinen et al. 2023) The median is calculated from data on every privately purchased taxi trip between April 2022 and August 2022, when all taxi firms were obligated to offer Traficom these data.

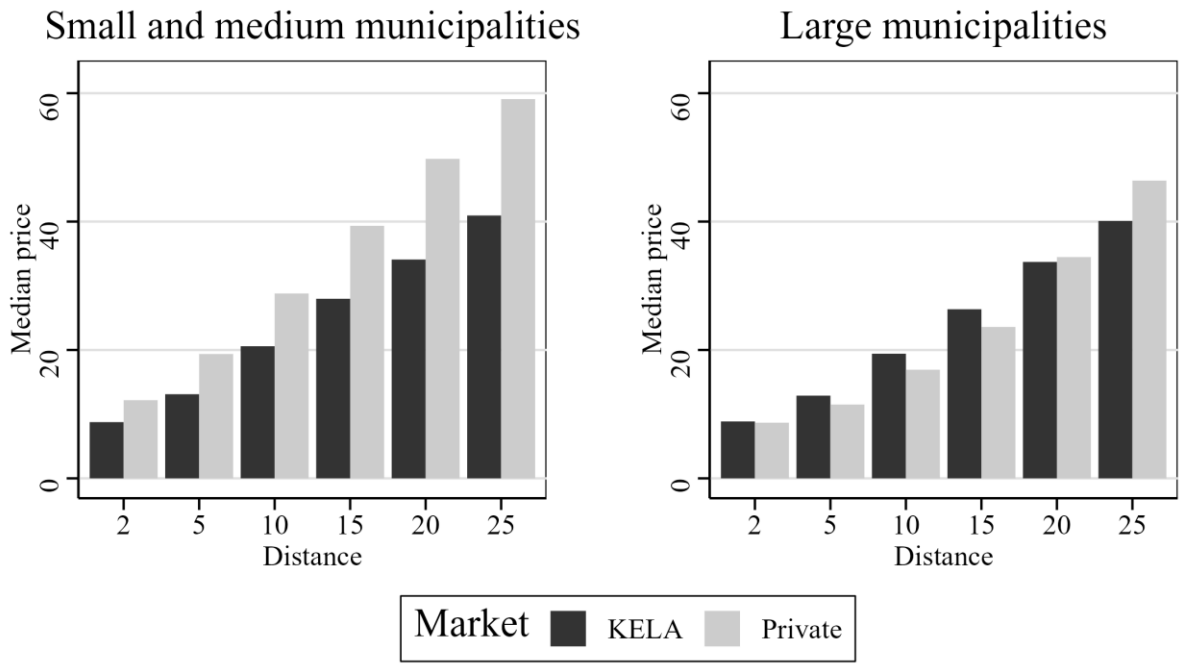

Figure 4. Median prices for different distances in municipalities of different size.

The right side of figure 4 shows the median taxi prices for private and Kela-trips in large municipalities. Trips with Kela taxis appear to be lower in price than private taxi trips for longer distances but more expensive for short distances (less than 20km). However, the differences are fairly small and inconsistent. The left side shows the median prices in small and medium-sized municipalities, where the Kela taxis' median prices are consistently and substantially lower than the private market median prices. The difference is especially large for longer trips: For a distance of 25 kilometers, the difference in median prices is almost €20.00. This, in combination with the results from our counterfactual price calculation, is in line with the hypothesis in Jääskeläinen et al. (2023). The authors argue that the reduction in the prices of publicly funded taxi trips can explain how the profits in small and medium municipalities have declined due to deregulation, despite an increase in the private market prices.

The difference between large and smaller municipalities is primarily explained by the differences in private market prices between the municipalities. Based on Traficom's data and the analysis by Jääskeläinen et al. (2023), deregulation led to lower prices in large municipalities. However, in small and medium sized municipalities, prices increased. These findings could be explained by many factors, one being that there is less competition in small municipalities than in large municipalities. Ridesharing platforms such as Uber and Bolt are present in large municipalities, which can

furthermore explain higher competition. However, Kela's procurements create competition in the publicly funded market, and some dispatch centers offer to operate Kela rides in regions where they do not operate in the private market.

5 Discussion

Competition in the market for taxi dispatch centers increased in Finland in 2018, when Kela started contracting centers through public procurement. We find that the studied procurements of publicly subsidized taxi rides have led to savings of around €132 million within the first 4.5 years after the policy change. Approximately €129 million are public sector savings, and around €3 million are passenger savings. More than half of the savings were obtained in 2022, the first year of the second contract period, when Kela contracted two dispatch centers per region. These findings are in line with prior literature that finds significant cost savings from procurement in the transport sector (Hensher & Wallis 2005). However, prior literature finds that usually the procurement rounds after the initial round have not produced more cost savings (Nash & Smith 2020). We, on the other hand, find that the second round of procurement led to even higher cost savings than the first round, as the savings were already €72 million in the first year of the second contract period. This can be due to the increase in contracted dispatch centers per region, as well as the dispatch center market maturing since the larger taxi market reform.

We find that prices are consistently and substantially lower in Kela rides compared to the private market for trips of the same distance in small and medium-sized municipalities. This can explain the paradox of higher prices and lower profits as a result of the deregulation, as shown in earlier literature by Jääskeläinen et al. (2023). Unfortunately, we do not have data on private prices from a longer time period, and, therefore, we can only offer a snapshot into a specific period of time. As more data are collected from the private market, a more thorough analysis would broaden our understanding of the effects of Kela's procurements. Kela's procurements may also have an influence on counties and municipalities that acquire publicly funded taxi services for school transportation and for individuals with disabilities. Some of the counties and municipalities also use public procurements, while some simply utilize the maximum fares that Kela's procurements are based on. There is very little information about these procurements made by other public organizations, even though the use of good practices and larger procurement bodies could benefit the entire public sector.

The competitive procurement of publicly subsidized taxi services affected all stakeholders in the market. First, the public sector has managed to organize the service at a lower cost through procurements compared to the previously used maximum fares. Although organizing the procurements and monitoring the contracts may take slightly more resources than the previous regulated monopoly model, our calculations show that the savings for the public sector are significant. Second, the introduction of competitive procurements has disrupted previous local monopolies, forcing dispatch centers to compete for the markets in the procurements. Since 2022, the dispatch centers have also competed for passengers, as two centers are contracted in each region. These changes have resulted in lower prices but also offered dispatch centers the opportunity to expand by participating in procurements in multiple regions. Third, for taxi companies and individual drivers, the tendering process might have resulted in lower earnings due to lower prices resulting from competitive procurements. However, it has also provided them with the opportunity to work for multiple dispatch centers by multihoming even within a given region. Fourth, for passengers, the competitive tendering has resulted in modest cost savings and, after the second round of tendering, an opportunity to choose between dispatch centers. This choice can lead to improved service quality, as providers can compete not just on price but also on service quality to attract and retain customers.

The results of our study are limited by two events that occurred during the study period. First, the private taxi market was completely deregulated simultaneously with the first procurement and start of the first contract period in 2018. Therefore, it is impossible for us to separate the effects of these two major policy changes from each other. We do not know what would have happened to the prices of Kela taxis as a result of the procurement in the absence of private market deregulation. The deregulation has led to an increase in the number of dispatch centers, especially in the large cities, and most taxi drivers in Finland are affiliated with a dispatch center. The dispatch centers set the prices for taxi rides driven by their affiliation, and thus the price competition in the market happens primarily between dispatch centers. Furthermore, the competition in Kela's procurements is competition between dispatch centers. If the deregulation led to an increased number of new dispatch centers entering the market, the competition in Kela's procurements might be less pronounced in the absence of the deregulatory reform. Second, the market changed substantially because of Covid-19 in 2020. Kela halted ride-sharing due to a risk of infection and the social distancing guidelines. Kela additionally covered taxi rides to Covid-19 vaccinations for some individuals. The pandemic then simultaneously affected the private taxi market, as people began traveling less and spending more time at home. We cannot be certain that these changes do not interfere with our calculations.

A further limitation of our analysis is that we do not have any detailed data on the quality of the Kela rides before and after the procurements started in 2018. Many factors could have affected the quality since then. First, the prices that lowered because of the studied procurements may have reduced the quality of service. Second, changes of local dispatch centers may have momentarily lowered the quality until the new center established its operations. Third, stricter minimum criteria in the procurements, such as the required training of the drivers or requirements for the taxi fleet, may have improved the quality. Fourth, increasing the number of contracted dispatch centers from one to two and bringing competition in the market may also have improved the quality. Probably the most visible and important measure of quality is the availability of Kela taxis. Based on our analysis, the number of Kela taxis that do not show up at all has been at a very low level after the first procurement. While it is important to maintain a competitive price level in publicly subsidized taxi rides, the quality and availability of the service are also important to consider when developing future procurements.

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Appendix

Table A1. Comparable maximum taxi fares between July 2016 and December 2022.

	7/2016–6/2017	7/2017–6/2018	7/2018–12/2018	1/2019–12/2021	1/2022–6/2022	7/2022–12/2022	Unit	Details
Starting fare I	5,90	5,90	5,90	5,96	6,36	6,72	€	On weekdays from 6am to 8pm
Starting fare II	9,00	9,00	9,00	9,1	9,69	10,26	€	At other times
Driving fare I (–2018)	1,57	1,60					€/km	1–2 passengers
Driving fare II (–2018)	1,89	1,91					€/km	3–4 passengers
Driving fare III (–2018)	2,05	2,07					€/km	5–6 passengers
Driving fare IV (–2018)	2,21	2,23					€/km	>6 passengers
Driving fare I (2018–)			1,61	1,63	1,74	1,84	€/km	1–4 passengers
Driving fare II (2018–)			2,07	2,09	2,23	2,35	€/km	>4 passengers
Waiting fare	45,89	47,04	47,04	47,54	50,69	53,65	€/h	Minimum of 15 minutes required
Assistant fare I	15,70	15,70	15,70	15,87	16,92	17,91	€	Assisting to the inside
Assistant fare II	31,41	31,41	30,09	30,41	32,42	34,31	€	Assisting by carrying
Maximum fare	111,51	112,70	111,41	112,6	120,04	127,04	€	Total

Notes: The maximum fares between 7/2016–6/2018 are calculated using old driving fares I and III as a comparison for new driving fares I and II. VAT of 10% is included in all fares. Prior to the reform in 1st of July 2018, the annually set government act included maximum fares also for pre-ordering (6,45€ in 2017), airport fare (2,27€), a separate assisting fare III for assisting with a stretcher (26,55€), and freight surcharge (2,54€). Assistant fare II has included assisting by carrying or with a stretcher since July 2018.
Sources: Government Acts 570/2016, 403/2017, 275/2018, 1381/2018, 405/2021 and 406/2022.

Table A2. Descriptive statistics.

	N	Mean	SD	Min	Max
Panel A. 2017 - 6/2018					
Realized costs (€)	4,998,413	59.51	62.66	0.01	3076.20
Co-payment (€)	4,998,413	13.05	12.64	0.00	200.00
Co-payment (% of trips)	4,998,413	0.56	0.50	0.00	1.00
Trip length (km)	4,933,974	42.37	62.43	0.00	3013.00
Shared taxi (%)	4,998,413	0.13	0.34	0.00	1.00
Wheelchair or stretcher taxi (%)	4,998,413	0.23	0.42	0.00	1.00
No. of cancelled trips*			-		
No. of passengers			479,379		
No. of taxi companies			7,476		
Panel B. 7/2018 - 2021					
Realized costs (€)	11,494,730	63.86	68.15	0.01	2474.46
Co-payment (€)	11,494,730	11.36	11.84	0.00	50.00
Co-payment (0/1)	11,494,730	0.50	0.50	0.00	1.00
Trip length (km)	11,494,301	35.24	46.33	0.00	2595.90
Shared taxi (0/1)	11,494,730	0.07	0.26	0.00	1.00
Wheelchair or stretcher taxi (0/1)	11,494,730	0.25	0.43	0.00	1.00
No. of cancelled trips*			5,597		
No. of passengers			823,319		
No. of taxi companies			5,945		
Panel C. 2022					
Realized costs (€)	3,540,110	62.41	65.80	0.01	2056.78
Co-payment (€)	3,540,110	12.02	11.74	0.00	50.00
Co-payment (0/1)	3,540,110	0.54	0.50	0.00	1.00
Trip length (km)	3,540,110	36.56	47.07	0.00	1329.10
Shared taxi (0/1)	3,540,110	0.02	0.15	0.00	1.00
Wheelchair or stretcher taxi (0/1)	3,540,110	0.24	0.42	0.00	1.00
No. of cancelled trips*			8,291		
No. of passengers			416,622		
No. of taxi companies			4,709		

Notes: Dummy variable Co-payment (% of trips) takes value of 1 if the passenger paid any co-payment. Panel A depicts statistics from January 2017 to June 2018, corresponding to the period before the procurements. Panel B covers the time period from July 2018 to December 2021, the first contract period. Panel C outlines statistics from the year 2022, the second contract period. * Information was retrieved from monthly reports required from the dispatch centers by Kela and is not available before July 2018.

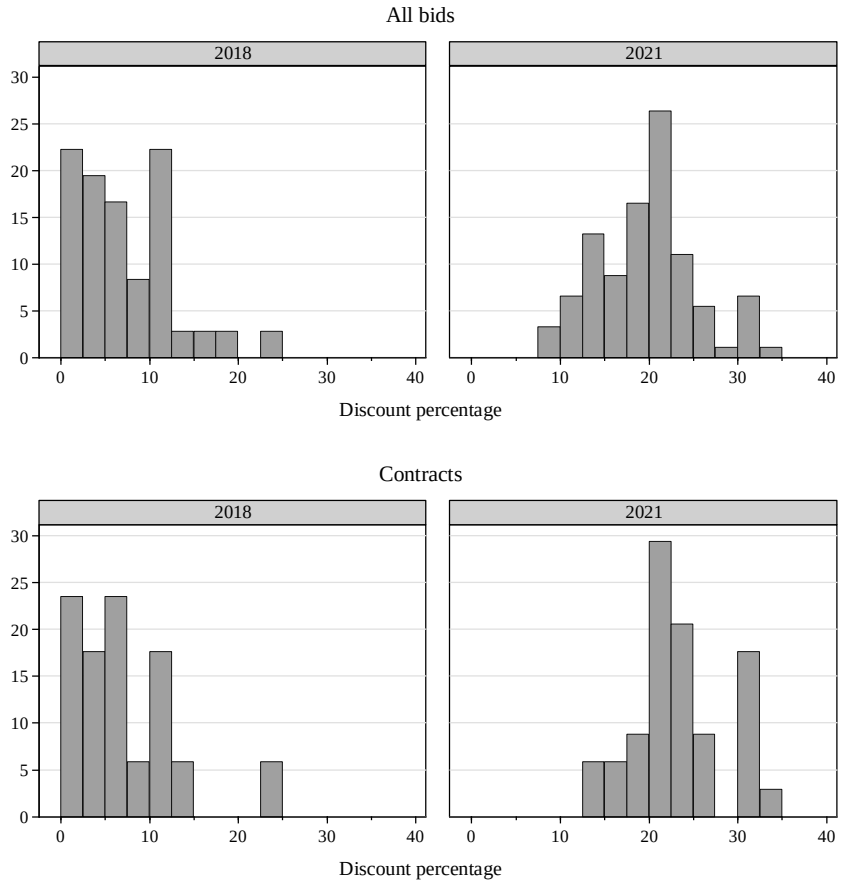

Figure A1. Distribution of discount percentages regarding all bids and contracts in 2018 and 2021.

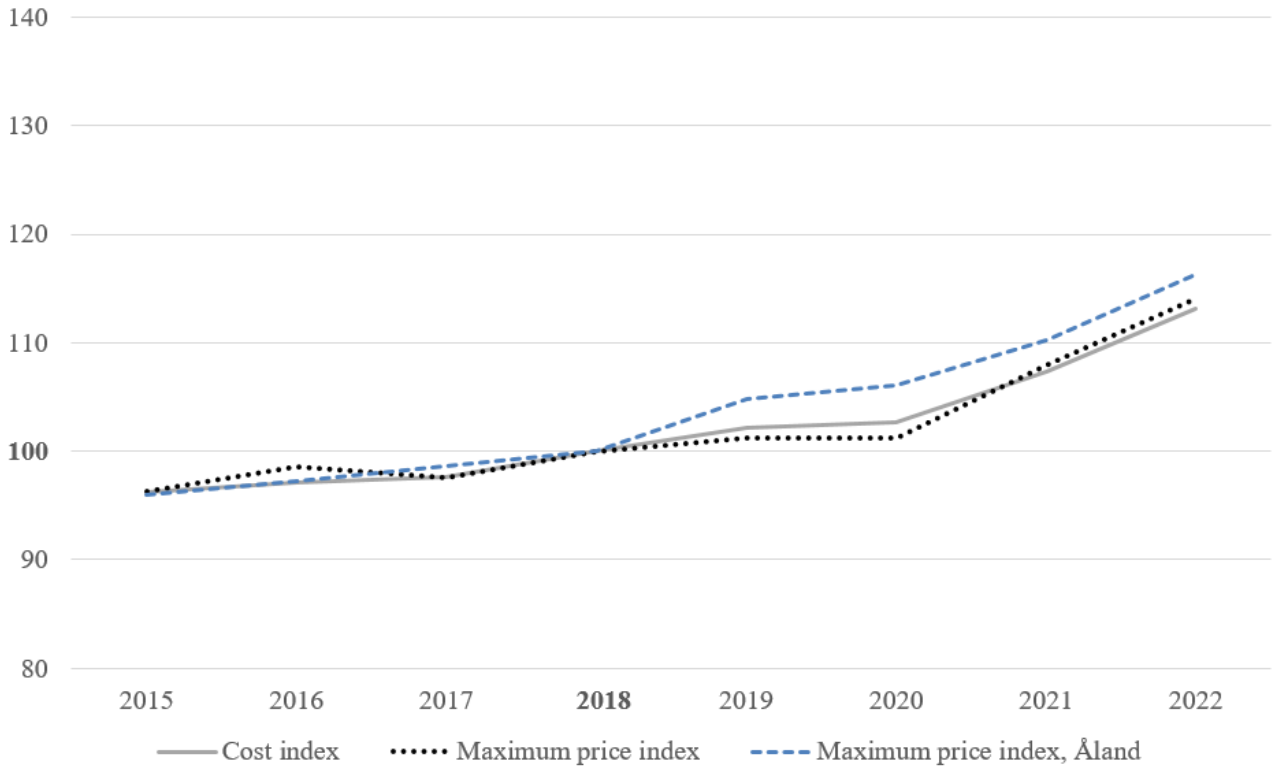

Figure A2. Cost index of taxi transport, maximum price index, and maximum price index of Åland

Notes: The cost index of taxi transport is obtained from the free database of Statistics Finland. Maximum prices are obtained from the government decrees on maximum fares of publicly reimbursed taxis (see Table A1). Maximum prices in Åland are obtained from the annual decisions of Åland's regional government. All indexes are constructed so that year 2018, which is the start of the first contract period, is 100.

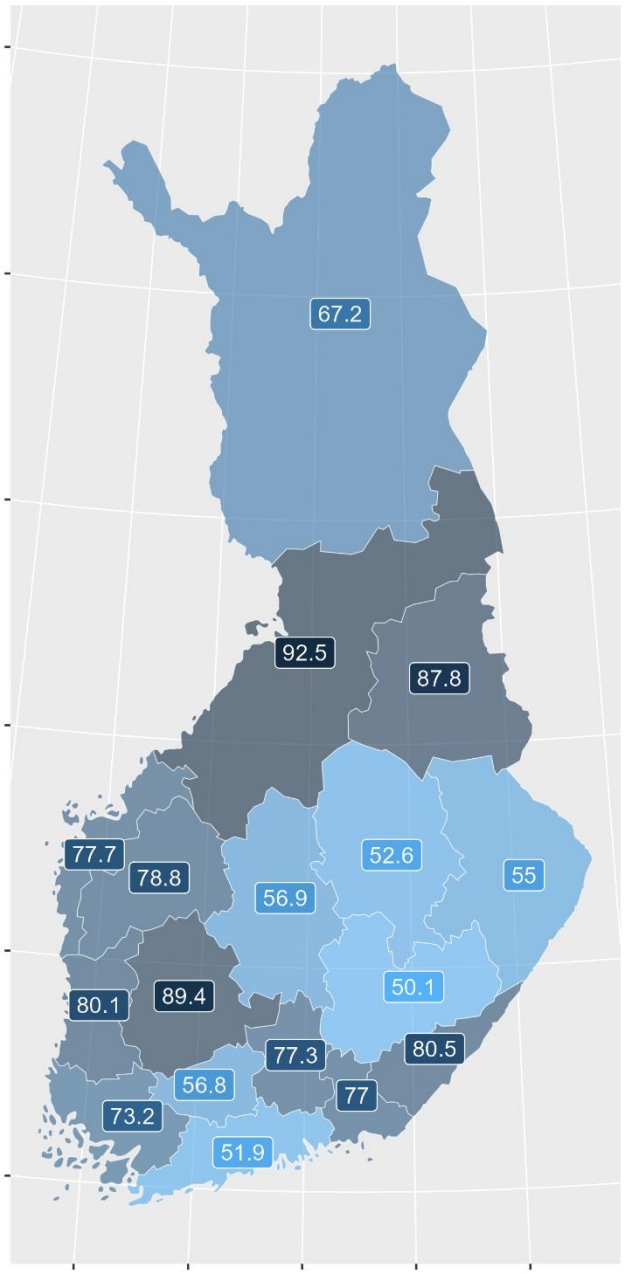

Figure A3. Market share of the largest dispatch center in 2022.

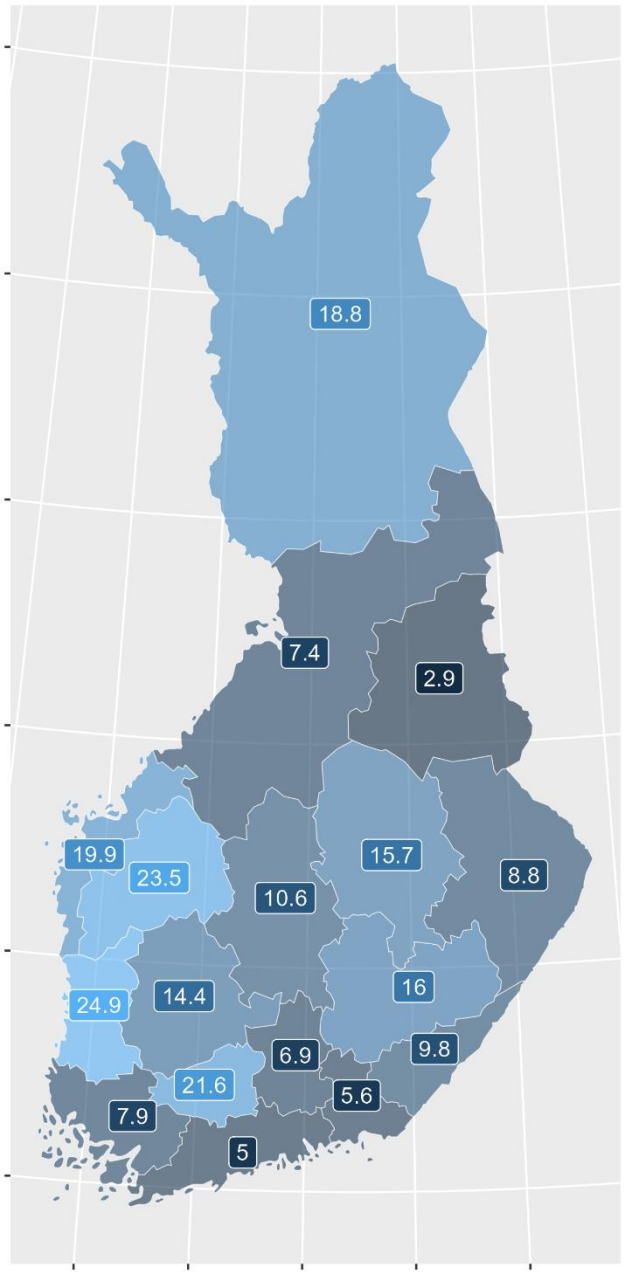

Figure A4. The **s**hare of taxi firms that drove for both dispatch centers in 2022.