

COMPETITIVE TENDERING AND STRUCTURAL CHANGES:
AN EXAMPLE FROM THE BUS INDUSTRY¹

Terje Andreas Mathisen^{a*} and Gisle Solvoll^a

^a Bodø Graduate School of Business, University of Nordland

NO-8049 Bodø, Norway

* Corresponding author

Email: tam@uin.no, Tel.: +47 75 51 76 37

Abstract

This article evaluates the structural changes that have taken place in the Norwegian bus industry after competitive tendering was introduced in 1994 in order to show that this procurement mechanism implies more than just efficiency gains. In a long-term view the many takeovers and increasing ownership links among the transport companies may weaken the competitive element of tendering and lead to an unwanted market situation with only a limited number of suppliers. To maintain market competition, the transport authorities should differentiate their procurement strategy and use competitive tendering together with other public procurement approaches.

1. Introduction

In Norway, as in most other European countries, transport companies operating scheduled services on road, sea and rail receive substantial subsidies from the state. During the last two decades, governments worldwide have introduced competitive market mechanisms in their public transport systems. Even though there is variation between countries, the general outcome of competition in the transport industry is cost savings (Cox and Duthion, 2001). The transport industry in Scandinavia has also been increasingly exposed to competition, but public authorities still exercise strong control over the quality and quantity of the services offered compared to the situation in countries which have more extensive deregulation, such as the UK.

The importance of subsidy allocation policies have been discussed in some studies of bus industry efficiency (e.g. Dalen and Gomez-Lobo, 2003; Jørgensen et al., 1997). Also studies considering competitive tendering have mainly focused on the short-term efficiency gains. The general effect of competitive tendering on cost reduction is proven in empirical studies of the Norwegian bus industry (Bekken et al., 2006; Carlquist and Johansen, 1999) and in several other developed countries (Hensher and Wallis, 2005; Preston, 2005; Transportrådet, 1998). According to Preston (2005), tendering typically gives around 20 percent reduced unit costs compared to a situation of an unchallenged public monopoly operation. These expected efficiency gains have been the most important motivation for the introduction of competitive tendering in the Norwegian bus industry (Ministry of Transport and Communication, 1990).

However, this procurement regime also brings with it consequences with respect to market structure which have been much less debated. Nash (2005) addresses such

consequences when describing the extensive consolidation of companies and the dominance of the industry by three large groups when the UK bus services were exposed to competition. Also in Sweden the reform in the late 1980's allowing the use of competitive tendering is suggested to have initiated major changes in the market structure (Alexandersson et al., 1998). These structural changes are similar to those experienced in the Norwegian bus industry after competitive tendering was introduced.

The aim of the article is to evaluate the structural changes that have taken place in the Norwegian bus industry after the introduction of competitive tendering in 1994 in order to show that this procurement mechanism could imply more than just efficiency gains. Furthermore, we suggest implications of the structural changes for the local transport authorities' long-term procurement policies. The Norwegian case is interesting in this context because the transport industry still has a considerably lower share of tendered contracts than such industries in neighbouring countries (e.g. Sweden and Denmark). Now that competitive procurement mechanisms are gradually being introduced in Norway, we can study the implementation of competitive tendering as it takes place with basis in knowledge from similar processes in other countries.

The article is organised as follows: First, section 2 presents tendering in the Norwegian bus industry. Section 3 gives a general discussion of the relationship between increased competition and structural change. Section 4 analyses the structural changes that have taken place in the Norwegian bus industry. Finally, the concluding remarks in section 5 highlight important policy implications of the structural changes among the bus operators.

2. Tendering in the Norwegian bus industry

Historically, Norwegian public bus transport services have been subject to substantial public regulation. Until 1991, the county councils in Norway used either direct negotiations, standardised cost norms or a combination of the two to determine the size of the subsidy allocated to a bus operator. Transport legislation was changed in 1991 allowing county councils to use competitive tendering as an alternative to negotiations and cost norms from 1 April 1994. Today, the county councils in Norway may combine or choose between direct negotiations, cost norms and tendering when distributing subsidies among bus operators.

Despite having the opportunity to use tendering, it has only been initiated on a limited part of the Norwegian bus services up to now. Many county councils are still unsure whether they should introduce tendering because they see many practical problems such as lack of competition, weak incentives for investment in short-term contracts and specification problems in contracts (Vickers and Yarrow, 1988). An alternative way to achieve cost reduction is to employ long-term performance-based contracts in which the counties commit themselves not to use tendering during the contract period if the operators manage to reduce production costs. It is argued that, given the total amount of subsidy support available, such contracts are more attractive than competitive tendering in terms of securing maximum social welfare for the community (Hensher and Stanley, 2003). In Norway, the first county to implement such incentives in performance-based contracts was Hordaland (Carlquist, 2001).

Bekken et al. (2006), presenting simple cost trends for the subsidised passenger transport in the Norwegian bus industry, shows that the average total cost per vehicle-kilometre had a decreasing trend during the early 1990s, but has lately

flattened out, and in some counties has even risen. The cost reductions related to the exposure to competition can be explained both by the actual use of tendering, and also by the authorities' ability and threat to put bus services out to tender (Carlquist and Johansen, 1999). Comparing the variation in tendering practices between counties, Bekken et al. (2006) suggests that the decrease in average total costs per vehicle-km has been most prominent where the majority of contracts are tendered. The most competitive counties are characterised by having the highest average population, total costs and subsidies.

The development of total average unit costs can be explained by factors with contradictory effects. While exposure to competition, technological progress and improvements in the road network reduces the average costs, increased traffic congestion in the cities pull in the other direction. Prices on important cost generating inputs for the transport industry has generally increased more than the consumer price index (CPI) and indicates increased real prices for transport services between 1991 and 2004². Only the purchasing prices of new vehicles have increased less than the CPI. Hence, the observed reduction in average costs per vehicle-km must be caused by something else than reduced input prices and the most important factor is the introduction of competitive tendering.

The use of competitive tendering in bus operations in Norway is increasing, but it varies considerably between the 19 counties. The overview in Figure 1 shows that tendering is most frequently used in the more densely populated southern regions of Norway. After a slow introduction, the use of competitive tendering has increased substantially since 1999. The share of vehicle-kms put out to tender was 2 percent in 1999, 7 percent in 2001, 16 percent in 2003 and 26 percent in the summer of 2005. A study of the 70 contracts put out to tender from 1995 to 2006 shows that

both the average duration of the contracts and number of vehicle-kms has increased and that the number of bidders generally has been around 3-5 (Bekken et al., 2006).

(Insert Figure 1 about here)

The main reason for the rapid growth in tendered contracts after 2001 is the clause from 1994 that gave the bus companies the opportunity to cease their operations and demand public redemption of operating equipment and fixed assets related to production if more than 20 percent of the companies' bus production was offered for tender during the following eight years. Sweden had a similar clause (e.g. Jansson and Wallin, 1991), but the transitional period was shorter than in Norway. The introduction of tendering was met by strong opposition from the bus industry and the long duration of the transitional period was a result of severe pressure from the bus industry towards the authorities. Now that this clause is history, future implementation of tendered contracts is mostly depending on changes in the local political regime. The political debate after 1994 regarding transport policy has shown that the conservative parties believe more strongly in tendering than the socialist parties. Based on statements from the counties in 2006 the share of tendered contracts is expected to grow to approximately 30 percent by 2009. Still, this is modest compared to the neighbouring Nordic countries. After a progressive implementation during the 1990s, today almost all public bus services in the other Nordic countries are subject to competitive tendering (Alexandersson et al., 1998; Hensher and Wallis, 2005).

However, the introduction of tendering in the Norwegian bus industry in 1994 has changed not only the efficiency in bus operations. This 'new' procurement regime has also changed both the number of bus companies and the ownership structure in the bus industry. Among other things we have witnessed many takeovers and an

increased frequency of ownership links between companies. Moreover, large holding companies from countries outside Norway, e.g. Connex (France), have begun to acquire shares in Norwegian transport companies. This indicates a determined positioning by the companies in response to an expected increase in the use of competitive tendering in the Norwegian bus industry.

3. Theoretical framework

In the strongly regulated Norwegian bus industry it is reasonable that changes in the regulatory regime lead to structural changes. Figure 2 illustrates a probable relationship between changes in the regulatory regime and structural changes in the bus industry. The short-term effect of introducing competition is (i) increased cost efficiency and reduced subsidy requirements in the industry. A neglected long-term effect of such change in the regulatory regime is (ii) structural change in the industry that eventually could reduce competition and weaken the efficiency focus and thus partly invalidate the intended efficiency gains.

(Insert Figure 2 about here.)

3.1 Improved infrastructure and economies of scale

In order to emphasise the importance of the regulatory change in the context of the Norwegian bus industry it is necessary to discuss other factors that could influence market structure. Hence, two important factors will be addressed, 1) improvements in infrastructure and 2) economies of scale.

The Norwegian bus industry has benefited from an improvement of the road infrastructure that has in turn improved the working conditions for the transport

companies. Due to the rough terrain of fjords and mountains, road construction in Norway is difficult and expensive. Some municipalities have partly been isolated because of poor connections to the national road network. For that reason several areas were previously served by only one company. During the 1980s and 1990s the isolation of several geographical areas was lessened due to the construction of several bridges and underwater tunnels (Ryntveit and Lian, 1993). The road infrastructure improvement has opened new transport markets for large scale operations and indirectly paved the way for mergers and takeovers. However, these potential structural changes would probably not have happened so rapidly if there were no threat of competition.

A major motive for acquiring a rival in a takeover is the prospect of reducing the average unit cost by utilizing economies of scale. Transport companies located on the decreasing side of the unit cost curve will reduce average costs and increase profitability if they manage to merge and thereby increase efficiency. However, studies assessing economies of scale in the Norwegian bus industry show a slightly U-formed cost curve, indicating that companies above a relatively low minimum size of 500 000 vehicle-kilometres achieve little or even nothing by further growth (Jørgensen et al., 1995; Jørgensen et al., 1997). Bekken et al. (2006) found, using a simple linear cost function on a more recent data set, that economies of scale are generally lacking in the Norwegian bus industry. Studying productivity, Cowie & Asenova (1999) found evidence of a minimum efficiency scale followed by constant returns to scale in the British bus industry. Odeck & Alkadi (2004), using Norwegian data from 1994, conclude that there is a U-formed relationship between size and efficiency. Based on the findings of these studies it seems that there are no considerable scale effects when a company exceeds a certain minimum size.

(Insert Table 1 about here.)

Table 1 shows the mean- and median size of the Norwegian bus companies receiving subsidies from the local transport authorities in 1991 and 2004. The mean value has increased relatively more than the median value because a few companies have grown very large. Most importantly, using the definition of small companies from Jørgensen et al. (1995), the table shows that the share of companies with less than 500 000 vehicle-kilometres has only been reduced by 5 percentage points from 1991 to 2004. Hence, consolidation takes place also in larger companies where scale effects are less prominent. Therefore, and with support from the data set, it is likely that other factors than economies of scale must be present to explain the substantial structural changes which have taken place in the Norwegian bus industry.

Despite constant returns to scale, it would be desirable for a company to grow in order to handle the comprehensive tendered contracts. In Norway the number of vehicle-kms included in the contracts put out to tender has increased over the years and effectively excluded the smaller companies from competition both financially and with respect to transport capacity. Additionally, larger companies have more resources to build and keep the administrative competence specialised to compete for tendered contracts.

3.2 Competitive tendering as an auction

As described in section 2, the Norwegian public bus transport procurement policy has moved from giving the exclusive rights to the local company towards competitive tendering presenting the companies for the uncertainty whether they get the contract or not. It can be argued that this change towards a regulatory regime with competition will alter the behaviour of the companies. Earlier, under strict

regulation the companies had to negotiate with the transport authorities to increase profit. However, when competitive tendering is used, a profit increasing strategy for a company is to reduce the number of actual competitors (e.g. by cross-ownership or mergers) in order to exercise market power so that bids can be raised and producer surplus increased. Such exercise of market power is discussed in the competition policy literature and generally considered to hurt both consumers and society at large (e.g. Motta, 2004).

In Norway, tendering using gross cost contracts is most commonly used (Bekken et al., 2006). That is, the company with the lowest subsidy requirement wins and receives the exclusive right to operate the specified transport network for a predefined number of years. As discussed in Preston (2005) the bidding strategies in gross cost contracts, also called the Scandinavian model, can be explained by auction theory. Gross cost contracts have the characteristics of a game similar to first price auctions in which costs are private information. In auction models, structural changes can be discussed by implementing ownership links. Theoretical studies of auctions conclude that ownership links between two bidders damage both seller and society (Chillemi, 2005). Even where relatively small ownership links are involved, they encourages collaborative agreements that weaken the potential efficiency gains from competition (Reynolds and Snapp, 1986).

A company acquiring ownership shares in a competitor gains access to and influence over corporate strategies, and thus both increases its profit and reduces competition. The profit sharing implies that a company keeps more of the competitors profit when the ownership share increases and gives less aggressive competition because the loss of losing the auction is reduced as cross-ownership increases. This is demonstrated by Greenlee & Waehrer (2004) in a game with profit sharing using symmetric ownership-shares in first-price auctions. In Mathisen

(2007), this game is adapted to tendering auctions in passenger transport using costs as private information. The conclusion is that the subsidy requirement (equilibrium bid) is slightly lower than the expected bid of the next best competitor and increasing with cross-ownership. Consequently, the introduction of auctions tend to give companies a profit incentive for increasing cross-ownership to reduce the downside of losing the auction and thus handle the uncertainty related to competitive tendering. This gives a higher winning subsidy bid and thus partially invalidates the transport authorities intended cost reductions of competitive tendering. Hence, strategic actions such as takeovers and increased cross-ownership are the expected consequences of exposure to competition and could have contributed to the substantial concentration of ownership and market power in the Norwegian bus industry.

4. Structural changes in the Norwegian bus industry

When describing the structural changes in the Norwegian bus industry we will address four dimensions: 1) number and size of companies, 2) ownership structure in terms of private or public and foreign or non-foreign, 3) market concentration and 4) ownership links. When addressing these four dimensions we find first, that the number of companies is reduced and average size increased. Second, foreign firms have entered the market and state owned firms have acquired both private and municipality owned companies. Third, the market concentration both with respect to individual companies and groups of companies has increased substantially. Finally, increasing ownership links makes disturbingly close relationships between the bidders within a county.

All bus companies are obliged to report accounting information to the national authorities and production information to the local transport authorities and this

information is accessible through national data bases. Further information used in the analysis (shareholders and extensiveness of cross-ownership) was obtained directly from the bus companies and the transport authorities in Norway's 19 counties. Our data set consists of information from bus companies in Norway in 1991 and 2004; i.e. the first observations represent the situation 3 years before the introduction of tendering and the last observations represent the situation about ten years afterwards. The observations from these two years are considered comparable because bus services are, despite some technological advances in the industry, virtually the same today as they were a decade ago. All bus companies providing local bus services subsidised by the transport authorities, except school transport, will be analysed. Bus companies operating only tour coaches and other purely commercial operations are not included in this analysis. In the cases where bus companies operate more than subsidised passenger transport services, specific information regarding the subsidised activities is available because the counties require separate production and accounting data from the companies to fulfil the subsidy contracts.

4.1 Number and size of companies

Table 2 shows the number of bus companies in Norway in 1991 and 2004 distributed according to the different counties. It should be noted that, due to ownership links, the actual number of independent companies is lower than exhibited in Table 2.

(Insert Table 2 about here.)

As shown in Table 2 the total number of bus companies in Norway has been reduced from 173 in 1991 to 95 in 2004, a 45 percent reduction. Because the yearly

subsidised bus production has been relatively stable³, takeovers have increased the average company size. Measuring average company size by vehicle-kms, the growth has been 65 percent, from 1.7 million vehicle-kms in 1991 (Solvoll et al., 1994) to 2.8 million vehicle-kms in 2004. Even though Norway has 19 counties, the bus services in the Norwegian capital, Oslo, and the adjacent county, Akershus, is so closely connected that the two counties have been merged in the table.

From the left, Table 2 shows the distribution of bus companies according to the postal address of their central office. In 1991 practically every company operated only within its 'home' county due to historical exclusive rights to specific concession areas while 10 of the 95 companies operated in two or more counties in 2004. Hence, the column to the right giving the actual number of companies operating bus services in the county in 2004 exceeds the total number of companies. Competitive tendering has made it possible for companies to operate outside their 'home' county and has led to a higher geographical scattering of the bus companies' production. Hence, in 2004 the actual number of companies operating in each county differs from the postal-address distribution of the companies. For example, two companies provided bus services in Vestfold in 2004, but neither of them had their central office in the county.

Furthermore, Table 2 shows that the reduction in the number of bus companies varies substantially between counties. Our data indicate that counties with modest use of competitive tendering have less reduction in the number of companies. This is probably a consequence of the fact that counties interested in stable long-term negotiated contracts are not giving the companies incentives to engage cross-ownership and mergers. Indeed, the data shows that all counties with a less than 50 percent reduction in the number of companies have either not implemented or have

only partially implemented competitive tendering. Also note that the only county without local bus companies (Vestfold) has put all its production out to tender.

This tendency for the reduction of bus companies to be less in counties without tendering can be illustrated by a bivariate linear OLS regression⁴. Let the dependent variable, Y , be the percentage reduction in the number of bus companies in the county from 1991 to 2004 and the independent variable, X , be the percentage share of vehicle-kms offered for tendering in the county in 2004. The estimation results are presented in equation (1) (t-values in brackets).

$$(1) \quad Y = 0.278 + 0.477 \cdot X \quad (R^2 = 0.312, N = 18)$$

(4.2) (2.7)

Equation (1) shows that the percentage share of vehicle-kms offered for tendering in a county, X , has a significant positive impact on the reduction in the number of companies, Y . A straightforward interpretation is that a 1 percentage point increase in the use of competitive tendering has reduced the number of companies by about 0.477 percentage points. The R^2 indicates that about 31 percent of the variance in the percentage reduction in the number of companies from 1991 to 2004 is explained by this model. The assumption of constant variance is confirmed as the Breusch-Pagan/Cook-Weisberg test⁵ did not reject the null hypothesis of homoskedasticity.

4.2 Ownership structure

Theoretically, the incentive of profit should make private companies more efficient than public firms and thus better suited for competitive markets than public companies (Vickers and Yarrow, 1988). However, the empirical literature is

ambiguous regarding the relationship between efficiency and ownership. In a review article De Borger et al. (2002) conclude that ownership is one of several factors directly affecting efficiency. Cowie & Asenova (1999) refer to North American studies which have found that higher costs are present in publicly owned companies. Filippini & Prioni (2003) could, in a study of the bus industry in Switzerland, only partly confirm that private companies operated more efficiently than public ones. Analysis of the Norwegian bus industry finds, on the contrary, no evidence that privately owned companies are more efficient than public ones (Holvad et al., 2004; Jørgensen et al., 1995; Odeck and Alkadi, 2004). The general conclusion from the empirical studies seems to be that the presence of competition in the subsidy allocation policy increases efficiency, while the type of ownership has less of an impact on efficiency.

Table 3 categorizes the bus companies in Norway in 1991 and 2004 with respect to ownership structure. A company is defined as privately owned if the majority (more than 50 percent) of its shares is controlled by individuals or private companies. Otherwise the company is defined as publicly owned. These two categories are further divided into two subcategories, resulting in four categories of majority ownership. The privately owned companies are divided, according to the nationality of the ownership, into non-foreign- and foreign-owned companies. Next, publicly owned companies are divided according to the owning public entity into non-locally owned (the State/central government) and locally owned (municipalities and counties) companies.

It is somewhat surprising that public companies have increased their market share as competition has increased due to competitive tendering. In addition to profit, public companies are assumed to have maximization of social surplus as a goal in their utility function. This should presumably make public companies less focused on

profit and efficiency than profit-maximizing private companies. However, in the Norwegian bus industry the largest group of companies, Nettbuss AS, is fully state owned but operates with few or no local attachments and appears as a private company that maximises its profit. Hence, we find it reasonable to divide the public companies in the Norwegian bus industry into two categories: state-owned (by the national central government) companies and companies owned by local authorities like municipalities and counties. Table 3 shows that the share of companies with local public ownership clearly has decreased while the share of companies with non-local public ownership has increased as competition has increased. Also in earlier studies has it been indicated that it is reasonable to divide between different types of public ownership (e.g. Bhattacharyya et al., 1995).

(Insert Table 3 about here.)

Table 3 shows that the number of non-foreign-owned private companies and locally owned public companies has been reduced while the number of foreign-owned private companies and non-locally-owned public companies has increased. The development is similar when focusing on the share of total vehicle-kms for each category instead of the number of companies. In total, even though the takeovers between 1991 and 2004 have caused a much (almost 15 times) greater reduction in privately owned companies than publicly owned companies, the privately owned companies still constitute a majority of bus operators in Norway. The relative share of publicly owned companies has increased from 24 percent in 1991 to 38 percent in 2004. State-owned companies have taken over several companies and have increased substantially from 5 percent of all companies in 1991 to 18 percent in 2004. The share of publicly owned companies has grown mainly because of one group of companies, Nettbuss AS, which is fully owned by The Norwegian State Railways (NSB). Nettbuss AS has acquired both local public companies and private

companies and its subsidiaries are in 2004 present in 15 of the 19 counties. This group of companies was in 2004 responsible for about one third of the total subsidised bus services in Norway and was the third largest bus company within the Nordic countries.

In the period 1991–2004, no new Norwegian-owned bus company has entered the market; however, several foreign-owned bus companies have. Furthermore, the existing Norwegian companies have only consolidated or changed owners during that time. To our knowledge, there were no Norwegian bus companies with a majority of foreign owners in 1991. Data shows that mainly American, British, French and Swedish shareholders have been involved in the Norwegian bus industry since competitive tendering was introduced in 1994. At the end of 2004 there were two groups with majority foreign ownership—Connex (France) which had both acquired Norwegian bus companies and founded new companies and Schøyens Bilcentraler which is 51 percent owned by the American group Goldman Sachs. Foreign controlled companies operate in 8 of the 19 counties, including both rural and urban areas. Even though only 5 out of 95 companies (5.2 percent) in our data set are classified as foreign-owned, i.e. more than 50 percent foreign ownership, they are responsible for over 31 million vehicle-kms or about 10 percent of the traffic volume. A recent example of a foreign takeover is Connex's acquisition in 2003 of Finnmark's only transport company which had, since it was founded in 1916, been fully owned by the county of Finnmark.

Because counties and municipalities have reduced their direct ownership interests in transport companies, they control less of the production in 2004 than they did in 1991. Therefore, local transport authorities are in a weaker position to directly influence the companies' strategies, especially with respect to the quality of transport services. However, this weakness can to some degree be compensated

for by the local authorities' paying careful attention to service quality issues in their contracts with the transport companies.

4.3. Market concentration

The Norwegian bus industry was in 1999 dominated by alliances of independent companies (Carlquist and Johansen, 1999). From 1999 to 2004, increasing ownership links between companies gave a few large groups market dominance. Thus, the market concentration in Norway has gone through two stages; the first stage involved the formation of strategic alliances by independent companies and the second involved the quite rapid growth of large groups of companies with strong ownership links.

Measures of market concentration is widely discussed in the Industrial Organization literature (e.g. Lipczynski et al., 2005). Using vehicle-kilometres we will apply three well-known market concentration measures: 1) the Lorenz curve/Gini coefficient which is a relative measure, 2) the n-firm concentration ratio which is an absolute measure and 3) the Herfindahl-Hirschman Index (HHI) assessing the sum of squared market shares. The level of analysis is the individual companies for the Lorenz curve and the groups of companies for the HHI, while the concentration ratio is given for both levels.

As originally conceived, the Lorenz curve/Gini coefficient is a measure of income inequality and is applied in transport, e.g. by Fridstrøm et al. (2000), to analyse the distribution effects of various transport policies. When adapted to measure market concentration, the Lorenz diagram in Figure 3 shows the cumulative size of the companies on the vertical axis which are ranked from largest to smallest on the horizontal axis. The 45° line indicates the situation where all firms are of equal size.

Studying individual companies, the curves indicate that the market concentration both in 1991 and 2004 were higher than a situation with equally sized companies. The inequality in the company size distribution illustrated by the Lorenz curve can be more precisely defined by the Gini coefficient. $G = 0$ corresponds to the case of n equal-sized companies while $G = 1$ corresponds to the case of one dominant company and $n - 1$ small and negligible companies. Calculations on the subsidised part of the Norwegian bus industry result in Gini coefficients of 0.57 in 1991 and 0.61 in 2004. This confirms the tendency of increasing market concentration.

(Insert Figure 3 about here.)

The concentration ratio, $C_n = \sum_{i=1}^n \frac{v_i}{V}$, gives the total market share of the industry's n largest companies measured in share of vehicle-kms. Company i 's market share is defined as the number of vehicle-kms, v_i , divided by the total number of vehicle-kms operated in the market, V . Table 4 shows the concentration ratio on the national basis for different levels of n for individual companies and groups respectively. This measure shows more clearly than the Lorenz curve that the market concentration has increased substantially from 1991 to 2004. For example, when studying groups of companies the C3 has increased from 0.13 in 1991 to 0.48 in 2004. As expected, when the number of companies decreases and the total number of vehicle-kms remains approximately at the same level, the market concentration increases.

(Insert Table 4 about here.)

The HHI for groups of companies has increased substantially from a very low level around 200 in 1991 to 1250 in 2004. According to US Merger Guidelines (Motta, 2004) there is reason to pay closer attention if the post-merger HHI is higher than

1000 and the increase in HHI caused by the merger exceeds 100 points. Hence, the Norwegian transport authorities should be aware of potential market concentration problems for future mergers in the industry. However, only a few companies operate nationwide and the HHI values are substantially higher on the county level where the actual competition takes place. The HHI varies considerably between counties and ranges from 1300 to 10 000 (one company) with a mean of 4480.

4.4. Ownership links

Increased market concentration has also resulted in increased ownership links, implying that most bus companies in Norway are related to one or more of the larger ownership groups. Since ownership links were almost nonexistent in 1991, the following discussion will only present measurements for 2004.

The six largest groups control about 35 percent of the companies and account for about 65 percent of the traffic volume. On the national basis 57 percent of the transport companies have owners that, either directly or indirectly, have shares in other bus companies. Within an average county, 46 percent of the companies 'compete' with companies with which they have ownership links. Ownership links can be expressed by calculating the average share, AS, of a company that is owned by other bus companies as expressed in equation (2).

$$(2) \quad AS = \frac{1}{n} \sum_{i=1}^n s_i$$

The share of company i owned by other bus companies, s_i , is summarized for all companies and divided by the total number of companies, n . The value of AS is 0.48 and indicate that, on average, 48 percent of the shares in the Norwegian bus

companies are owned by other bus companies. Considering that the high number of small family-owned companies and sole-proprietorships lowers the average, this means that most of the large bus companies in Norway are related through ownership links of varying degrees. A better illustration of the actual market concentration can be expressed by equation (3) where each observation has been given weight according to size.

$$(3) \quad AWS = \frac{1}{n} \sum_{i=1}^n s_i \frac{v_i}{V}$$

The average weighted share, AWS, is calculated by giving the share of company i that is owned by other bus companies, s_i , a weight according to share of production measured in vehicle-kms. The share of production is derived by dividing company i 's produced vehicle-kms, v_i , by the total number of vehicle-kms operated in the market, V . The value for AWS is 0.78 meaning that, on average, 78 percent of the bus services are produced by companies having ownership links. Since $AWS > AS$, large companies have a higher level of ownership links than the small ones.

Both AS and AWS show that there is a high level of ownership links in the Norwegian bus industry. Consequently, when a local network of routes is put out for competitive tendering it is likely that some of the bidders will have quite strong ownership links with other bidders. The fact that the average number of bidders is 3-5 companies suggests a lack of real competition for some of the tendered contracts.

5. Conclusions and implications

The use of competitive tendering in bus operations is still substantially lower in Norway than in the other Nordic countries and the UK. This is due to a later

introduction of competitive tendering and a transitional period, where the counties had restricted incentives for implementing tendered contracts, which was long compared to Norway's neighbouring countries. The clause during the transitional period lasted for eight years and gave the bus companies the right to cease operation and demand redemption of assets if the counties put a high share of the production out to tender. Ten years after its introduction in 1994, competitive tendering accounted for only 20 percent of bus production in 2004; this share is expected to increase to 30 percent by 2009. The uncertainty related to competitive tendering is likely to have increased cross-ownership and reduced the number of bus companies. A review of the structural changes that have taken place in the Norwegian bus industry between 1991, 3 years before tendering was introduced, and 2004 shows that:

- There has been a 45 percent decrease in the number of bus companies, from 173 in 1991 to 95 in 2004. This has led to a 65 percent increase in the average company size from 1.7 million vehicle-kms to 2.8 million vehicle-kms per year.
- The reduction in the number of bus companies has been greatest in the counties with the most extensive use of competitive tendering. The relationship between the use of tendering and the reduction in the number of companies is demonstrated by statistically significant coefficients in a linear OLS regression analysis.
- The number of private companies and local public companies has decreased while the number of foreign private companies and non-local public companies has increased. This indicates that companies with local attachment are being ousted by foreign and state companies as competition increases.
- The developments in ownership structure show an increasingly complex and interwoven set of ownership links. While the Norwegian bus industry in 1991

consisted of independent companies, it was by 2004 dominated by a few large groups with strong ownership links.

As discussed in section 3, increased cross-ownership in the Norwegian bus industry can be viewed as strategic positioning on the part of the companies due to the threat and/or implementation of competitive tendering. Indeed, the introduction of tendering has increased competition in the Norwegian bus industry which has in turn caused structural changes towards larger companies and increased market concentration. These structural changes have been given little attention by the transport authorities. Even though the Norwegian Competition Authority has expressed its concern for the competitive effect of the Norwegian State Railways (NSB) owning the dominant bus company under the current competitive regime, the Ministry of Transport and Communication do not act on the recommendations (Norwegian Competition Authority, 2004). The reduced number of companies could be problematic because effective competition requires several independent participants. However, these structural changes could be regarded as desirable for the transport authorities and the public if the resulting larger companies were to operate more cost efficiently than smaller ones, but, unfortunately, earlier studies indicate only limited economies of scale.

Transport authorities should be aware of these structural changes when considering how to best continue the implementation of competitive tendering. In a long-term view these changes might lead to undesirable local monopolies which can weaken the competitive element of tendering and thus reduce both quality and cost efficiency. Based on the experiences in countries that have implemented tendering at a larger scale than Norway and the development we have seen in the Norwegian ferry and road construction industry, it is most likely that we will have only a few large independent bus companies left in Norway in the future.

It is important that the local transport authorities bear in mind that competitive tendering is only a means of achieving efficiency rather than a goal in itself. To avoid that regulators are becoming dependent on monopoly operators because of the extensive use of competitive tendering, we now see a growing interest in the use of performance- and output-based contracting as an alternative to competitive tendering. By combining different forms of procurement strategies, local authorities can maintain both the basis for competition and the overall long-term objective of maximizing the social surplus of public transport services.

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Notes

1. This article is a revised version of a paper presented at the European Transport Conference in Strasbourg, October 2005.
2. The Norwegian consumer price index presented by Statistics Norway (www.ssb.no) has increased by 31 % from 1991 to 2004. During the same time-period, the cost indexes for operation and maintenance, fuel and vehicle purchase have increased by 58 %, 144 % and 22 %, respectively. The index for wages in the transport industry is available from 1998 and increased by 34 % to 2004. During the same time-period the consumer price index increased by 13 %.
3. The public procurement of bus services was about 270 million vehicle-kilometres in 1991 and about 261 million vehicle-kilometres in 2004.
4. Estimations using a quadratic function gave higher R^2 but reduced model- and variable significance compared to the linear model.
5. For details about homoskedasticity see e.g. Wooldridge (2006) and for practical application of the Breusch-Pagan/Cook-Weisberg test in Stata see e.g. Baum (2006).

Table Captions

Table 1 Size distribution (vehicle-kms) of the bus companies receiving public subsidies in 1991 and 2004.

Table 2 Number of bus companies in different counties in Norway in 1991 and 2004.

Table 3 The distribution of companies in the Norwegian bus industry in 1991 and 2004 with respect to ownership.

Table 4 Concentration ratio (C_n) for the n largest companies in the Norwegian bus industry in 1991 and 2004.

Figure Captions

Figure 1 Share of the Norwegian subsidised bus services for tendered contracts in 2004.

Figure 2 Relationship between regulatory changes and structural changes in the Norwegian bus industry.

Figure 3 Lorenz diagram for the Norwegian bus industry in 1991 and 2004.

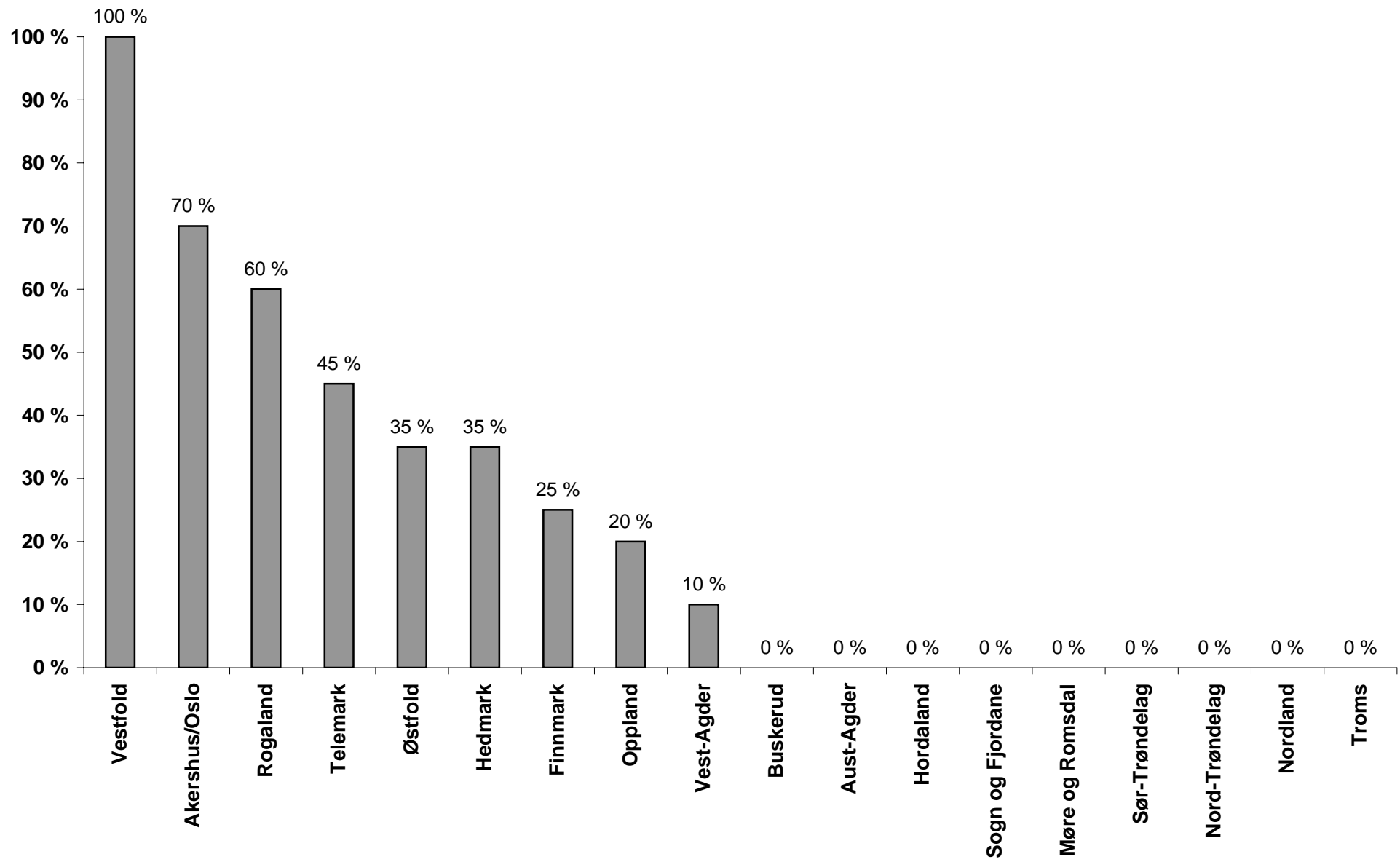
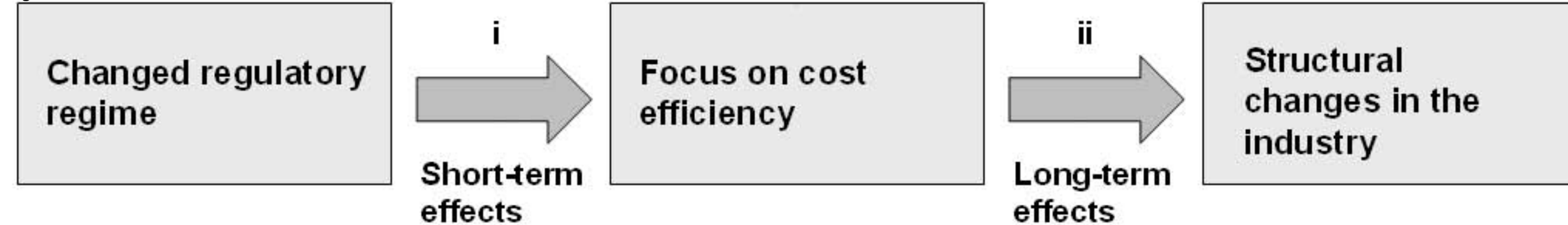


Figure 2



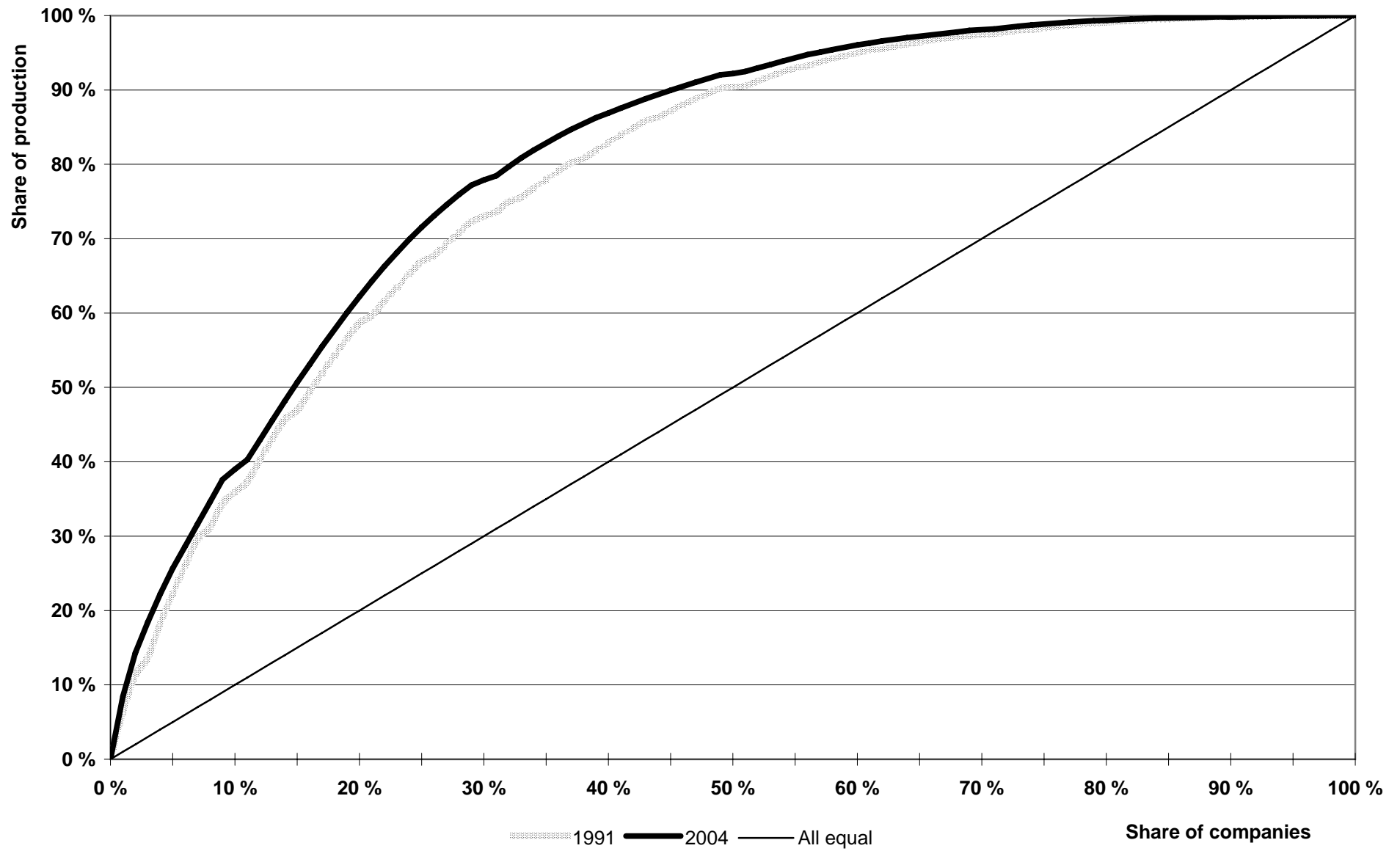


Table 1

	1991	2004
Mean	1 563 000	2 752 000
Median	920 000	1 200 000
Share of small companies^{a)}	40 % (69)	36 % (34)

^a Companies with a yearly production of less than 500 000 vehicle-kms is defined as small.

Table 2

<i>County</i>	<i>Companies with central office in the county</i>				<i>Bus operators within the county in 2004</i>
	<i>1991</i>	<i>2004</i>	<i>Change</i>		
			<i>Number</i>	<i>Percent</i>	
Østfold	11	5	-6	-55 %	6
Akershus/Oslo	11	5	-6	-55 %	6
Hedmark	8	2	-6	-75 %	5
Oppland	13	7	-6	-46 %	11
Buskerud	11	7	-4	-36 %	6
Vestfold	11	0	-11	-100 %	2
Telemark	12	8	-4	-33 %	9
Aust-Agder	6	6	0	0 %	7
Vest-Agder	4	3	-1	-25 %	4
Rogaland	15	12	-3	-20 %	11
Hordaland	13	6	-7	-54 %	5
Sogn og Fjordane	6	4	-2	-33 %	4
Møre og Romsdal	17	9	-8	-47 %	10
Sør-Trøndelag	6	5	-1	-17 %	6
Nord- Trøndelag	13	4	-9	-69 %	5
Nordland	11	8	-3	-27 %	7
Troms	4	3	-1	-25 %	4
Finnmark	1	1	0	0 %	1
Total	173	95	78	-45 %	

Table 3

Type of ownership	1991		2004		Change		
	Number	Share	Number	Share	Number	Percent	
Private	Non-foreign	132	76 %	54	57 %	-78	-59 %
	Foreign	0	0 %	5	5 %	5	NA
Total private companies		132	76 %	59	62 %	-73	-55 %
Public	State	9	5 %	17	18 %	8	89 %
	Local public	32	19 %	19	20 %	-13	-41 %
Total public companies		41	24 %	36	38 %	-5	-12 %
Bus industry as a whole		173	100 %	95	100 %	-78	-45 %

Table 4

n	Cn 1991		Cn 2004	
	Companies	Groups	Companies	Groups
3	0,09	0,13	0,18	0,48
5	0,14	0,18	0,26	0,60
8	0,20	0,25	0,35	0,75