Strategic Pricing by Oligopolists in Public Tenders of Passenger Railway Services

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ABSTRACT

An important component in the deregulation of the public sector in the European Union is public procurement of services and products. This paper studies the bidding behavior of firms participating in public tenders of passenger railway services in Sweden. At a later stage in this research, the intention is to broaden the analysis to include the similar markets of Great Britain and Germany. A general assumption in the paper is that firms sometimes place very low bids and sometimes very high bids in tenders. In a theoretical part of the paper we discuss both these forms of strategic pricing, linked to a discussion on continuous and discontinuous economies of scale regarding costs of production. Detailed data on bids and bidders in Swedish tenders of railway services are then analyzed. About 30 tenders taking place between 1992 and 2003 are included, checking for cases of very low and high bids and other types of deviation within the data material. Among the early results, based upon this rather limited data set, we find that big firms like SJ and Connex tend to place either the lowest or the highest bid when participating in tenders. Connex' bids generally deviate more from the average bid level than the bids from other firms. More data from Sweden and other countries is needed to make further analyses and hypothesis testing applicable. The scarcity of data is in itself an interesting result of the study, since it is caused by efforts of the procuring authorities to protect the "secrets" of the bidders. We argue that this is against the competition policy of the European Union and may harm the tendering process and industry development.

1. Introduction: the research problem

An important component in the deregulation of the public sector in the European Union is public procurement of services and products. The Community legislation on public procurement aims at reducing costs for contracting authorities, increasing intra-Community competition in key industries, and permitting competitive European firms to develop.

This paper studies the bidding behavior in public tenders of passenger railway services. The aim of the paper is to research if some firms, presumably large oligopolistic firms, may use their pricing of bids in a strategic way, e.g. as signals to inform competitors that they are either not interested in a market or seek to capture it. The original intention was to compare how different firms have placed their bids compared to their competitors in public tenders in a couple of deregulated markets: for example Germany, Great Britain and Sweden. However, in this version of the paper, due to problems of getting access to data, we will only analyze bids placed in Swedish tenders.

One of our hypotheses is that a firm by placing either very high or very low bids signals to its competitors that it is interested in some markets and less interested in other markets. To seek evidence for the existence of very low and very high bids in tenders, and the possibility of strategic pricing, we try to measure the differences between the firms' bids in public tenders for passenger railway services during the last ten years. Tentatively the hypothesis will be confirmed if some firms have a bigger variation in their bids than different subsets of competitors: individual firms that have placed many bids, firms that are only competing in national markets and other major players.

One methodological problem in the study is that many contracts have only been subjected to public tendering on one occasion. Another methodological problem is that the size of the contracts varies a lot. A third factor is that the uncertainty about costs and revenues tend to be higher the first time a railway service is tendered. A fourth factor is the lack of tenders involving more than two known bidders. All these factors need to be considered in the evaluation of the results.

2. The market for procured passenger railway services in Sweden

Following a step-by-step process that may be traced back to the 1960's, the Swedish railway sector has gradually been transformed from a vertically and horizontally integrated monopoly

to an industry characterized by decentralization and multiple suppliers of railway operations and supporting services.[1]

The first Swedish tenders of passenger railway services took place in 1989-1990. These tenders were a direct result of two inter-related reforms of 1988: the vertical separation of railway infrastructure from operations, and the transfer of responsibility for the unprofitable local and regional lines to the county public transport authorities. Consequently, the first tenders concerned local and regional lines, resulting in BK Tåg becoming the first new entrant in 1990. For the first time in over 40 years, the national company SJ faced competition from another railway operator.

Drawing from the positive experiences of competitive tendering of local railway services, tendering was also introduced for subsidized inter-regional services, taking effect from 1993. While the local tenders were for gross-cost contracts, i.e. the operator got no revenues from ticket sales, the tenders of inter-regional services presupposed net cost contracts. Moreover, in order to get access to several common functions and to necessary rolling stock, the new operators bidding for these contracts had to reach an agreement with the former monopolist, SJ. For several years, these tenders involved much negotiation and whenever competitors appeared, SJ commonly reduced its own bid during this process in order to keep other operators from entering the market. It was not until 1999 that other firms started to win these contracts. By that time, several of the railways' common functions had been removed from SJ and a proper price-list of vehicles had been established by the procuring authority and the government.

Today, the Swedish State still controls and maintains the railway infrastructure, by means of the authority Banverket, and is the owner of the most important railway operator SJ. SJ still has a monopoly on the so-called profitable passenger lines, i.e. the important trunk lines between Stockholm and major cities like Gothenburg, Malmoe, Karlstad and Sundsvall. All subsidized lines are tendered by either regional authorities or the national authority Rikstrafiken. Some old long-term contracts between local authorities and SJ remain, but eventually these will probably be tendered as well. Since 1990, a total of six new railway operators have entered the Swedish market for passenger railway services. Of these, four remain as independent actors alongside SJ in 2004: Connex, Keolís, BK Tåg and Tågkompaniet.

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[1]   A detailed description of this development is presented in Alexandersson *et al* (2000) (in Swedish). A condensed version in English is available in Alexandersson and Hultén (1999).

Sweden has been a member of the European Union since 1995. The most direct consequence for the railway sector is probably that the regulations on public procurement and competition have became stricter and more formalized (a process initiated already with the implementation of the EES treaty in 1994). In other respects, the Swedish railway deregulation process has been pushed forward almost entirely for domestic reasons, rather than as adjustments to comply with European Union directives and policies.

3. Public tenders of railway services – some characteristics

Public procurement of public transport services entails some specific circumstances that are rarely observed in ordinary markets. The procuring entity has a strong position as a buyer, sometimes close to a monopsonist. Its purchases and buying behavior determine the range and limits of the actual market. In the case of a net cost contract a supplier that wins a tender enjoys a monopoly-like position during the contract period, but its actual powers are often restricted, for example in terms of its possibilities to influence prices and supply. In the case of a gross cost contract the firm that wins the contract has a very limited market power upstream and downstream. Towards the customers the firm delivers the service and the end consumers are bound to use the supplier chosen by the procuring entity.[2]

Public procurement also means that actual competition between firms for a specific part of the market only takes place at discreet points in time, often with several years in between. This affects the continuity of the seller structure, and thereby competition, over time. Even if other public tenders, concerning other parts of the market, may happen during these years, a loss in a tender that represents a major part in a firm's business may lead to the dismantling of the firm altogether. It may be argued that firms that are efficient in the long run would always have the alternative to borrow money (see for example Strand 2004). However, this option does not seem to be realistic in situations when firms need to survive long periods of no or much reduced business activity, with only a chance (not certainty) to win a future tender.[3]

A firm that wins a contract in the passenger railway market may become the only supplier for a long period of time (sometimes up to 15 years). Contracts are regularly prolonged with a couple of years. Once the contract has been signed there are also some possibilities for the winning firm to renegotiate the contract. These circumstances, and the fact that firms that don't win a contract sometimes leave the market altogether, give the incumbent firm a

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[2] Similar observations on public procurement characteristics have been made by Sorana (2000).
[3] Eckert (2002) discusses the importance of speed of antitrust actions in order to avoid these types of problems.

substantial advantage in later public tenders. Hence, in the public procurement market for passenger railway services it may be more advantageous than in other competitive markets to become an incumbent.

The conditions stipulated in the procuring authority's invitation to tender form the basis for a firm's bid calculation. The invitation defines the type and amount of traffic that is to be produced, and a number of characteristics and demands related to the rolling stock, maintenance, performance and quality. Although the specific demands differ from tender to tender, they generally define the minimum standard of the traffic. Depending on the type of contract tendered – gross cost contracts or net cost contracts (where ticket revenues also become an important source of the operator's income) – the bidder may be more or less inclined to offer a service level or standard above the minimum requirements. Promising higher quality may result in a more favorable evaluation from the procurer, and possibly also increased travelling and ticket revenues.

Based upon how much and what traffic that is to be produced, the bidder has to combine a set of inputs to construct its bid. Among the many questions to be answered are: What type of rolling stock is needed? Should it be rented or bought? How much maintenance is expected and where to get it? How much personnel is needed and on what positions? What are the costs of electricity (or other types of fuel), track access fees, cleaning, marketing and (when applicable) administration of ticket sales? In addition to this, possible revenues from ticket sales must be calculated in bids for net cost contracts, based upon projections on the development of demand. In many ways, calculating a bid in a tender for train services is similar to planning a start-up of a new business operation from scratch. It is difficult to get the true prices of all the factors of production beforehand. The impact of unexpected events and breakdowns must also be taken into account, influencing the need for spare vehicles and alternative ways of transportation, e.g. buses.

The resulting bid is not only a specified price, but also a presentation of how the bidder intends to perform the services, as well as showing that it is committed to this and has the means and capabilities to deliver. Therefore, many tenders may be viewed as hybrids of reverse closed auctions and beauty contests.

Bids that lead to low profitability or even losses create a risk that the supplier will not be able to fulfil the conditions of the contract. Sometimes this becomes obvious already when the shift from the former to the new entrepreneur takes place. In the short run, this may cause sudden interruptions in delivery, resulting in considerable consequences, e.g. for services like

public transportation. The procuring authority may be forced to purchase the goods or services from another firm, sometimes at considerable additional costs. When this is not an option, end consumers, such as bus and train passengers, will face big transportation problems, which may have negative socio-economic and environmental effects. In a longer perspective, the confidence for the supply of goods and services is deteriorated, and firms that contribute to a healthy competition may leave the industry. Thereby, the future price competition as well as the innovativity of the industry may be harmed.

4. High and low bids in tenders

Ideally, all firms participating in tenders of public railway services place bids that relate to their best estimates of costs and revenues. A realistic bid from the most efficient firm would then win the tender and force the others to improve their competitiveness in order to stand a better chance in the next tender. However, we suggest that firms bidding in these tenders on some occasions place very low bids and on other occasions place very high bids, not necessarily related to actual costs or revenues.

The presence of very high or very low prices is of course not unseen in other markets. For example, a firm that launches a new product often charges a much higher price from the first buyers than it does later on from the majority of consumers. This has recently happened in the market for DVD players. Likewise, firms that sell fashion clothes lower the prices with up to 70 percent at the end of the season.

The peculiarity of the market for public tenders of passenger railway transportation is that a firm that charges a very high or a very low price makes a long-term commitment that is more or less impossible to forego. If the firm wins with a very low bid it is forced by the contract to supply the services regardless if it will make big losses. Naturally, if a firm wins a tender with a very high bid it will earn a high profit level, but probably it will never win the contract in the first place.

We can imagine two basic reasons behind bids that are either very high or very low. The first reason is that the firm bases its calculation on different assumptions than its competitors, concerning the costs of inputs, indivisibilities in the production function, economies of scale of variable inputs, and market revenues. The second reason is that the firm offers an aggressive bid to win a market or wants to signal that it is soft in a market. In the following analyses, we will look into these reasons in some more detail.

Low bids in tenders[4]

Why do firms place very low bids in tenders? In the desirable case, the explanation is that some firms do have a unique competence on production methods that result in a completely different cost structure or possibilities for additional income compared to their competitors. One important factor may be that some firms are able to gain from economies of scale or scope.

In addition to this, there are several possible explanations for low bids that are less attractive from a socio-economic point of view. Based upon the literature, we have identified three main categories of explanations for low bids in tenders.

Firstly, low bids may aim at ousting out or at least weaken competitors. The firm may practice dumped prices with a consciously calculated loss, or is able to use profits gained in other branches of its business through cross-subsidization. This bidding behavior is analogous to a strategy of *predatory pricing*. One major problem is the difficulty to separate predatory pricing from the sometimes fierce but legitimate price competition between firms (see e.g. Niels and Ten Kate 2000). While some industrial economists have based their analyses on historical evidence, advocates of the Chicago School have claimed that predatory pricing should be rare – if existing at all. Their main argument is that such a strategy is seldom or never rational from an economic point of view, since it is costly (compared to e.g. acquiring competitors) and often difficult to recoup by future monopoly profits due to entry of new competitors (Ten Kate and Niels 2002). However, during the past 20 years, the views on predatory pricing have changed. The development within the fields of decision theory and game theory has shown that the strategy may be rational in the presence of asymmetric information between different actors, for instance between incumbents and entrants or between management and investors. Under certain circumstances, small firms with very competitive and innovative products appear to be particularly prone to successful attacks of predatory pricing (Grout 2000). Moreover, aggressive pricing and other practices may function as strong signals to new firms, deterring entry to certain markets (Roberts 1986). If predatory pricing is a rational strategy or not will depend on the objectives of the firm using this type of strategy. Something that appears to be irrational from a profit-maximizing perspective may be rational when other objectives are taken into account (Ten Kate and Niels 2002).

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[4] This text draws from Alexandersson and Hultén (2003).

Secondly, a subsidiary to the procuring organization may place a bid that, if it turns out to be impossible to fulfil, presupposes more money from the owner. This type of explanation for low bids may be viewed as a special case of the first. A common complaint to the Swedish Competition Authority is that companies owned by municipalities or county councils apply pricing below costs in public tenders, signifying a "hidden tax subsidy" (Konkurrensverket 2004). A related accusation is that low bids from public companies are based upon lower expected rates of return compared to competing private firms.

Thirdly, it happens that firms do more or less serious mistakes when calculating their bids. Some mistakes may be due to shortcomings of the internal information systems, producing false impressions of costs and revenues. The basic data provided by the procuring authority may sometimes contain incomplete or incorrect information on the tendered business, leading to faulty calculations. Firms may also have unrealistic expectations on the possibility to perform changes in a certain business, or underestimate the development of costs in the industry. This is probably more common among new entrants than incumbent firms. In particular, *common value auctions* – in which the participating bidders value items differently based upon their judgment of uncertain prospects – tend to be won by the bidder with the most optimistic estimate of the item's value – the so-called *winner's curse* (see e.g. Kagel and Levin 1986).

High bids in tenders

Why do firms place very high bids in public tenders? We have identified five possible reasons.

Firstly, the bidder may be absolutely confident that no other firm will present a bid. This was the case for several years when the Swedish State monopolist SJ was the only bidder in tenders of long-distance services. To defend the bid the operator had to present calculations of costs and revenues to the procuring public agencies.

Secondly, the bidder may have real cost disadvantages compared to its competitors. In general terms we can identify two categories of cost disadvantages: 1. a firm that has no economies of scale and scope in its operations compared to the competitors, and 2. a firm that has diseconomies of scale in its operations, for example due to a big bureaucracy resulting in high overhead costs.

A third possibility is that the bidder wants to signal to its competitors that it has no interest in the market and would like the competitors to signal back that they have no interest in other markets.

The fourth possibility is that the bidder presents a high bid in period one and has the intention to present a much more competitive bid in a later period. It could be argued that a high bid, although not successful, may drive up the price level in later tenders.

The fifth possibility corresponds to the third explanation behind very low bids: faulty calculations or bids based upon a lack of relevant knowledge of costs and revenues related to a certain business.

Pricing strategies and games

Oligopolistic pricing share all the characteristics of a contest or a game. True, in the deregulated public passenger railway market the oligopolists face competition from different types of firms. In the Swedish market, foreign big international players like Connex and Keolis and the former monopolist SJ could be regarded as oligopolists. These firms meet competition from Swedish start-up firms that begin in one region and then gradually move to other markets. The two most successful start-up firms have been BK Tåg and Tågkompaniet. To further complicate matters, the start-ups have sometimes joined forces with foreign big players in the bids for contracts. BK Tåg has cooperated with Keolis and Tågkompaniet with DSB, the former monopolist of Danish railway operations. All in all, the oligopolists do not control the market.

The firms that participate in the tenders know that this market is a repeated game in two ways. First, new tenders will appear for new railway systems, and second, the market that has just been tendered will be put up for tender again when the winning bidder's contract has expired. An optimum strategy in repeated games is tit-for-tat (Axelrod, 1984; Dixit and Nalebuff, 1991). Since public tenders are winner-takes-all markets, the option to increase profits by being soft in all tenders is an untenable proposition for the individual oligopolist. The oligopolists have to come up with something smarter, for example a division of the markets. A firm cannot inform the competitors beforehand about its bid but "each firm recognizes that its own current and past actions will be treated by rivals as signals of its costs and intentions" (Scherer and Ross, 1990, p. 215).

To make the tit-for-tat (or perhaps this-for-that) rule work in repeated public tenders the oligopolistic firms need to arrive at playing a delayed tit-for-tat game. Firm #1 is soft in tender #1 and firm #2 is tough. In tender #2 firm #1 responds by being tough and firm #2 responds by being soft, and so on. Of course this system of sharing the markets may collapse for different reasons. Firstly, if all the oligopolistic firms play soft to increase profits in repeated tenders, they will attract new entrants to the market. Secondly, if one firm starts to play tough it will force the other to retaliate. Thirdly, haphazardly other firms may win tendered contracts and force the oligopolist that lost to change its strategy.

Any firm can make faulty calculations, but only large firms can benefit from strategic pricing that either is below or above costs. This leads us to the following conjecture: A small entrepreneurial firm will only offer very high or very low bids due to faulty calculations of costs and revenues. An oligopolistic firm may offer very high or very low bids due to faulty calculations, strategic pricing to predate competitors or to signal that it is soft, or possibly because of a mixture of faulty calculations and strategic pricing. *Ceteris paribus,* this means that small entrepreneurial firms will offer less extreme bids than oligopolistic firms.

Economies of scale and faulty assumptions, with and without strategic pricing

Since one important source behind both low and high bids are differences in firms' cost calculations, we will take a closer look at this factor. We will look at the impact of economies of scale and faulty calculations related to economies of scale, assuming that there may exist real differences the firms' possibilities to achieve economies of scale, that firms' costs for inputs may be different, but also that firms may make faulty calculations concerning the possibilities to achieve certain economies of scale. We will then look at how strategic pricing may influence a bid.

A first observation is that differences between bids, without strategic pricing, will be bigger if some inputs are available only in discrete lumpy units. Lumpiness will make the firms' estimate sensitive to how much of the inputs the firm will need to produce the service. The more factors that are lumpy, the more difficult will it be to arrive at a specific plant size that is more efficient than plants that are smaller or bigger. The bigger the service output the less difficult will it be for a firm to achieve an optimal production system. Whenever an input of production switches from being lumpy and discontinuous to becoming variable and continuous the cost curve becomes flatter. Eventually all inputs can be treated as variable costs.

This means that indivisibilities and lumpiness are sources of economies of scale. According to the indivisibility thesis, small-scale production is inefficient due to failure to obtain the lumpy factor in fractional units having proportionate efficiency. If an input of production had perfect divisibility, the optimum could be achieved for any aggregate; hence, economies of scale are due to indivisibilities (Blaug, 1985, p. 455).

Another source of economies of scale is increased productivity of variable inputs. Often a firm can get economies of scale from both lumpy inputs and specialization. According to Haldi and Whitcomb (1967), economies of scale in basic industries occur mostly in the initial investment cost and in operating labor cost, with no significant economies observed in raw material cost. Scale economies can also result from learning curve effects, spreading of set-up costs, and certain stochastic processes associated with inventories.

Mathematically, continuous economies of scale can be represented as the function: $C^* = \sum a_i X_i^{b_i}$, where C^* stands for costs, X_i stands for capacity, a_i is a constant, and the exponent b_i is called the scale coefficient. A value of $b<1$ implies increasing returns while $b>1$ implies decreasing returns (Haldi and Whitcomb, 1967).

The easiest way of imagining a *threshold effect* is the minimum efficient scale that a firm needs to reach to be competitive in a market place. In our case the threshold effect will result in discontinuities or steps in the average cost curve. In order to illustrate this discussion on continuous and discontinuous economies of scale and their impact on bid levels with or without strategic pricing, we will present three simplified cases with different outcomes.
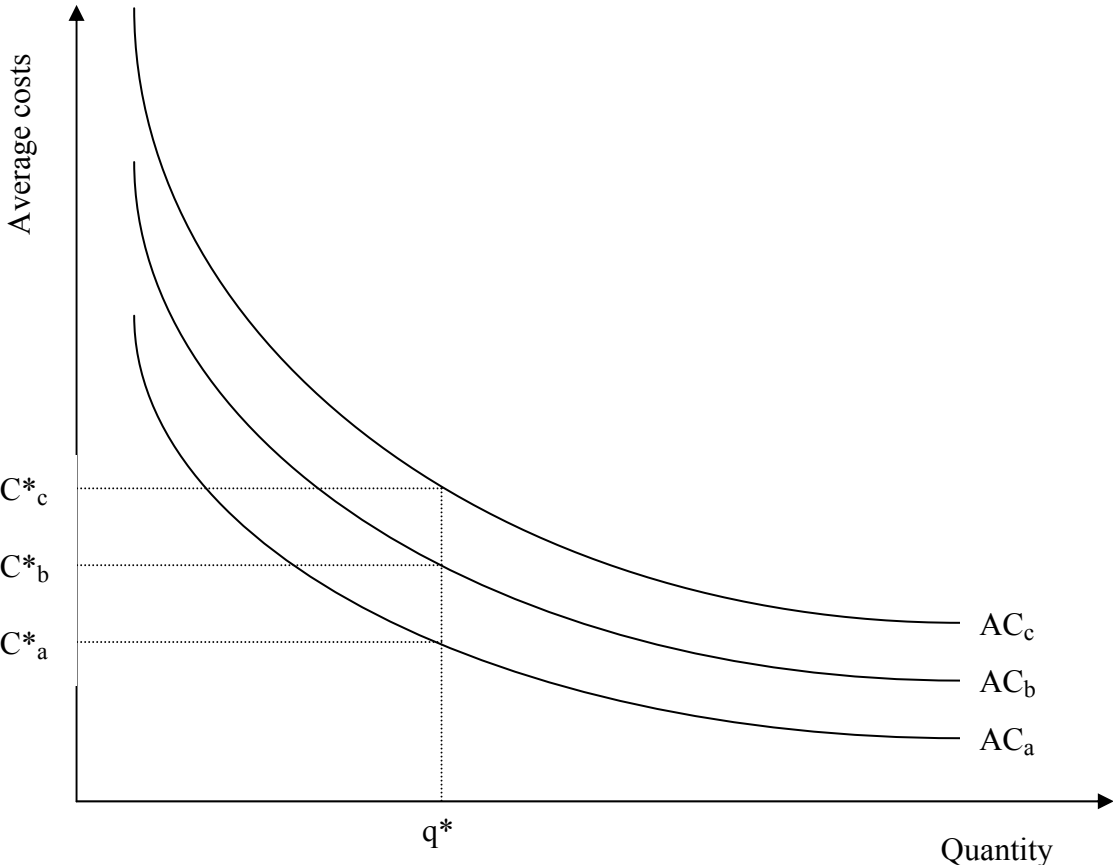
Case 1: Continuous economies of scale

We start by assuming that the costs of producing the passenger railway services fall due to continuous economies of scale and that indivisibilities don't create any calculation problems with lumpy inputs. This may be the case when we have a railway line or a railway system with high density and high volume. Here density refers to how intensively a railway system is used, enabling operators to make better use of terminal facilities, rolling-stock and crew (Preston, 1996). Another possibility could be a line or a network that has been tendered on many occasions, making the competing bidders well-informed when calculating their bids.

In this case we get a geometric relationship of the type $C_i = a_i X_i^{b_i}$. In Figure 1 we have depicted a situation like this with three bidders (a, b and c) that make different estimates on how much of economies of scale that can be achieved in the provision of a passenger railway

service. We assume that each firm offers a bid based upon its calculated costs plus a profit margin. We can see that the differences between the bids are fairly small.

**Figure 1. Continuous economies of scale**

Case 2: Threshold values

In the second case we change the assumption and assume that some factors are lumpy due to indivisibilities, which result in a stepwise fall in the production costs and thereby discontinuous economies of scale. This may be the case with a railway line or system with high density and low volume, low density and high volume or low density and low volume resulting in many inputs that are not fully utilized.

In Figure 2 we have depicted a situation in which three bidders, a, b, and c, respectively, under the condition of production functions with discontinuous economies of scale and threshold values, make different estimates on how much of economies of scale that can be achieved. In this case, small changes in the demanded output may result in very different bids

if a bidder thereby falls short of a threshold value or beyond a threshold value. We can see that the distances between the average costs of the bidders, C^*_a, C^*_b, and C^*_c, respectively, increase compared to the corresponding case of a continuous fall in average production costs. As before, we assume that each firm offer a bid based upon its calculated costs plus its profit margin.

Figure 2. Threshold values
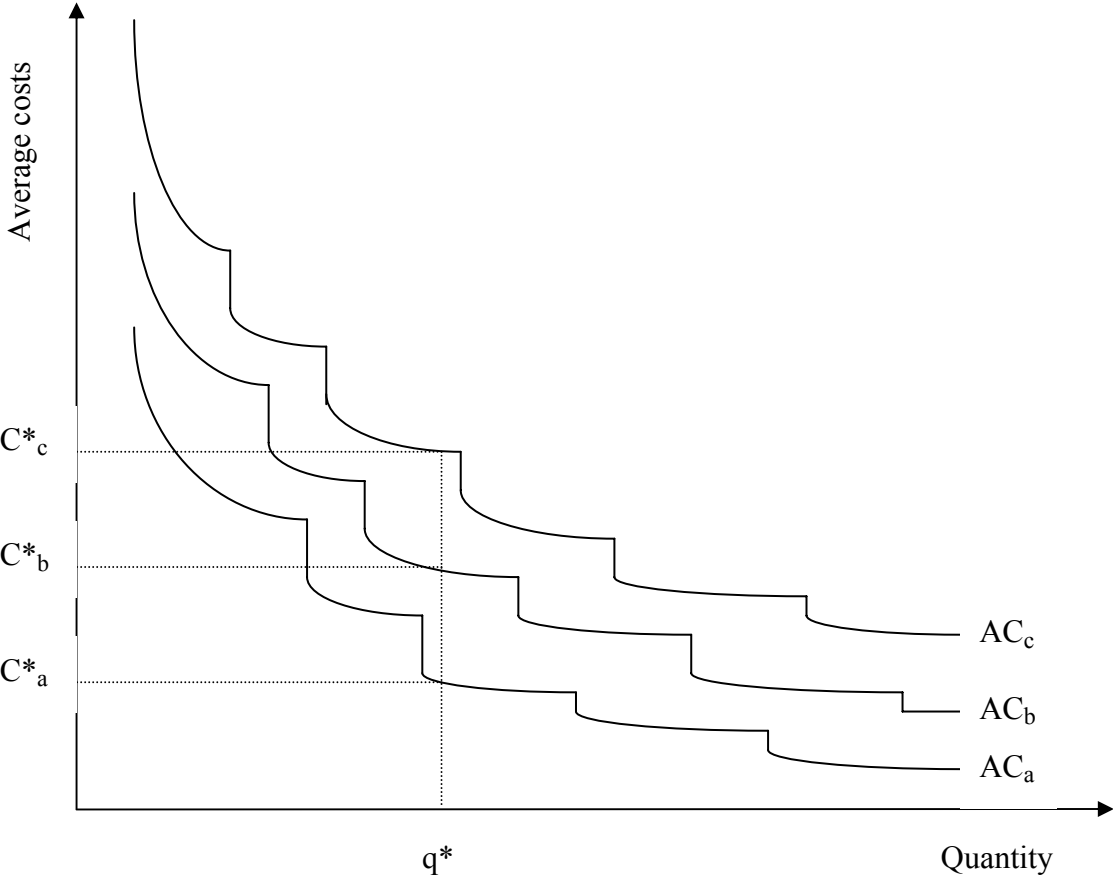
Case 3: Threshold values and strategic pricing

In Figure 3 we add strategic pricing to the calculation and bidding process. We use the example from Figure 2 and add that two bidders decide to use strategic pricing to signal their intentions. This type of analysis can also be made under continuous economies of scale as in Figure 1. Firm c decides to signal that it is not interested in the market by means of offering a higher price than a pure cost-plus-profit calculation would give. Firm a decides that this market is so attractive that it is willing to offer a bid below its calculated costs.

The result of this strategic pricing behavior is that the bidding space increases. The difference between the highest and the lowest bid becomes even bigger than in Figure 2. On the other hand, strategic pricing might also narrow the gap between bidders. For example, this would occur if firm a, having the most optimistic cost calculation, decides that it would like to signal that it has no interest in this market and firm c simultaneously decides to lower its bid below its calculated costs (see Figure 4).

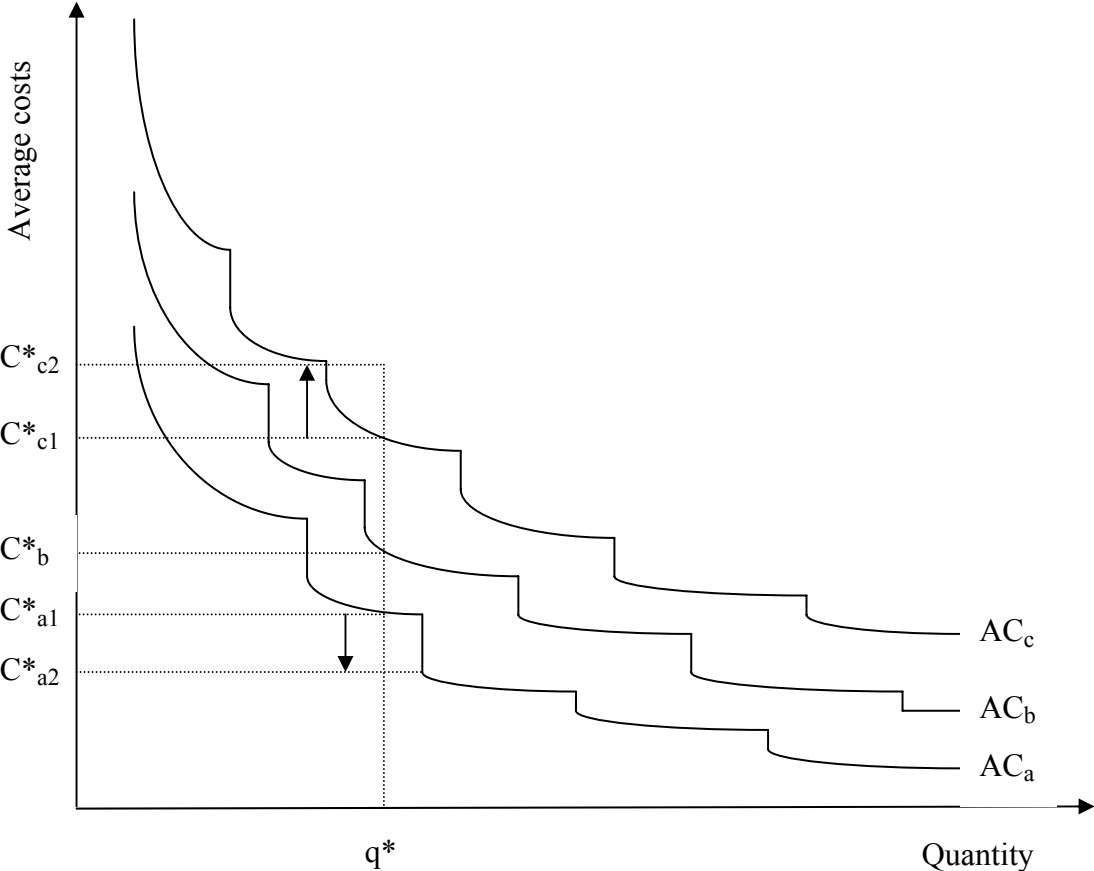**Figure 3. Threshold values and strategic pricing - widening bidding space**
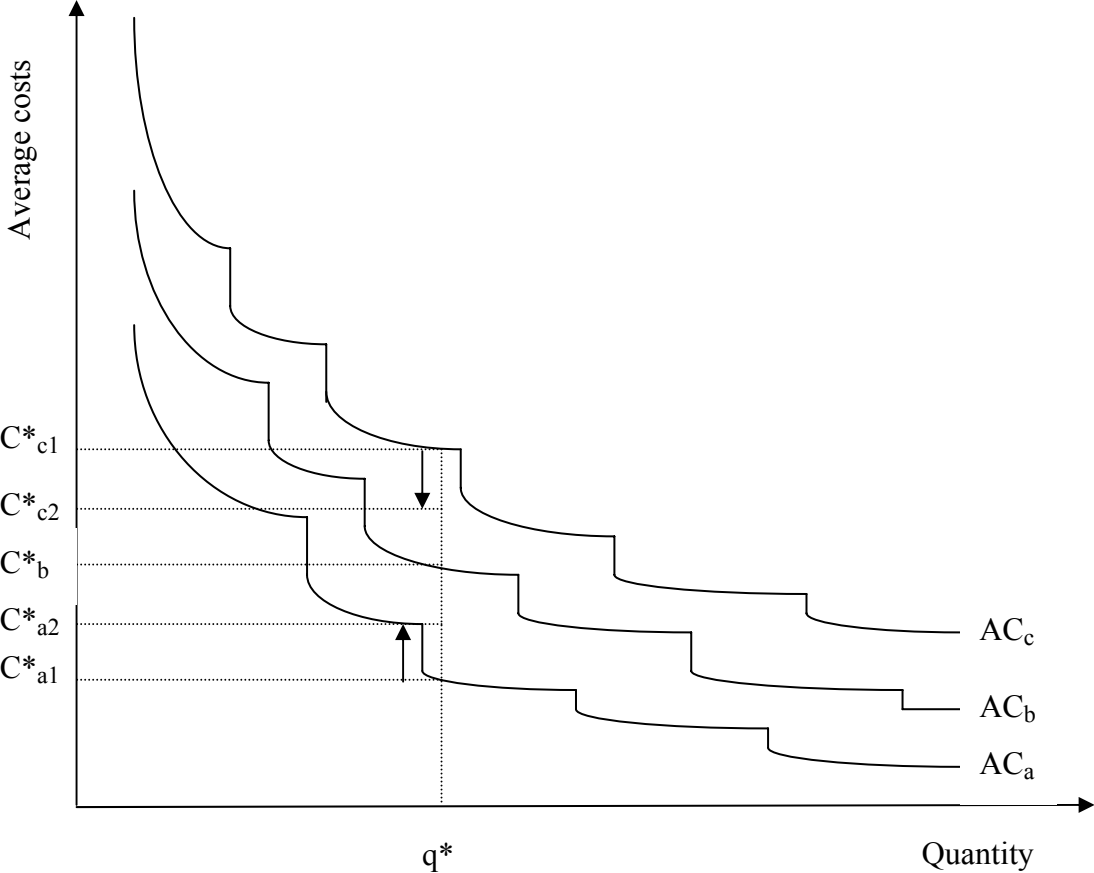
Figure 4. Threshold values and strategic pricing - narrowing bidding space

5. Data analysis

The original intention of the empirical part of this study was to collect data on bidders and bids from public tenders of railway services in three countries: Sweden, Germany and Great Britain. At least for now, however, we have been forced to limit this particular study to data from Sweden, following some unexpected difficulties in getting hold of usable data. For almost the entire 1990's, data on bidders and bids in the Swedish state's tenders was non-official material. Likewise, many local and regional authorities published only limited information when presenting the results of a particular tender. Typically, only the best bid (and sometimes the second best) was presented. In Great Britain, the Strategic Rail Authority will only publicize the winner's bid in terms of subsidies needed or net payments to the state. The situation in Germany seems to be similar. This secrecy is generally motivated by a

concern for the bidders, seeking to help them keep their competitive edge and their "secrets" of how to do business.

Much of the Swedish data that we do have is still not generally available and we have therefore found it necessary to mask our figures in various ways. Unfortunately, missing values due to the secrecy of some public authorities, limit the possibilities to analyze certain tenders. All in all, about 80 tenders and re-tenders of Swedish railway lines have taken place since tendering of some local services began in 1990. Limiting ourselves to the 60 tenders where at least two bidders have been active, we have managed to find complete or almost complete data on 32 of these tenders. There are many tenders in which only one bidder placed a bid, but these are not included in this analysis.

Referring to our three different models of bidding behavior as described earlier, we have identified 12 tenders where the bidders appear to behave as if economies of scale are continuous. Most of these cases correspond to re-tendering of lines that over time have become fairly well known by several actors or lines with very limited services. In another 13 tenders, threshold values appear to be of importance. These are generally lines that are tendered for the very first time and where the different bidders have had different access to information on costs and revenues. In at least five tenders we have identified behavior among one or several bidders indicating that strategic bidding is going on.

In a series of diagrams (see the Appendix) we get an overview of the spread of bids in different tenders. Diagram 1 shows the differences between all bids in relation to the lowest bid in each tender (defined as an index with value 100). Although most bids fall in the range of 100-125, a substantial amount of bids appear in the range of 125-175, that is 25-75% above the lowest bid. In addition to this there are one or two data points corresponding to *very* large deviations from the lowest bid.

The very same data material may also be presented in a slightly different way. In diagram 2 we have plotted the bids in relation to the calculated average of all bids in each tender (defined as an index with value 100). Diagram 3 is a corresponding figure using the median instead of the average. These diagrams give a somewhat better representation of the bid spread in each tender. Bear in mind though that most of the tenders have only attracted two bidders. Therefore, each bid has a profound impact on the calculated average and the calculated median is equal to the average. Actually, in this data set we have only five cases of tenders where more than two bidders are known (in terms of their bid price). Nevertheless, it

is possible to use the material for some early observations, which may hopefully be possible to develop into tested hypotheses later on in this research.

If we look at all the included tenders, the bids and who has placed them, we find that the bidders behave rather differently. Large firms, like the incumbent former monopolist SJ and French-originated Connex, have commonly placed either the highest or the lowest bid in all tenders, and roughly both "strategies" have been used half of the time (see Table 1). Perhaps surprisingly, up-start firms like BK Tåg and BSM have placed the highest bid in about 50% of the tenders they have participated in. This may be explained by the fact that either BK Tåg or BSM have often been the only contender to SJ on occasions when SJ has placed the lowest bid, sometimes lowered at the very last minute in order to avoid new entry.

Table 1. Companies participating in tenders – share of lowest and highest bid

	SJ	Connex	Via GTI	Stagecoach	CPTA subsidiary	BK Tåg	BSM	Other small firms
Number of bids	29	10	2	3	7	15	6	7
Lowest bidder; share in %	44,8%	40,0%	0,0%	0,0%	85,7%	33,3%	16,7%	42,9%
Highest bidder; share in %	48,1%	44,4%	50,0%	0,0%	0,0%	53,3%	50,0%	16,7%

In Table 2 we have tried to identify other patterns in the behavior of the bidders, looking at the percentage deviation (in absolute terms) of each bidder's bid from the tender average and median. Again, we have to bear in mind that a certain bidder's deviation is affected by the bids of other bidders, especially in tenders where only two bidders have been active, but nevertheless, the bids of Connex stands out. On average, Connex has placed bids that have deviated from the average by more than 18 percent and from the median by more than 24 percent. For the other firms (that have participated in at least four tenders), figures in the magnitude of 10 percent seem to be "normal".

Table 2. Deviation from bid average and median

	SJ	Connex	Via GTI	Stagecoach	THM db	BK Tåg	BSM	Other small
Deviation from bid average (percentage units)	9,8%	18,5%	2,1%	1,5%	2,0%	10,5%	11,0%	14,2%
Number of observations	25	7	1	1	3	14	7	4
Deviation from bid median (percentage units)	8,3%	24,4%	1,8%	1,8%	5,1%	8,8%	10,1%	12,0%
Number of observations	25	8	1	1	5	14	6	6

The limited number of tenders with more than two known participating bidders have been scrutinized in a special way. In order to measure the impact of each bidder, we have calculated the bid average with and without each bidder's bid and checked how much the value is affected when a specific bid is included. The results are presented in Table 3. From this limited number of tenders it is difficult to draw any real conclusions, but the calculations confirm the earlier observation that SJ and Connex tend to tilt the average in a certain direction (either high or low).

Table 3. Change of bid average when including a specific bidder (tenders with >2 bids)

Traffic / Line	Bid average	Change of bid average when including a specific bidder						
		Connex	Via GTI	Stagecoach	SJ	BSM	BK Tåg	Other small firms
Stockholm commuter trains	655,95	-0,79%	-0,68%	0,51%	0,98%			
Länstågen 3rd tender	15,47				3,80%	-5,98%	2,77%	
Västerdalsbanan 3rd tender	18,13				4,17%	2,98%	-4,61%	-2,03%
Mora-Borlänge	25,37				-6,22%	-2,62%	10,29%	
Stångådalsbanan etc.	181,20	50,75%			-12,59%		-16,15%	

6. Discussion and conclusions

Public tenders have become an important tool for procuring authorities to increase competition between suppliers of products and services. Ideally, the most efficient firm would win a tender with a bid based upon realistic assumptions on costs and revenues. However, for a number of reasons, this may not always be the case. The peculiar characteristics of public tendering may a) influence the possibilities for the firms to calculate realistic bids, and 2) make strategic pricing an attractive option because in these markets it is more advantageous to become an incumbent compared to other competitive markets.

We suggest that firms bidding in these tenders on some occasions place very low bids and on other occasions place very high bids. These bids are not necessarily related to actual costs or revenues. We can imagine two basic reasons behind bids that are either very high or low. The first reason is that the firm bases its calculation on different assumptions than its competitors, concerning the costs of inputs, lumpy inputs, economies of scale of variable inputs, and market revenues. The second reason is that the firm offers an aggressive bid to win a market or wants to signal that it is soft in a market.

Any firm can make faulty calculations, but only large firms can benefit from strategic pricing that either is below or above costs. We therefore suggest that a small entrepreneurial firm will only offer very high or very low bids due to faulty calculations of costs and revenues. An oligopolistic firm, on the other hand, may offer very high or very low bids due to faulty calculations, strategic pricing to predate competitors or to signal that it is soft, or possibly because of a mixture of faulty calculations and strategic pricing.

The analysis of data from Swedish tenders of railway services show that there certainly exist examples of very low and very high bids. Some of these can probably be explained by firms' different assumptions on costs and revenues (some realistic – some not) while others may be related to strategic pricing or even multi-period strategic games. Our statistical analysis supports the conjecture that large firms like SJ and Connex have been more likely than other firms to place either very low or very high bids in tenders. Moreover, Connex' bids tend to deviate more from the average bid level.

Unfortunately, the relative lack of empirical data makes it difficult to perform further testing of hypotheses regarding the presence of high and low bids in tenders. As has been mentioned briefly previously in the paper, we have encountered significant problems in terms of obtaining data on bidders and bids in tenders of railway services. We find it notable that data

of this kind is so difficult to get access to. The official policy of the European Union as regards competition and liberalization may be expressed by the following citation: "If a company is awarded the monopoly over a public service that any one of a number of companies could provide, the selection process must be transparent" (Europa, 2004). In our opinion, the common practice of secrecy applied by the procuring authorities in several countries belies this policy of transparency. It pulls public procurement of railway services even further away from being normal markets, ultimately increasing the firms' perceived gains from strategic bidding. Thereby, there is also an increased risk of experiencing more of the socio-economic problems related to such strategies.

Bibliography

Alexandersson, G. and S. Hultén. 1999. "Sweden." In *Changing Trains. Railway Reform and the Role of Competition: The Experience of Six Countries,* edited by D. M. van de Velde, Aldershot U.K./Brookfield VT: Ashgate, pp. 79-141.

Alexandersson, G. and S. Hultén. 2003. "The Problem of Predatory pricing in Competitive Tenders. A Swedish Case Study." Paper presented at the 1st Conference on Railroad Industry Structure, Competition, and Investment, Toulouse, 7-8 November 2003.

Alexandersson, G., S. Hultén, L. Nordenlöw, and G. Ehrling. 2000. *Spåren efter avregleringen.* KFB-rapport 2000:25. Stockholm: KFB/Banverket (in Swedish).

Axelrod, R., 1984, *The Evolution of Cooperation*, Basic Books

Blaug, M., 1985, *Economic Theory in Retrospect*, 4th ed., Cambridge

Dixit, A. K. and B. J. Nalebuff, 1991, *Thinking Strategically*, W.W. Norton & Company

Eckert, A. 2002. "Predatory Pricing and the Speed of Antitrust Enforcement." *Journal of Industrial Organisation* 20: 375-383.

Europa. 2004. "Activities of the European Union. Competition", http://europa.eu.int/pol/comp/print_overview_en.htm, 2004-09-10

Grout, P. A. 2000. "Recent Developments in the Definition of Abusive Pricing in European Competition Policy." CMPO Working Paper Series, No. 00/23.

Haldi, J. and D. Whitcomb, 1967, "Economies of scale in industrial plants", *Journal of Political Economy*, vol. 75, pp. 373-385

Kagel, J. H. and D. Levin. 1986. "The Winner's Curse and Public Information in Common Value Auctions." *The American Economic Review* 76: 894-920.

Konkurrensverket. 2004. "Procurement", http://www.kkv.se/eng/competition/procurement.shtm, 4 May 2004.

Niels, G. and A. Ten Kate. 2000. "Predatory Pricing Standards: Is There a Growing International Consensus?" *Antitrust Bulletin* 45: 787-809.

Preston, J., 1996, "The economics of British Rail privatization: an assessment", *Transport Reviews*, Vol. 16, No. 1, pp. 1-21

Roberts, J. 1986. "A Signaling Model of Predatory Pricing." *Oxford Economic Papers* 38: 75-93.

Scherer, F. M. and D. Ross, 1990, *Industrial Market Structure and Economic Performance*, Houghton Mifflin Company

Sorana, V. 2000. "Auctions for Universal Service Subsidies." *Journal of Regulatory Economics*. 18: 33-58.

Strand, N. 2004. "För- och nackdelar med låga priser." *Ekonomisk Debatt* årgång 32, no. 1: 44-47 (in Swedish).

Ten Kate, A. and G. Niels. 2002. "On the Rationality of Predatory Pricing: the Debate Between Chicago and Post-Chicago." *Antitrust Bulletin* 47: 1-24.

Appendix

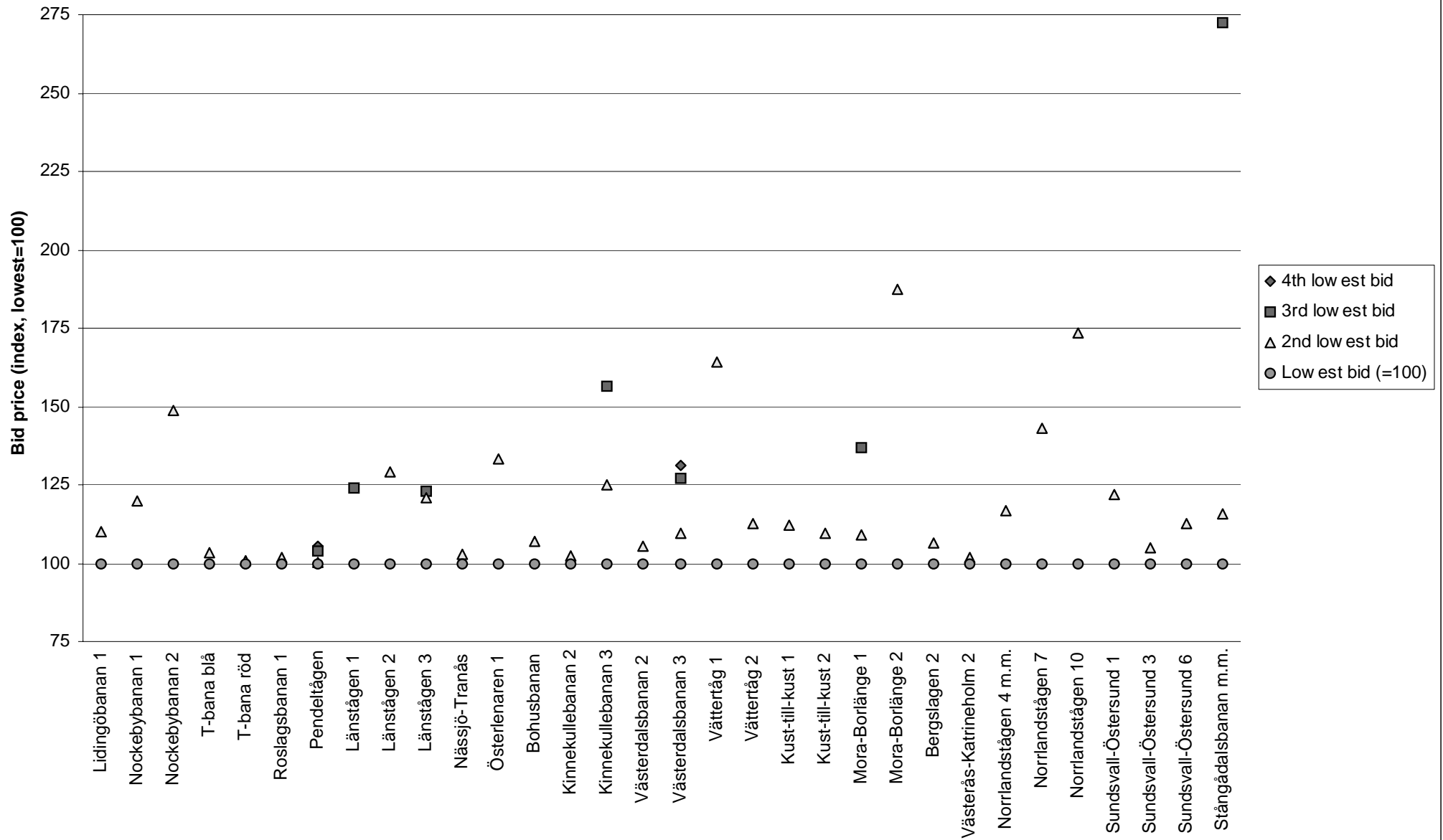Diagram 1. Swedish tenders of passenger train services 1992-2003: Differences between bids

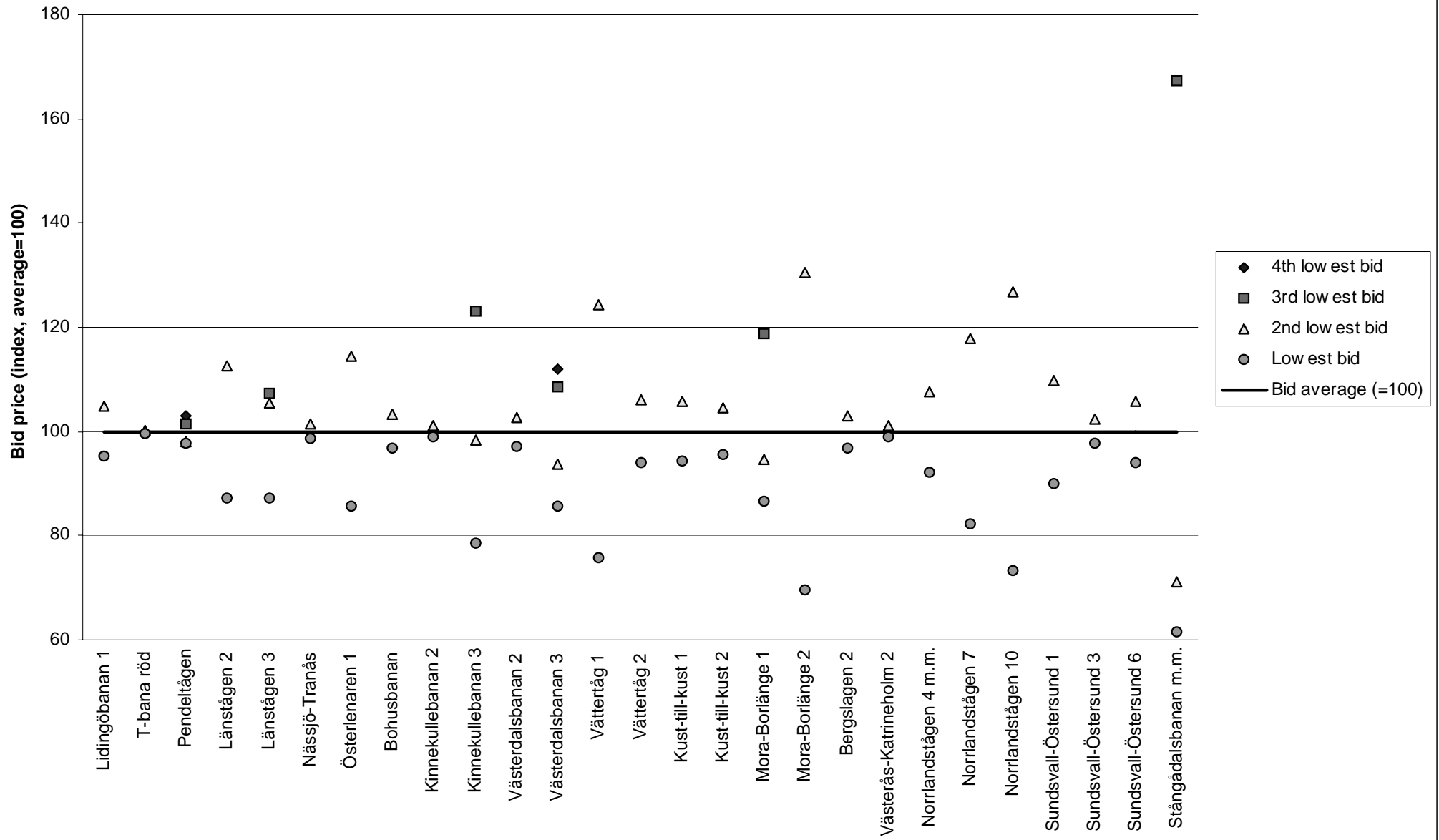Diagram 2. Swedish tenders of passenger train services 1992-2003: Spread of bids compared to bid average

Diagram 3. Swedish tenders of passenger train services 1992-2003: Spread of bids compared to bid median