

Competition in e-commerce parcels delivery – a disaggregated approach

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Abstract

The market for delivery of e-commerce parcels to consumers (B2C) in Sweden exhibits heightened competitiveness. Aggregate data from the Swedish Post and Telecom Authority (PTS) shows the market shares, with the Universal Service Provider (USP) Postnord as the dominant actor with over 50 %, while the relatively new deliverer Instabee after a merger between Instabox and Budbee, has 10-15 %. DHL and Schenker have 5-10 % each and the rest of the market include some small companies to give a total of 14. We identify the market structure according to the dominant-fringe-firm model.

In this study, we employ a disaggregated methodology to analyse the competitive situation concerning e-commerce delivery for consumer goods. We observe the delivery options provided by the 200 largest e-commerce companies, measured by turnover in 2022, to the urban parts of a medium-sized town in Sweden. By making ‘fake’ purchases online, we register the delivery companies offered by the different e-commerce companies, prices for delivery, and the purchase limit for free delivery.

The disaggregated approach gives similar results as some of the national data but provides new insights about variations in the supply and prices. We can observe eleven active delivery companies in our study, three fewer than in the data from PTS. The four biggest ones together have almost the same supply in this study from January 2024 as their market share nationally in 2022. Instabee and DHL has a higher share in our data, which may be explained by the central locations we use or by those companies gaining market shares. Consumers mostly have a maximum of three delivery companies as options, and in almost one third of the cases there was only one available option. The number of offered delivery companies falls with a higher price of delivery.

Postnord has overall somewhat higher prices than Instabee, but when both companies are available options, the price is the same, indicating strong price competition. Schenker and most notably DHL have higher average prices. E-commerce companies without free delivery have a higher delivery price than those who have, and the limit for free delivery correlates positively with the delivery price. Our study shows that the number of delivery companies significantly covariates with lower delivery prices and that the purchasing limit for free delivery also significantly covariates with the delivery price. It seems that some e-commerce companies offer a low delivery price and a low purchasing limit for free delivery and others do not. Our study indicates that the market may be progressing to a more ordinary oligopoly with a few companies that might end up as similar to intensive Bertrand price competition or like a Cournot one, with higher prices and profits.

1. Introduction

The parcels market is characterized by being more competitive than the letter market. In Sweden, the Swedish Post and Telecom Authority (PTS, 2023a) reports the Herfindahl-Hirschman index (HHI) for the volume of total domestic parcel deliveries in 2022 to be 3,000 and for Business-to-Consumer (B2C) domestic parcels to be 3,300. The values have fallen from 4,400 and 4,300 respectively since 2018 mainly because smaller distributors gain market shares from the four biggest ones. As a comparison, for the letter market in 2022, HHI is reported to be 6,200 (PTS, 2023b).

PTS (2023a) has identified a total of 14 companies in B2C parcel delivery in Sweden. Nine of these companies provide delivery through postal agents, with six ensuring coverage across all regions in Sweden. Twelve of them extend their delivery services to all regions, while eight cover all 290 municipalities in Sweden. The parcel delivery companies in Sweden in 2022 were (in order of market share) Postnord, Instabee, DHL, Schenker, Bring Parcels, Early Bird, Airme, Best Transport, UPS, Asendia, Bussgods, Citymail, Fedex and Jetpak (PTS, 2023a, Levin, 2023). The overall conclusion is, according to PTS, that of intense price competition within the B2C segment. The Universal Service Provider (USP) Postnord has the biggest market share with 50-55 %. Instabee is a relatively new actor on the Swedish market, because of a merger in 2022 between Instabox and Budbee and has 10-15 % of the market. DHL, Schenker and Bring has 5-10 % each and the remaining delivery companies below 5 % each.

However, aggregate measures do not give the full picture of how competition works for single transactions. Distributors may be more established in specific areas, like Citymail in the letter market in Sweden, or for deliveries of specific products. In e-commerce, the companies selling the goods choose which parcel delivery companies to co-operate with, and they may only offer distribution by one or a few of the available distributors. In addition to fewer alternatives today, it could also result in weaker competition and even fewer delivery alternatives in the long run.

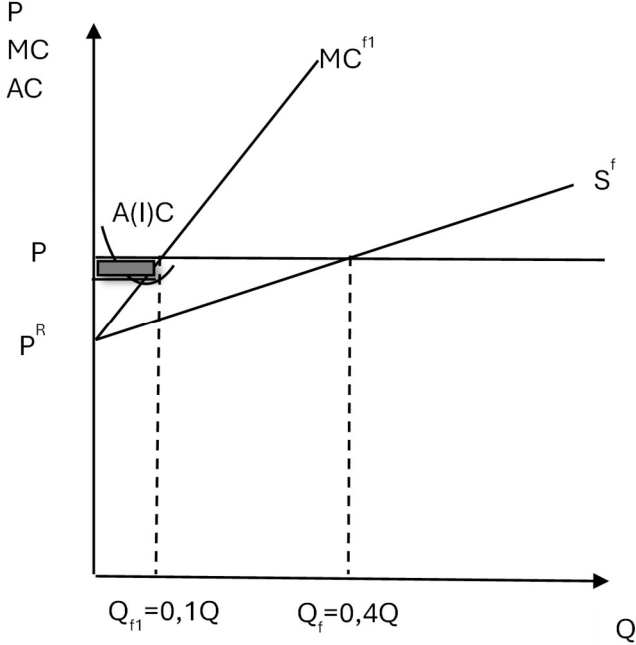
To understand more about competition, we apply a disaggregated approach. The object of our study is domestic parcel deliveries to private consumers (B2C). We measure the choice opportunities for the consumers for parcel deliveries regarding e-commerce for goods in Sweden that are sufficiently small to have parcel box as a possible option. Delivery options may change over time and the options today will affect those available in the future. In the short run it is probably most important for the consumers which options they have in form of delivery: to their home, to a parcel box, or delivery to a postal agency, and the price for the different alternatives. Which company that carries out the delivery probably matters to a much smaller degree for the consumers. In the long run though, service quality and price could be highly dependent on the number of delivery companies that each e-commerce companies co-operate with today, their cost-structures and competitive strategies. If the number of delivery companies becomes smaller over time this could mean fewer and more expensive delivery options for the consumers. To find out what might happen in the future we focus on the delivery companies offered by the different e-commerce companies together with prices and their variation.

A deeper knowledge about competition based on a disaggregated approach can complement the aggregate measures of competition on a national level. Like many other industries in the transport sector, like rail or air transportation, aggregate market shares may overestimate competition on a certain route or connection, or for a specific product or place, where few or even only one operator provide services. There is detailed knowledge about receivers'

distances to access points like letter boxes or postal agents (see e.g. PTS, 2023b). However, if consumers' choices in practice are limited to few or only one distributor, the accessibility may decline over time. If many e-commerce companies only offer few of the available parcel delivery companies, few distributors may survive in the long run. An oligopoly with less intense competition may arise. This could result in worsened service and to higher prices especially as the price for delivery is only a smaller fraction of the total price paid for the product. The results of a disaggregated study can therefore provide a more complex picture of the market structure and have policy implications for the provision and financing of the Universal Service Obligation (USO) and the need for revised regulation of the parcels market. The applied methodology can be used as a model for similar studies about other markets or in other countries.

2. Market analysis

Considering the existing market shares in the studied industry, with Postnord as the dominant actor with over 50 %, three other actors sharing most of the rest, and a number of small firms, we apply a standard dominant-fringe-firm-model (see e.g. Carlton, Perloff, 2015). Despite being a state-owned firm, Postnord is profit-maximizing (Postnord, 2022), and the other, private actors can be expected to be the same. In figure 1 we illustrate the current market structure where the upper section shows the fringe firms and the lower section the dominant firm Postnord.



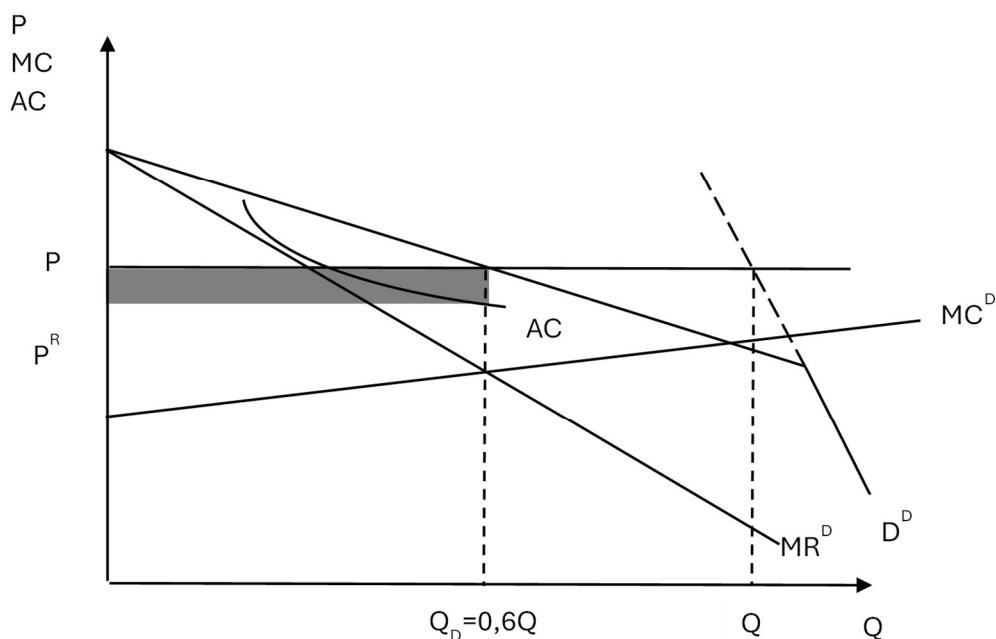


Figure 1: A model of the current competitive situation

The dominant firm is in the model assumed to have lower costs than the rest and to be the price setter. The solid demand curve in the lower section represents the residual demand curve for Postnord. Below the reservation price (P^R) it will have monopoly as no other firm can cover its variable costs below this price. Above this price, the dominant firm's residual demand is the total demand minus the supply from the other firms. In the upper section, the marginal cost curve of one fringe firm (MC^f) is its supply curve. The total supply from the fringe firms (S^f) is here supposed to be the sum of four individual actors. This could represent Instabee, Schenker, DHL and the total of the remaining small firms.

The dominant firm maximizes its profits at the quantity Q^D where its marginal revenue equals its marginal cost. The price is determined by its residual demand curve. The more fringe competitors, the flatter the residual demand curve will be and the force of competition on limiting the price will be stronger. The market price (P) set by the dominant firm becomes the same for all operators. Each fringe firm produces the quantity where this price equals its marginal cost, so one firm produces Q^{f1} and the total supply from the fringe firms is Q^f . Together, the supply from all firms equals total market demand. The figure is drawn so the dominant firm, representing Postnord, has a 60 % market share and the other three larger and the small fringe firms have ten percent each, which approximates the current situation according to PTS' data.

The possibility to make profits is determined not only by the variable costs, but also the fixed costs. As postal services have significant fixed costs, average costs (AC) will fall as long as they are larger than the marginal cost. In the figure, we have sketched AC-curves for the firms illustrating this relationship and the resulting profit is marked. For firms having economies of scope, like DHL and Schenker who also delivers heavier goods, this curve should be interpreted as the average incremental cost (AIC). The size of the profit depends on the produced quantity, economies of scale and scope, and differences in variable costs.

In the current situation with one dominant firm, this firm can be expected to be the price setter with the restriction on price given by the other competing firms. If the market will grow towards more evenly distributed market shares, a standard oligopoly model would become applicable. What happens then depends on the competitive strategies from the firms involved. If they engage in Bertrand competition, the firms will try to compete with price and undercut the other firms' price as long as they cover the total costs. This may become an intense competition to benefit the consumers. If they compete according to the Cournot model, the firms will on the other hand determine their quantity (capacity and where to deliver) to maximize their price and profits given all other firms actions at the expense of the consumers.

3. Methodology

3.1 Data collection

We apply the disaggregated methodology by choosing the 200 largest e-commercial companies measured by turnover in 2022 for consumer goods in Sweden and study the delivery companies offered by each e-commerce company for two urban addresses in the medium-sized Swedish town Linköping. Based on a list of the 250 largest e-commerce companies (Market.se, 2023) we choose from largest to smaller until we have 200 companies that fit our restrictions¹. Companies that mainly sell their goods over the counter in their stores are not included in the list. In this study we exclude some companies due to selling food, only selling goods that is too large to deliver in a parcel box, only selling very expensive goods that will not be delivered in a parcel box and to bankruptcy². We collect 200 observations by making 'fake' purchases online from the largest 200 e-commercial companies for consumer goods in Sweden. We select one item from the company's website and carry out all steps up to the last which is the payment when we cancel the order. All the possible options regarding available delivery companies, their prices, and if and under what condition delivery is free for the customer are documented. We choose a good that is small enough to be delivered in a parcel box with a value below the free shipment threshold³.

All offered delivery companies are registered, and their cheapest delivery alternative if any of them offer more than one way of delivery. If the company does not clearly state the limit for free delivery (always, above a certain purchasing amount, or never) we test to find the limit of free delivery up to 2,000 SEK⁴ and after that assume that delivery is never free.

The data were collected in the weeks 2-5 2024 to two addresses in the urban parts of the medium-sized Swedish town Linköping. The available delivery companies for a consumer at a specific address might differ due to locality. By choosing central urban addresses with all available delivery companies as possible delivery options, we are aiming for the largest number of alternatives for the consumers. Rural delivery options are probably fewer. The reason to choose the largest e-commerce companies is that they can be expected to cooperate with the largest number of delivery companies. Smaller companies may be expected to sign delivery contracts with fewer delivery companies than the largest do. Thus, we intend to map the upper level of delivery options given to consumers when e-shopping consumer goods.

¹ A list with the e-commerce companies included in our study is presented in Appendix 1.

² The excluded companies are presented in Appendix 2.

³ Some companies offer free delivery from zero SEK; in those cases, we register the delivery companies and their price (which might not be zero for all).

⁴ 1 EUR = 11.2075 SEK (Riksbanken, 2024)

2.2 Similar studies

Copenhagen Economics (2023) made a comparative analysis of the possibilities for parcel delivery services in rural and urban areas in Sweden, with a particular emphasis on the practical availability of diverse parcel distribution options to consumers. The primary focus was directed towards the extent to which consumers could choose among multiple parcel delivery services. They conclude that competition among e-commerce companies is anticipated to drive them to select the delivery operator capable of providing the most favourable terms, encompassing both expeditious delivery and cost-effectiveness. Consequently, if a particular e-commerce company extends a specific delivery option to its customer base, it is plausible to expect a parallel offering from comparable e-commerce companies. Their conclusion could indicate that if each e-commerce company today only offer a few of the available delivery companies, in the long run most e-commerce companies will offer the same few of them. This could lead to the other competitors leaving the market in the long run with less competition and worse delivery service.

Hägglund and Wikström (2023) sent a questionnaire to ten parcel delivery companies and 25 randomly selected relatively small e-commerce companies. They also carried out 'fake' online shopping to one address from the 25 randomly selected e-commerce companies. Their conclusion was that e-commerce companies have incentives to exclusively provide parcel delivery services through a single delivery company and that e-shoppers are confronted with a limited number of delivery options and a few selections of delivery companies to choose from. They conclude that there is an opportunity for both e-commerce companies and parcel delivery companies to raise their prices.

According to Cardenas et al. (2017) more efficient logistics in urban areas is important for the success of e-commerce. In densely populated areas the last mile of delivery means pollution and congestion. Parcu et al. (2023) point out that e-commerce companies, delivery operators and traditional postal operators compete in the growing dynamic e-commerce market, where delivery is an important part. They find that Amazon is vertically integrating delivery, while smaller e-retailers are less interested to deliver themselves. Strobel et al. (2023) consider the decline in letter volumes and the increase in parcel volumes to see how the Universal Service Provider will be affected. They point out that the degree of competition in the market for parcel distribution in different countries will be important for the sustainability for their USP.

While Copenhagen Economics in a small part of their study also incorporated a sample of five e-commerce companies and Hägglund and Wikström included 25 randomly selected relatively small e-commerce companies to one address, our sample is the 200 largest e-commerce companies for consumer goods in Sweden, based on turnover. Our study provides a more comprehensive picture of competition than the previous ones.

4. Results of our study

4.1 Presence of the delivery companies

According to PTS, there are 14 delivery companies within the B2C segment in Sweden. Our study finds one additional delivery company: DSV, but in total only eleven. There are no delivery options from Asendia, Jetpak, Bussgods or Fedex. The two former ones do not cover all municipalities in Sweden which can explain why they were not present in our study. However, both Bussgods and Fedex have parcel delivery in all 290 municipalities in Sweden (PTS, 2023a). All the eleven available delivery companies offer home delivery (Airmee, Best, Bring, Citymail, DHL, DSV, Early Bird, Instabee, Postnord, Schenker, UPS, 2024). Bring, Citymail, Instabee, Postnord offers parcel box. Delivery to a postal agent is available from

Bring, Citymail, DHL, Postnord and Schenker. Table A1 in Appendix 3 shows these possible delivery options by the delivery companies present in our study.

Our examination has not accounted for potential variations in services offered by a single company, such as door delivery or postal box delivery. We only register which delivery companies each e-commerce company offer and the cheapest option by each delivery company. Figure 2 underscores that a significant proportion of e-commerce companies offer only one, two or three distinct delivery companies to the consumers, and that Postnord emerges as the predominant delivery company, featured in over 70 % of the cases. Additionally, Instabee enjoys a notable presence, being offered in 50 % of the cases.

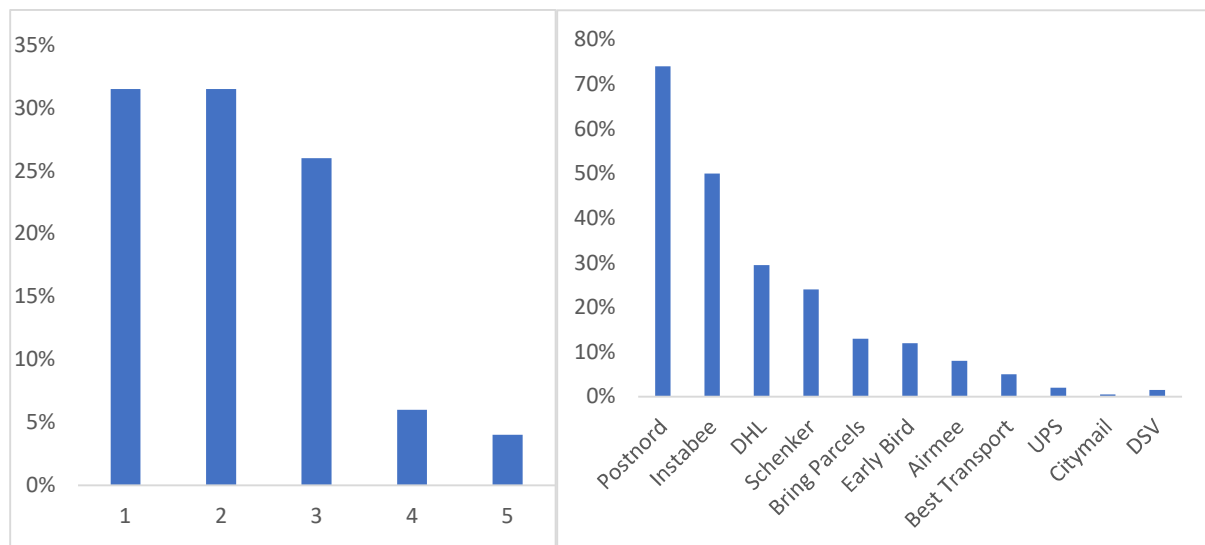


Figure 2: Number of available delivery companies from each e-commerce company, in percent (to the left). Availability of different delivery companies, in percent (to the right).

It is important to acknowledge that our sample originates from two central addresses within the municipality of Linköping. Nevertheless, despite this urban concentration, a significant portion of e-commerce establishments continue to limit their delivery options to three or fewer delivery companies. It is plausible that the availability of diverse delivery services may be even more restricted in rural areas. The findings presented in Figure 2 underscore that within the central parts of Linköping, consumers are predominantly presented with a choice among one or more out of only four delivery companies: Postnord, Instabee, DHL and Schenker. Notably, UPS and DSV emerged as available options in merely 2 % of the e-commerce companies' delivery options, while Citymail featured in only 1 %. From the data in Figure 2, it appears as four delivery companies collectively hold a significant market share in parcel delivery services. Despite Instabee's reported market share of 10-15% of the total market, according to PTS, our data show that Instabee holds a strong position as an available option in the e-commerce parcel delivery market in Linköping.

4.2 Price for delivery

It cannot be determined if the price for delivery is the same as the price the e-commerce companies pay to the delivery company for a specific delivery. However, we assume that they treat all delivery companies equally, with the same mark-up, thus making the offered delivery price reflecting the price paid to the deliverers.

Table 1 shows delivery price intervals with the number of the 200 e-commerce companies offering this as the cheapest delivery price. The table also includes the share with more than one delivery company and then the share where the price varied between different delivery companies.

Table 1 Descriptive statistics of delivery prices

Price (SEK)	Total number of observations	Share with more than one option, %	Share with variation in price when more than one delivery company, %
0	20	70	55
10-25	12	83	75
29	18	89	61
35-45	39	82	59
49	45	71	47
50-60	22	77	77
69	15	47	20
75-179	29	28	10
Total	200	68	49

It can be found from Table 1 that the share with more than one delivery company varies but is negatively related to the price if free delivery is excluded and the intervals are a bit more aggregated. Table 2 shows that when it is possible for the consumer to choose between more delivery companies the average delivery price is lower.

Table 2: Prices with different number of delivery companies

Number of delivery companies	1	2	3	4	5
Average price (SEK)	64	44	42	39	29

When the consumer only has one available delivery company the price is more than double compared to when there are five different delivery companies available. A regression with OLS can be used to see if there is a significant correlation between the number of delivery companies offered and the delivery price paid by the consumer. Table A2 in Appendix 3 shows a regression with delivery price as dependent variable and number of delivery companies as explanatory variable. The number of delivery companies correlates significantly with the delivery price paid by the consumer. As the R²-value shows, the model only explains some of the variation. According to the model, one more delivery company means that the delivery cost is more than eight SEK lower. Table 3 shows the estimated average delivery price when the number of delivery companies varies from one to five.

Table 3: Delivery price with different number of delivery companies, based on Table A2

Number of delivery companies	1	2	3	4	5
Estimated average delivery price in SEK	58.5	50	42	33.5	25

To further evaluate the possible impact of competition on pricing, Figure 3 presents the average prices offered by the four most offered delivery companies in our study. Notably, Instabee has the lowest average price at 44 SEK, while DHL has the highest at 68 SEK. It is worth noting that Early Bird offers an even lower average price of 35 SEK, a data point excluded from Figure 3.

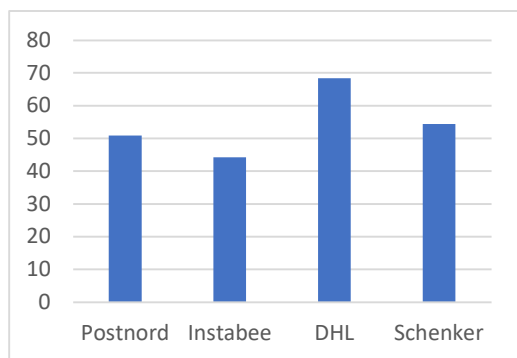


Figure 3: The average price from the four largest delivery companies.

Upon close examination of the pricing dynamics between the two leading delivery companies in this study, it becomes apparent that when both Postnord and Instabee are available as options from e-commerce companies, their average prices are practically identical. Postnord's average price stands at 43.4 SEK, closely paralleled by Instabee's average price of 43.7 SEK.

Tables A3-A6 in Appendix 3 focus on the four most frequently offered delivery companies to show how often they are the sole delivery company, how often they are one of two or more delivery companies and how often they in that case are more expensive than the lowest offered price. Postnord, which is an offered delivery option by 75 % of the 200 e-commerce companies, is the sole delivery company in 23 % of those cases. Their offered price to the consumers is higher than the lowest offer in 37 % of the cases when they are one of at least two delivery companies. Instabee, which is an offered delivery option by 50 % of the e-commerce companies, is never the only delivery company. This might explain why their average price is lower as presented in Figure 4. Their offered price to the consumers is higher than the cheapest offer in approximately one third of the cases when they are one of the delivery companies. DHL, which is an offered delivery option by 30 % of the e-commerce companies, is the sole delivery company in 25 % of those cases. Their offered price to the consumers is higher than the cheapest offer in 59 % of the cases where they are one offer among others. Finally, Schenker is the only offered option in 13 % of the times they appear, which is by 24 % of the e-commerce companies. When more than one delivery company is offered, they are more expensive in 19 % of the cases.

4.3 Purchasing limit for free delivery

E-commerce companies have different limits for how much the consumers have to order for to receive free delivery. Table A7 in Appendix 3 shows numbers and shares with different limits for free delivery. It can be concluded from the table that the limit for free delivery varies a lot. Ten percent of the e-commerce companies always offer free delivery, while 26 % never does. There is a trade-off between attracting customers by always offering free delivery, inducing each customer to order more to receive the free delivery, and financing of the delivery cost by having the customer pay for it separately instead of including it in the price of the consumer goods. The strategy applied by the e-commerce companies are obviously differing.

Table 4 shows that the number of delivery companies also covariate with the limit for free delivery. Those e-commerce companies that do not offer free delivery up to 2,000 SEK in purchase amount on average offers 1,6 delivery companies instead of 2,4.

Table 4: Number of delivery companies with and without free delivery under 2,000

Number of delivery companies	1	2	3	4	5	6	Number	Average
Free delivery purchase amount ≤ 2,000	32	54	43	10	8	1	148	2.4
Not free delivery purchase amount up to 2,000 SEK	32	11	8	1			52	1.6

Table A8 in Appendix 3 shows an OLS regression that also includes a dummy for not offering free delivery, at least not for any purchase amount up to 2,000 SEK, while Table A9 shows a model that instead includes the limit for free delivery for the 148 e-commerce companies that have a limit that is 2,000 SEK or lower. Tables A8 and A9 imply that those with no free delivery also have a higher delivery price than those who have a limit and that the limit is positively correlated with the delivery price. Fewer delivery companies appear to significantly coincide with both a higher price for delivery and a higher purchasing limit for free delivery or no free delivery at all.

4.4 Supply of delivery companies

Table 5 shows the supply of delivery companies and each delivery company's share of the total supply. The table is based on the supply of delivery companies by the 200 e-commerce companies. With supply we mean that the company is among the offered alternatives the consumer can choose from.

Table 5 The supply of delivery companies and their share of the supply

Delivery company	Alone	1 of 2	1 of 3	1 of 4	1 of 5	1 of 6	Weighted number of cases	Share of supply in percent
Postnord	35	51	45	9	8	1	79.5	40
Instabee	0	41	39	11	8	1	38.0	19
DHL	15	13	17	6	7	1	30.2	15
Schenker	6	11	20	5	5	1	20.6	10
Bring	6	7	10	3	0	0	13.6	7
Early bird	0	2	12	4	6	0	7.2	4
Airmee	0	1	4	3	4	1	3.6	2
Best	0	0	5	2	2	1	2.7	1
UPS	2	1	0	1	0	0	2.8	1
Citymail	0	1	0	0	0	0	0.5	0.5
DSV	0	2	1	0	0	0	1.3	0.5
Number of cases with	64	65	51	11	8	1	200	100

The weighted number is calculated as in the following example: Being one of five offered delivery companies eight times gives a weighted number of 1.6. To be a share of supply this is divided by 200. Which delivery company the consumers will actually choose will also be affected by the variation in delivery price by the different delivery companies. Table 1 showed that there is a variation in price for 49 % of the e-commerce companies that offer more than one delivery company.

5. Discussion

We can observe eleven active e-commerce delivery companies in our study, three fewer than in the data from PTS. There seems to be a trend towards consolidation with four companies (Postnord, Instabee, Schenker, DHL) having the vast part of the market. In PTS statistics they together have near 5/6 of the market and 84 % of the supply, considering the weighted shares presented in table 5, in our sample. The remaining companies make up the rest with Bring and Early Bird being the only more significant ones. Even the supply of the individual company is similar to their market shares according to PTS. Postnord has a somewhat lower supply and Instabee and DHL holds a higher supply in our study compared with their market share 2022. This may be explained by our focus on the central parts of a town and not knowing how price differences affect the choice by consumers. Thus, the dominant-fringe-firm model introduced in the second section appears to be supported not only by PTS figures but also from our study. It could also point at the beginning of a future change to only four companies with more equal shares.

Consumers typically have no more than three delivery companies as options; in nearly one third of the studied cases there was only one available option. Even if there are 14 companies altogether on the market, in practice our study underlines that the market is mostly in the range from monopoly to three competing ones. Moreover, the share with more than one option clearly decreases with a higher price of delivery. In our study, Postnord was the sole deliverer in 35 of the 200 observations and was not an offer in 50 of them. DHL was the sole deliverer in 25 % of the cases they were among the options and Schenker in 13 %. Instabee were never the sole delivery option.

From our study, it appears as Postnord and Instabee competes intensely with price. Even if Postnord has a somewhat higher price on average, when both companies are available options, the price is virtually the same. Schenker and most notably DHL have somewhat higher prices. Postnord had an offered price that was higher than the lowest in 37 % of the cases where they were among the delivery options. The same number for Instabee, DHL and Schenker were 34 %, 59 % and 19 % respectively. As the latter have higher prices on average, it suggests that they only offer delivery when their price is fairly competitive. Offering free delivery is a strategic choice for the sellers as they on the one hand can trigger consumers to buy more, but on the other hand may lose revenues or rise prices for the goods. Our study finds new evidence that those without free delivery also have a higher delivery price than those who do have a limit, and that the limit for free delivery correlates positively with the delivery price.

Our study shows that the number of delivery companies significantly covariates with lower delivery prices and that the purchasing limit for free delivery also significantly covariates with the delivery price. It seems that some e-commerce companies offer a low delivery price and a low purchasing limit for free delivery and others do not. One possible explanation is that some e-commerce happens to (or strategically choose) to co-operate with several delivery companies and therefore can negotiate a lower delivery price they pay them. Another could be that the competition is higher in some e-commerce industries and therefore the companies in those industries co-operate with more e-delivery companies to be able to compete with lower delivery costs. A third possible explanation is that industries that have lower delivery costs attract the most delivery companies that wants to deliver. This would be an interesting area for future research.

It can be assumed that volumes will continue to grow, although in a smaller rate than before, especially compared to the year during the pandemic. Will the market shares remain the same

on a growing market, if not how and why will they change? Will Postnord's dominant position remain, be strengthened, or weakened? Postnord is struggling with falling letter volumes and the financing of the universal service obligation concerning services in sparsely populated areas. Parcel delivery needs to be an important source of revenue. In our study, Postnord appears as an alternative in the majority of the cases. Can the other companies increase their market shares by being able to reduce costs or benefit from economies of scale or scope due to increasing volumes?

Another intriguing question is how the major three other companies can survive with smaller volumes. Is it because they rely on economies of scope (DHL and Schenker are mostly active in the market for delivery of heavier goods) or from economies of density and lower absolute costs (Instabee is most present in densely populated areas and do not work with postal agents). After the removal of the state monopoly in the letter market in Sweden in 1993, a large number of new postal companies started business. At the most, around 100 had acquired a license from PTS. Fairly quickly most of them exited the market and today they constitute only 0.2 % of the market (PTS 2023b). Will the same trend develop on the parcels' delivery market, and the current four big companies turn into an oligopoly? Already, Instabee is a result of a merger between two relatively new companies. Will the merger between Instabox and Budbee to Instabee result in a company that will increase the market share over time? If so, the result may be either Bertrand oligopoly that is good for the consumers or Cournot oligopoly that is bad for consumers.

Moreover, how can higher prices sustain? We do not know to what extent consumers actually choose alternatives with anything but the lowest price, but if they are selected, what other factors (proximity to consumer, brand loyalty etc.) are important? As the alternatives are presented during the purchase, consumers are well informed about the different offers. The disaggregated approach turns out to support some of the national data but provides new evidence about variations in the supply and prices compared to the overall picture. Further research with such approaches could cover more areas (the biggest cities, small cities, rural areas surrounding cities, sparsely populated remote areas) or extend to e-commerce by companies mostly selling over the counter.

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Appendix 1 The 200 largest e-commerce companies for consumer goods, Market.se (2023)

ansiktsmaskbutiken.se	gräsklipparbutiken.se	nordicnest.se	snushandel.se
apohem.se	gudrunsjoden.com	northtrampoline.com	soffadirekt.se
apotea.se	gummihuset.se	nudient.se	sovtex.se
asket.com	gymgrossisten.com	odla.nu	spelbutiken.se
babyland.se	hatshop.se	outdoorexperthen.se	spelexperthen.com
babyshop.se	hatstore.se	outl1.se	spobik.se
bagarenochkocken.se	hem.com	outnorth.se	sportfiskeprylar.se
bangerhead.se	hembiobutiken.se	parfym.se	sportshop.com
batteriexperthen.com	hemfint.se	partyhallen.se	stayhard.se
bemz.com	hemmy.se	partykungen.se	stellarequipment.com
bga.se	hjalpmedelsbutiken.se	penstore.se	strongerlabel.se
biketown.se	hultens.se	peterhahn.se	svenskhalsokost.se
billigteknik.se	husochhemma.se	phonelife.se	svensktkosttillskott.se
bokus.com	hylte-lantman.com	photowall.se	svenskttenn.se
boozt.com	idealofsweden.com	pnjakt.se	sweef.se
bramobler.se	ilva.se	polarpumpen.se	tailorstore.se
bubbleroom.se	impecta.se	posterstore.se	tcmcykel.se
bygghemma.se	inet.se	power.se	teknikdelar.se
caiacosmetics.se	inkclub.com	proffsmagasinet.se	telefonshoppen.se
campingvaruhuset.se	iphonebutiken.se	protein.se	timarco.se
careofcarl.se	johnells.se	proteinbolaget.se	tinybuddy.se
cdon.se	jollyroom.se	psofsweden.se	toolab.se
cellbes.se	jordklok.se	rapunzelofsweden.se	topformula.se
cocopanda.se	jotex.se	returhuset.se	toyspace.se
conrad.se	junkyard.se	revolutionrace.se	trendrum.se
coolstuff.se	kidsbrandstore.se	ridestore.se	tres-bien.com
cyberphoto.se	kilamobler.se	rinkabyror.se	tretti.se
delitea.se	kitchentime.se	rofa.se	träningsmaskiner.com
desenio.se	komplett.se	royaldesign.se	tvins.com
djerfavenue.com	lampgallerian.se	rugvista.se	tyngre.se
doggie.se	lekia.se	rull.se	uret.se
elbutik.se	lekmer.se	safira.se	vacier.com
elcykelpunkten.se	lensway.com	scandinavianphoto.se	ventilation.se
eleven.se	lyko.se	scstyling.com	verktygsboden.se
ellos.se	macadegolf.com	shopping4net.se	vinkylen.se
engelsons.se	margaretha.se	shopunderstatement.com	vitvaruexperthen.com
estore.nu	maskinklippet.se	skalhuset.se	vparts.se
estrid.com	maxgaming.se	skanskabyggvaror.se	vssochbad.se
familjetapeter.se	mayadelorez.com	skapamer.se	wakakuu.com
footway.se	meds.se	skincity.com	wexthuset.com
fyrklovern.se	mekster.se	skogma.se	willabgarden.se
gaspofficial.com	miinto.se	skruvat.se	yves-rocher.se
gents.se	millenarywatches.com	skyltmax.se	zoo.se
ginza.se	minfot.se	sleepo.se	zoovillage.com

Appendix 2 E-commerce companies at the list Market.se (2023) not included in our study

amazon.se
bysnus.com
bythjul.com
chiquelle.se
dack365.se
efi.se
euroflorist.se
foodora.se
gamersgate.com
gardenstore.se
getgifted.com
glossybox.se
hellofresh.se
jakt.se
linasmatkasse.se
mathem.se
matsmart.se
mshop.se
nordiskafonster.se
rackesbutiken.se
snusme.com
sparfonster.se
stonefactory.se
stonewall.se
trademax.se
udenssport.se
vanbruun.com

Appendix 3 Table A1-A9

Table A1: Options from the delivery companies

	Home delivery	Parcel box	Postal agent
Airmee	X		
Best	X		
Bring	X	X	X
Citymail	X	X	X
DHL	X		X
DSV	X		
Early Bird	X		
Instabee	X	X	
Postnord	X	X	X
Schenker	X		X
UPS	X		

Table A2: Regression with number of delivery companies and delivery price

	Estimate	Std. Error	t value	Pr(> t)
Intercept	66.776	4.442	15.031	< 2e-16 ***
Number of delivery companies	-8.279	1.817	-4.556 9	12e-06 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
Residual standard error: 28.16 on 198 degrees of freedom Multiple R-squared:
0.09487, Adjusted R-squared: 0.0903 F-statistic: 20.75 on 1 and 198 DF, p-value: 9.124e-06

Table A3: Delivery with Postnord

Price (SEK)	Total number of observations	Number, Postnord sole deliverer	Number, Postnord and other(s)	Postnord more expensive, %
0	20	3	12	8
10-25	12	1	10	40
29	18	2	15	20
35-45	39	4	25	48
49	45	7	28	36
50-60	22	3	11	100
69	15	3	6	0
75-179	29	12	7	9
Total	200	35	114	37

Table A4: Delivery with Instabee

Price (SEK)	Total number	Number, Instabee sole deliverer	Number, Instabee and other(s)	Instabee more expensive, %
0	20	0	11	45
10-25	12	0	8	63
29	18	0	14	43
35-45	39	0	27	22
49	45	0	22	32
50-60	22	0	12	25
69	15	0	5	40
75-179	29	0	1	0
Total	200	0	100	34

Table A5: Delivery with DHL

Price (SEK)	Total number	Number, DHL sole deliverer	Number, DHL and other(s)	DHL more expensive, %
0	20	2	5	60
10-25	12	0	2	50
29	18	0	4	100
35-45	39	1	7	71
49	45	4	13	38
50-60	22	2	8	75
69	15	3	2	0
75-179	29	3	3	67
Total	200	15	44	59

Table A6: Delivery with Schenker

Price (SEK)	Total number	Number, Shenker sole deliverer	Number, Shenker and other(s)	Shenker more expensive, %
0	20	0	3	0
10-25	12	1	3	33
29	18	0	1	100
35-45	39	1	14	29
49	45	1	9	22
50-60	22	0	7	0
69	15	0	1	0
75-179	29	3	4	0
Total	200	6	42	19

Table A7: The limit where the e-commerce companies offer free delivery, number and share

Free delivery from (SEK)	Number	Share in percent
0	20	10
100	4	2
200	5	2.5
250	3	1.5
300	8	4
350	4	2
400	5	2.5
450	2	1
490	1	0.5
500	39	19.5
600	13	6.5
630	1	0.5
690	1	0.5
700	4	2
800	6	3
890	1	0.5
900	1	0.5
1000	22	11
1500	5	2.5
1900	1	0.5
2000	2	1
No free delivery	52	26
Total	200	100

Table A8: Regression with number of delivery companies and delivery price, dummy for limit free delivery

	Estimate	Std. Error	t value	Pr(> t)
Intercept	52.243	4.762	10.970	< 2e-16 ***
Number of delivery companies	-4.786	1.775	-2.696	0.00761 **
Not free delivery up to 2000 SEK	26.535	4.434	5.985	1.01e-08 ***
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1				
Residual standard error: 25.97 on 197 degrees of freedom , Multiple R-squared: 0.2341				
Adjusted R-squared: 0.2263 , F-statistic: 30.11 on 2 and 197 DF, p-value: 3.893e-12				

Table A9: Regression with number of delivery companies, limit for free delivery and delivery price

	Estimate	Std. Error	t value	Pr(> t)
Intercept	30.033	4.645	6.466	1.44e-09 ***
Number of delivery companies	-3.422194	1.490108	-2.297	0.0231 *
Purchase amount to get free delivery	0.033873	0.004043	8.378	4.24e-14 ***
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1				
Residual standard error: 19.92 on 145 degrees of freedom Multiple R-squared: 0.3503,				
Adjusted R-squared: 0.3413 F-statistic: 39.09 on 2 and 145 DF, p-value: 2.646e-14				