

GOVERNMENT-ASSISTED OLIGOPOLY COORDINATION? A CONCRETE CASE*

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In 1993 the Danish antitrust authority decided to gather and publish firm-specific transactions prices for two grades of ready-mixed concrete in three regions of Denmark. Following initial publication, average prices of reported grades increased by 15-20 percent within one year. We investigate whether this was due to a business upturn and/or capacity constraints, but argue that these seem to have little explanatory power. We conclude that a better explanation is that publication of prices allowed firms to reduce the intensity of oligopoly price competition and, hence, led to increased prices contrary to the aim of the authority.

I. INTRODUCTION

In October 1993 the Danish antitrust authority, the Competition Council (CC in the following), decided to gather and regularly publish statistics on transactions prices of individual firms for two grades of ready-mixed concrete in three regions of Denmark. The intervention by the CC was based on The Competition Act of 1990. According to Article 1, "The purpose of this Act is to promote competition and, thus, strengthen the efficiency of production and distribution of goods and services, etc., through the largest possible *transparency* of competitive conditions and through measures against restraints on the freedom of trade and other harmful aspects of anti-competitive practices" (our translation and emphasis).¹ In the interpretation of the Act by the CC, any suspected abuse of dominant position, e.g. through oligopoly collusion, coordination or price discrimination, should be countered by measures to increase

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¹The Act is based on a principle of *abuse-control*, contrary to antitrust legislation in both the US and the EU which is based on a principle of prohibition. A pure principle of abuse-control means that there are no *per se* prohibitions on conduct and agreements. However, following a complaint or on its own initiative the authority can intervene. Orders to cease-and-desist can be issued and agreements can be declared null and void following an assessment of a given case on its merits (rule of reason).

market transparency.² Thus, the general premise of Danish antitrust policy seems to have been that easing the flow of firm-specific price information always improves the possibilities for potential customers to shop around for bargain-prices and thereby put pressure on oligopolists to lower their prices.

However, following initial publication, average prices of the reported grades of concrete increased by 15–20 percent within less than a year as compared to annual inflation rates of a mere 1–2 percent. Furthermore, the data reveal that, at least locally, the prices converged significantly across firms serving the same market. We investigate whether these phenomena may be due to a business upturn and/or capacity constraints in the concrete industry, but argue that these seem to have little explanatory power. Instead, we argue that the change in information structure resulting from the publication of firm-specific prices allowed firms to reduce the intensity of oligopoly competition and, hence, led to increased prices. In Albæk, Møllgaard and Overgaard [1996] we have discussed the logic and historic roots of The Competition Act of 1990. We argue *inter alia* that basing the Act on the so-called *transparency principle* seems rather misguided in light of the industrial organization literature. At least since Stigler's [1964] seminal article, this literature has stressed the importance for (tacitly) colluding oligopolists of observing firm-specific transactions prices of their rivals and rapidly detecting changes in these. Otherwise, collusion is prone to break down.³ Pursuant to this, it has become widely accepted that secret discounts and price-shading are natural (if not essential) features of an effectively competitive oligopoly. In this paper we shall try to convince the reader that the application of the Danish Competition Act of 1990 to the ready-mixed concrete industry quite likely produced results that were contrary to the intentions of the CC. That the intervention was ill-suited to lower prices seems to have been acknowledged by now: Towards the end of 1996 the CC stopped the publication of concrete prices.⁴

The rest of the paper is organized as follows: Section II presents the case, including a brief description of the Danish ready-mixed concrete industry, the intervention by the CC, and the data collected and published by the CC. In Section III we outline various hypotheses to explain the

² We believe this interpretation to be fully in line with the intention of law-makers. In the government white-book on competition policy leading to the 1990 legislation there is a long chapter on the virtues of increasing market transparency, with no mention of any adverse effects of increased observability, see Ministry of Industry [1986, ch. 6].

³ For more recent formalizations of these ideas see e.g. Tirole [1988].

⁴ Cf. CC [1996]. According to this official source, the reason that the price reporting and subsequent publication were brought to a halt was that "... even though a certain convergence between the list price and the actual price had occurred since January 1994, this convergence ... has been brought about solely by an increase in the actual price ... " (p. 661, our translation).

price movements and provide our interpretation of the data. Section IV concludes with a discussion of the limitations of this study.

II. A CONCRETE CASE⁵

Before moving to the possible explanations of the price movements following the publication of concrete prices, we briefly describe the nature of the Danish ready-mixed concrete industry, detail the intervention of the CC and summarize the subsequent data collected.

II(i). *The products*

Ready-mixed concrete is a mixture of cement, gravel, sand and water. The strength of the concrete increases with the content of cement compared to the other components. Hence, concrete comes in different grades depending on the strength and on the time it takes the mixture to harden. The strength of concrete is usually measured with Mega-Pascal as the unit (MPa in the following). Concrete of a particular grade is a homogeneous good. Different grades are imperfect substitutes and, thus, compete with one another. A purchaser may also consider to purchase the ingredients and mix the concrete on location using a concrete mixer.

This study focuses on two standard grades of concrete, both selected by the CC; a weaker type (10 MPa), which may be used for the foundation in single-family residential construction, and a stronger type (25 MPa), which is typically used for staircases, etc.

The ready-mixed concrete is transported from the factory to the purchaser in a mixer lorry with a revolving mixing drum that contains at most six cubic metres. Concrete can only be kept in a mixer lorry for about two hours after the mixing, unless additives that delay hardening are mixed in. These features of the product and the distribution technology imply that, under normal conditions, concrete is transported at most, say, twenty miles from the production site, see Green [1985, p. 173]. Hence, a supplier can only serve a geographically rather small area.

II(ii). *The competitors*

In total there are 115 ready-mixed concrete production sites in Denmark. The two main producers of concrete are *Unicon*, which is owned by the only Danish producer of cement, and *4K*. These two firms own sites scattered across the country. The rest of the production capacity is made up of independent, local firms.

⁵ A more detailed account can be found in Albæk, Møllgaard and Overgaard [1997].

Concentration is high in this industry. According to the latest official statistics, in 1987 the nationwide four-firm concentration ratio (CR_4) was 57%.⁶ *Unicon* had a share of 37% and *4K* a share of 11%. But only two years later, *Unicon's* market share rose to 43% mostly because it acquired the third-largest company. If anything, concentration (as measured by national market shares) has further increased since then. However, due to the distribution technology and transportation costs, the relevant market for a particular production facility is clearly not the country as a whole. If, instead, the relevant market is defined narrowly by a radius of 20 km (12.5 miles) around the production site, many local markets are monopolistic, and the nationwide average market share of the largest firm is about 70% (according to the 1987 figures). Typically, less than 5 production sites can serve a given potential customer.

II(iii). *The intervention*

Historically, price-setting behaviour in the Danish ready-mixed concrete industry has been characterized by a combination of rigid and publicly posted list prices and by considerable individualized and confidential discounts. This has led some industry observers and antitrust authorities to suggest that pricing behaviour in the industry is not sufficiently competitive due to lack of market *transparency*. Thus, in October of 1993 the CC decided to sample actual invoice prices from 18 production sites and publish this information in its official newsletter. It was indicated that prices were to be published, roughly, once every quarter. The CC hoped that publishing such firm-specific price information would improve information on the buyer side (that is, mainly among building contractors) whereby seller competition would be stimulated and average transactions prices pushed down.

II(iv). *The data*

For the two sampled grades of concrete, prices were gathered from selected firms in three regions: I) Copenhagen (in and around the Capital); II) Aarhus (in and around the second largest city); and III) Northern Jutland. In total, prices from 18 sites were sampled; 7 in Region I, 6 in Region II, and 5 in Region III. In the following we shall refer to these production sites as firms, even though the largest firms were sampled at several locations. For each firm the CC published the list price, the average price, and the average of the five lowest prices in the first month of a quarter. Below we shall refer to these as *list*, *average* and *low* prices,

⁶ See Monopoly Control Authority [1989]. This is the latest comprehensive study of markets for concrete products which is publicly available.

respectively. Typically, prices were published with a three month lag. The data cover the four quarters of 1994 and the first three quarters of 1995.⁷ They show that the list prices of the two dominating firms were almost identical in each region. Typically, the two dominating firms set the highest list prices but also gave the largest discounts.

During the sample period, the average *discount* observed was 25–26% of the list prices for 10 MPa and 27–31% for 25 MPa. Relative discounts were smaller in Region III than in the other two regions. Maximum discounts ranged from 25% in Region III to 38% in Region II.

The most important data are summarized in Fig. 1. The figure shows the national price indices for the average transactions prices of the two grades of concrete selected by the CC.⁸ These prices rose significantly over the first 2–3 quarters of 1994. The (weighted) average increase over the two grades sampled was 19% from January to October of 1994 according to the reports of the CC (see CC (1994/95)). Since October 1994, these average prices have, more or less, levelled off. Fig. 1 also plots the unit value of all types of concrete produced in plants with more than five employees together with the unit value of cement, which is the single-most important raw material in ready-mixed concrete.⁹

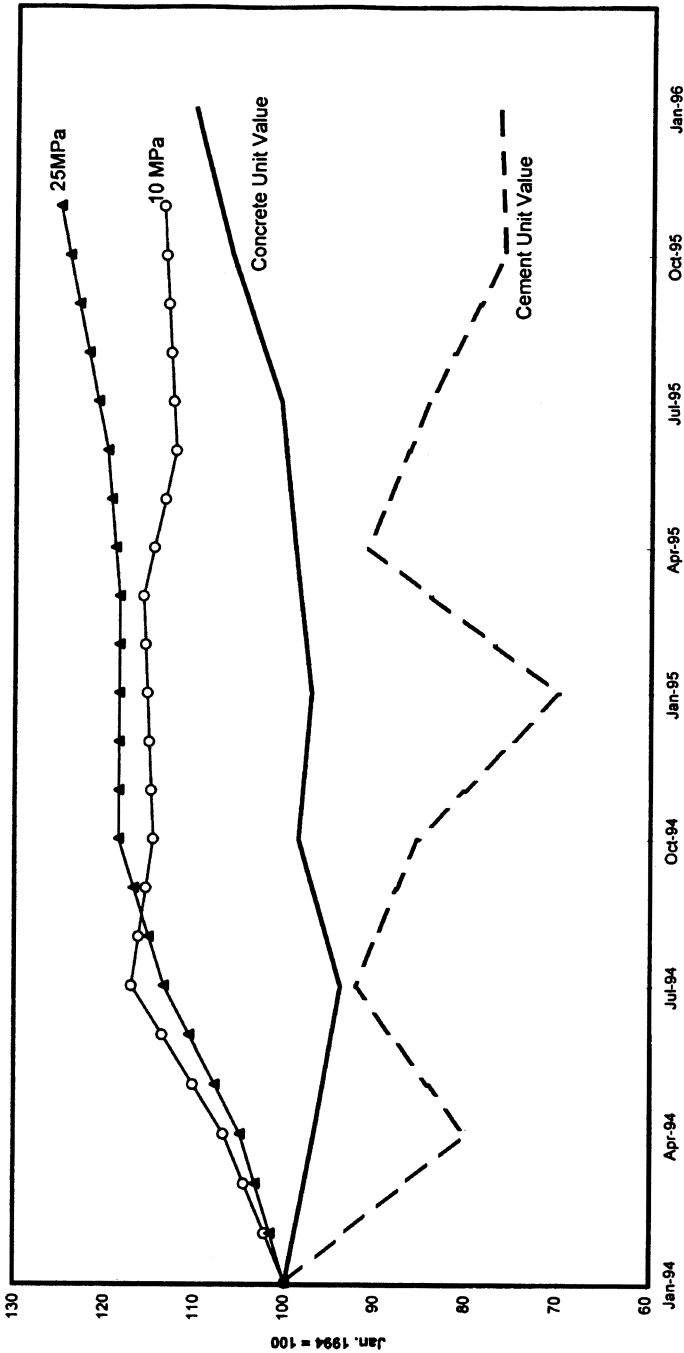
Evidently the indices of the reported prices are out of line both with the industry average and with cement prices. Furthermore, other related aggregates also showed a much more modest movement in the first three quarters of 1994: Consumer prices rose by 1.9%, wholesale prices by 1.6%, and the price index for imported, unprocessed raw materials by 1.1%. In addition, a national index for residential construction costs exhibited almost no movement during this period.

Another notable feature of the price movements following the initial publication is a tendency for the prices of different firms serving a given geographical market to converge to the same level. This is most clearly seen in Region II, which we study in more detail in the next section (cf. Fig. 2–3 below).

⁷The latest publication of prices was made in April 1996, and concerned data for November 1995. According to official sources, since then data has been collected for the two largest firms (*Unicon* and *4K*), but these have not been made public. In December 1996, the CC officially decided to make no further publications. This leaves us with 7 data points for the 18 firms sampled.

⁸Hence, Fig. 1 shows weighted averages of the average firm-specific prices reported. Firms are weighted by their share of turnover in the sample.

⁹The *unit value* is an average price per m³ of all grades of concrete (cement). In Fig. 1, the unit values reported are calculated from quarterly data and to facilitate comparisons the observations of these indices are placed in the first month of the relevant quarter throughout the period of observation.



Source: Unit Values: Danmarks Statistik Varestatistik for Industrien, Various Issues; 10 and 25 MPa: CC 1994/95.

Figure 1
National Price Indices

III. INTERPRETATIONS

Given the data presented above, there are two main features in need of an interpretation. First, contrary to the aim of the CC, the *reported prices rose sharply in the space of a few quarters and then settled at a higher level*. Secondly, during this process there is an indication that (locally) *prices have converged significantly across firms*. In the following we mainly focus on Region II for reasons that will be explained shortly. But before we do so, let us briefly outline a theoretical framework.

In the previous section it was emphasized that prices seem to be the object of short-term strategic maneuvering among the firms, in as much as secret, individualized discounts were widespread and sizable at the time the authority decided to intervene. Secondly, while concrete of a particular grade is a homogeneous product, the geographical dispersion of firms and the transportation costs differentiate the sources of supply from the point of view of individual customers. Thirdly, it might be conjectured that orders are somewhat lumpy in this industry, since construction projects are highly variable in size. Finally, since entry and exit are rare in this industry, it can safely be assumed that the set of firms serving a given market remains unchanged for the entire sample period. Hence, the active firms are engaged in repeated interaction. These features of the industry suggest that a Bertrand-Edgeworth-style model of price competition with possible capacity constraints might serve as a sensible reference point for the discussion when the dynamic nature of the competition is suitably accounted for (see e.g. Tirole [1988]).

III(i). *Business upturn and capacity constraints*

In the context of a price-setting oligopoly with possible capacity constraints, prices could be driven up by either an increase in demand, an exogenous cut in capacity, or an increase in input prices. We briefly consider these in turn.

Construction activity and employment is an indicator of the demand for concrete. A strong nationwide recession in construction bottomed out in the summer of 1993. By February 1994 employment was back at the low level of 1992, and by November 1994 seasonally adjusted employment had risen 4.4% while unadjusted employment had risen 17.6%. This indicates that an upturn within construction was indeed occurring, and that the demand for ready-mixed concrete may have rebounded somewhat. The question then is whether this caused capacity to be a binding constraint that might explain the rise in concrete prices.

At the end of 1993 production of ready-mixed concrete was at the same low level of production as in a trough ten years earlier. During 1994 production rebounded, but certainly not by unprecedented amounts. In

1994 total production was almost 20% higher than in 1993, but still below the level of 1991. It thus seems unlikely that there should have been capacity constraints in production during 1994.

This point is reinforced by the CC's predecessor, the Monopoly Control Authority's [1989, p. 38] account of capacity utilization: In 1987, when production peaked at a level more than 50% higher than that of 1994, capacity utilization in production was estimated at about 41% while capacity utilization in distribution was 62% on average. According to our information, productive capacity has not been significantly reduced since these estimates were made. Thus, rather than productive capacity, distributional capacity seems to be the hypothetically binding constraint. Distributional capacity is basically limited by the number of mixer lorries; hence, the national capacity could arguably easily be increased by importing new lorries (or turning multi-purpose lorries into mixer lorries). Local capacity constraints could be dealt with by "importing" lorries from regions in which capacity constraints are non-binding. This should be particularly easy for the larger firms that operate in most regions. This suggests that capacity constraints are unlikely to contribute much to the explanation of the sharp increase in price around the middle of 1994.

Turning to input prices as a possible explanation we note that wages and energy prices were at a virtual standstill from 1993 to 1994. As far as the price of cement is concerned we refer the reader to Fig. 1 which hardly suggests that this cost component could have put much upward pressure on the price of concrete during 1994. Recall that the only Danish producer of cement owns the largest national producer of ready-mixed concrete (*Unicon*). This cement supplier has historically enjoyed a fairly sheltered position in the Danish market with only weak competition from imports, and offers uniform delivered prices to all producers of ready-mixed concrete, see Johansen [1989] p. 58. This, paired with the fall in the cement price, would seem to be rather hard to reconcile with any business-cycle explanation of the surge in the reported concrete prices.

Taken together these comments make it unlikely that a static Bertrand-Edgeworth set-up will be able to explain much of the upward shift in the average reported concrete prices for the nation as a whole.

III(ii). *Dynamic oligopoly coordination*

To get a micro-perspective we now focus on the development in Region II around Aarhus. Before presenting the details we provide a few remarks to motivate the focus on this particular subsample. First of all, the 6 firms selected in Region II account for approximately 70% of the weight in the national price indices reported in Fig. 1 (CC, 1996 (private communication)), whereas the remaining 12 firms pick up only 30%. Secondly, the raw data released by the CC show that the price increases in Regions I and

III have been much more moderate than in Region II. This is hardly surprising: Region I (Copenhagen) is quite large and densely populated, and only half of the region's production sites are in the sample. We would therefore expect the publications by the CC to have a smaller impact in Copenhagen than in Aarhus (Region II), where the plants in the data have a combined market share close to one, if attention is restricted to the local area of the city of Aarhus (see below). Region III (Northern Jutland) is a much less densely populated area than the other two regions. None of the sampled firms are very close neighbours, and under a narrow market definition it might be argued that they are local monopolies in small markets suggesting that the change in the structure of information should be of only marginal importance for price setting.¹⁰

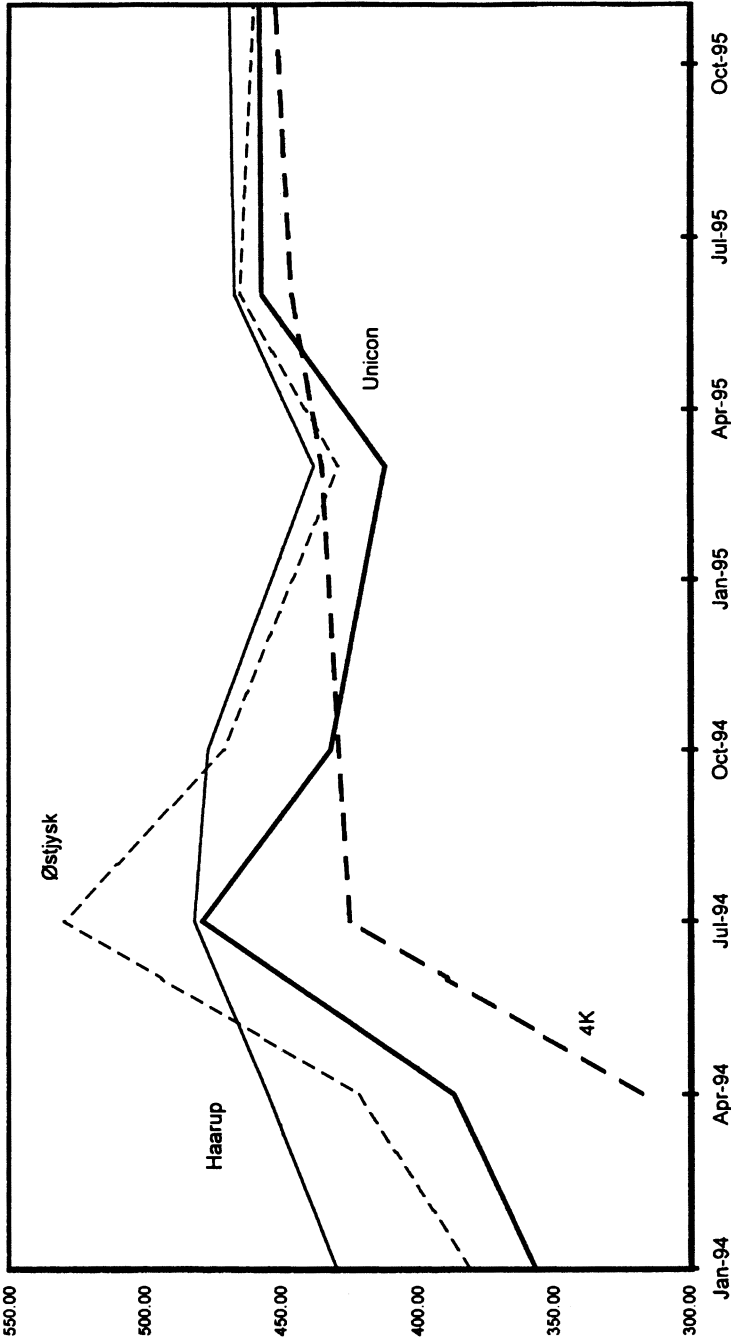
In Region II, we focus on the market close to the city of Aarhus. This leads us to exclude two of the six firms: One independent, local firm is situated more than 60 kilometres (about 40 miles) north-east of Aarhus at the extreme of a peninsula, and would hardly be competing for customers with the plants in Aarhus. The other is about 40 kilometres (25 miles) north of Aarhus in the town of Randers. It is owned by *Unicon*, which also has facilities in Aarhus, and is, thus, unlikely to compete vigorously for the Aarhus market. Two of the remaining four facilities are owned by *4K* and *Unicon*, respectively, and are located about 2 kilometres apart within the city of Aarhus. Two local producers have common ownership, and are located in towns outside Aarhus at a distance of 25 kilometres south-west and 40 kilometres west, respectively. At this point it should be added that one local competitor located near Aarhus does not appear in the sample selected by the CC. However, the firms included in our sample have a combined market share around Aarhus fairly close to one.

The reported prices of the remaining four facilities are presented for 10 MPa in Figs. 2–3.¹¹ These facilities account for about 60% of the weight in the indices reported in Fig. 1.

From January to April of 1994, the low prices of all four firms may (very) roughly be said to be constant, while average prices rose a bit. In contrast, from April to July prices shot up by 20–25%. Since then prices have more or less settled at the new level. This suggests that the observed price change may be described as a one-shot jump in response to an exogenous change in the structure of information available to firms. To explain why this jump occurred with a certain lag, we would suggest that the data reported for January and April 1994 relate to the competitive

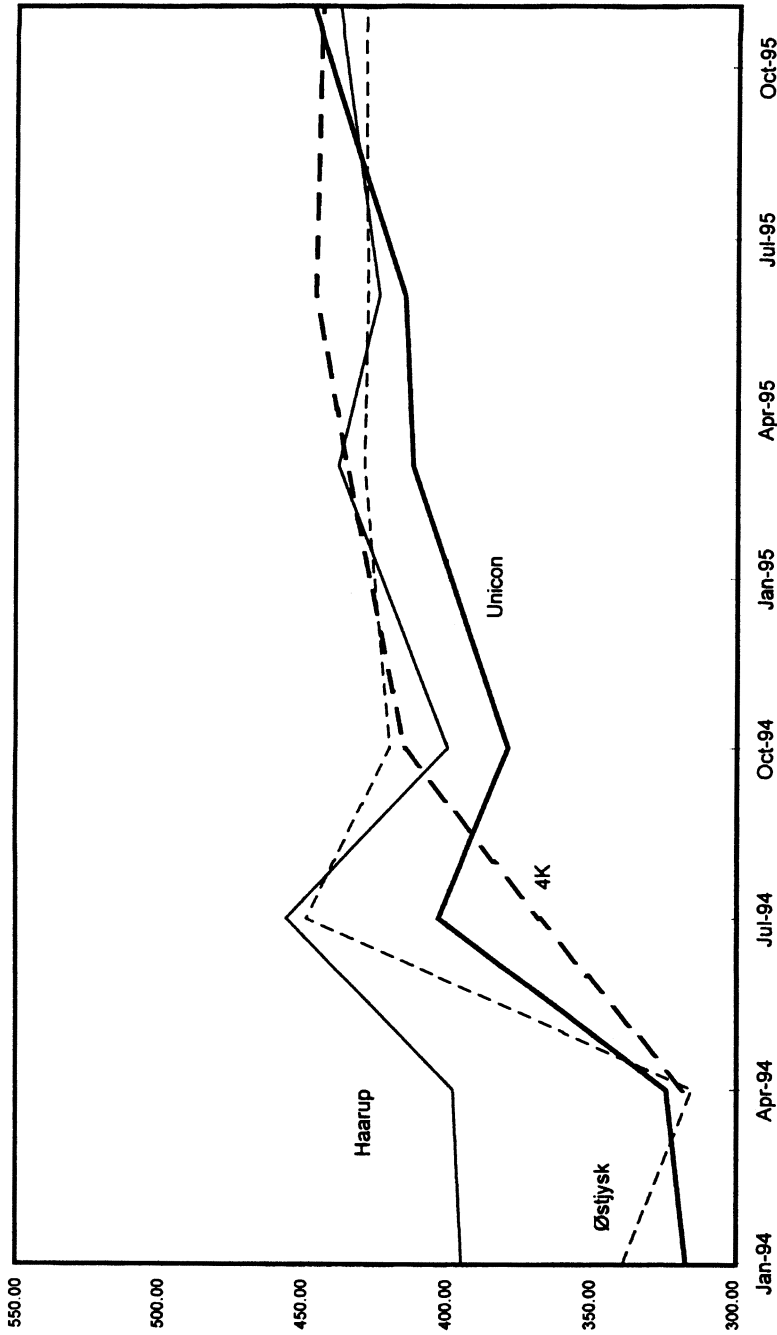
¹⁰ That firms may be local monopolies is also suggested by the fact that the discounts were smaller at the outset in this region.

¹¹ Similar results are obtained for 25 MPa. Figures corresponding to 2 and 3 can be found, alongside with other supplementary statistical material, on the journal's web site (<http://haas.berkeley.edu/~jindec>).



Source: CC 1994/95

Figure 2
Low 10-MPa Prices in Aarhus



Source: CC 1994/95

Figure 3
Low 10-MPa Prices in Aarthus

situation *before* the shift in informational regime kicked in, whereas the observations from July 1994 and onwards relate to the competitive situation *after* the regime-shift. The January data were released on April 8, 1994, in the official CC newsletter, and it follows that transactions prices in April could, at best, *partly* reflect information on January prices. It is obviously uncertain how fast the information is disseminated once made public. Whether prices went up or down in April may thus reflect the degree to which firms had relatively large orders in the beginning of the month of April. Also, contracts for future delivery made previously may be reflected in some of the reported invoice prices. The pattern observed for 10 MPa of constant low prices and moderately increasing average prices is certainly consistent with a partial adjustment to the new information structure. The adjustment would be expected to be completed in July, when the data for April were made public already on the 5th (see CC, [1994b]). By that time competing firms thus had reliable information spanning two quarters on the previously secret discounts. At least the observations for January should be completely disseminated.

The figures also clearly reveal that, by the time of the latest reported prices, the prices of the four firms are more or less aligned. This is true for both 10 and 25 MPa concrete and for both the low prices and the average prices. In fact, for all four measures the price variation across firms is down to about 2–4% around the mean, as opposed to variations of up to 30% around the mean in the early part of the sample period. In addition, it is notable that the low prices have rapidly approached the average prices from below, that is, the largest discounts have been abandoned.

In our opinion, except for reduced intensity of competition following the publication of previously secret discounts,¹² there seems to be no immediate explanation why the prices of ready-mixed concrete should rise, in the space of a few quarters, by 25% in tandem for two major producers that are located (almost) as closely as is possible. In particular, there was no particularly strong local business upturn,¹³ and input prices (i.e. wages and prices of raw materials) remained more or less constant, or, in the case of cement—the most important raw material—fell.

¹²The reader may wonder why a trade association could not have performed the information service supplied by the CC. In private communication, the trade association (Dansk Fabriksbetonforening) has stressed that it does not get reports from the members regarding sales prices on ready-mixed concrete. We believe there are two main reasons for this. First, such reports may not be credible without a costly monitoring system. If members have an incentive to give secret discounts they also have an incentive to misreport prices. Second, the CC would likely take a dim view against price reporting practices carried out by the industry.

¹³We have compared the ratio of local construction employment to total construction employment, and the number of started square metres in Aarhus to the total number of started square metres in Denmark. For more details on this, see Albæk, Møllgaard and Overgaard [1997].

In contrast, we would argue that the evidence presented suggest that a strategic model of dynamic oligopoly with an exogenous change in the structure of information could explain the price movements in this region. Such a model would be able to track the jump in prices, as well as the convergence to a uniform standard.

We believe that the evidence presented in this paper indicates that the Danish Competition Council, by providing reliable price reporting services, has unwittingly assisted firms in reducing the intensity of competition and thereby allowed them to increase prices. Hence, this paper suggests that the potential for improved information flows to conflict with the efficient performance of markets is more than an artefact of sophisticated theorizing, as some antitrust practitioners might be inclined to argue. Another piece of evidence in support of this is provided by Fuller, Ruppel and Bessler [1990] and Schmitz and Fuller [1995]. These authors have studied the effects of contract disclosure legislation passed by the US Congress on US railroad freight rates. They conclude that rates have increased as a direct result of the improved scope for (tacit) collusion following the mandated disclosure of firm-specific contract terms.

IV. CONCLUDING REMARKS

The arguments presented above would obviously be more convincing had they been based on a larger or better data set. Ideally, the sample data should have been compared with either data from other regions where price statistics were not published or with prices in the three regions prior to the new publication practice of the CC. The first type of data is not publicly available, and we do not, in fact, know whether they exist. The CC does have some data prior to January 1994 but has declined us access to these data since they were not sampled with the purpose of publication in mind. Furthermore, we do not have any direct firm-specific information on costs and capacities, precluding analysis of the profitability of different oligopoly strategies as carried out by Rees [1993]. Unfortunately, we are therefore left with the data published by the CC and used in this paper.

As a final remark, we reiterate that the CC decided to halt any further publication of concrete prices in December 1996. Furthermore, radically changed antitrust legislation was passed by the Danish Parliament on May 30, 1997. From the perspective of the present paper, the most significant change is that under the new antitrust regime emphasis is no longer on the creation of market transparency.

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REFERENCES

- Albæk, S., Møllgaard, H. P. and Overgaard, P. B., 1996, 'Law-Assisted Collusion? The Transparency Principle in the Danish Competition Act', *European Competition Law Review*, 17: 339–343.
- Albæk, S., Møllgaard, H. P. and Overgaard, P. B., 1997, 'Government-Assisted Oligopoly Coordination? A Concrete Case', Working Paper 97-03, Centre for Industrial Economics, University of Copenhagen.

- Competition Council, 1994a, Gennemsigtighed om prisfastsættelsen på fabriksbeton (Transparency in the Formation of Ready-Mixed Concrete Prices), *KonkurrenceNyt* 4.
- Competition Council, 1994b, Priser og rabatter på fabriksbeton (Prices and Discounts on Ready-Mixed Concrete) *KonkurrenceNyt* 9.
- Competition Council, 1994/95, Priser og rabatter på fabriksbeton (Prices and Discounts on Ready-Mixed Concrete), *Reports*, 1994 (January, April, July, October) and 1995 (March, June, November), Copenhagen.
- Competition Council, 1996, *Dokumentation 1996-4*, Copenhagen.
- Fuller, S. W., Ruppel, F. J. and Bessler, D. A., 1990, 'Effect of Contract Disclosure on Price: Railroad Grain Contracting in the Plains', *Western Journal of Agricultural Economics*, 15: 265–271.
- Green, C., 1985, *Canadian Industrial Organization and Policy*, McGraw Hill Ryerson Ltd., Toronto.
- Johansen, H. C., 1989, *Gennem Forandring til Fremskridt: Aalborg Portlands udvikling 1972–89* (Advance through Change: The Development of Aalborg Portland 1972–89), Anton M. Jensen, Aalborg.
- Ministry of Industry, 1986, *Fra monopollov til konkurrencelov* (From Monopoly Act to Competition Act), Betænkning nr. 1075, Copenhagen.
- Monopoly Control Authority, 1979, *Monopoltilsynets Meddelelser*, Copenhagen.
- Monopoly Control Authority, 1989, *Markedet for betonprodukter* (The Market for Concrete Products), Redegørelse fra Monopoltilsynet, Copenhagen.
- Rees, R., 1993, 'Collusive Equilibrium in the Great Salt Duopoly', *Economic Journal*, 103: 833–848.
- Schmitz, J. and Fuller, S. W., 1995, 'Effect of Contract Disclosure on Railroad Grain Rates: An Analysis of Corn Belt Corridors', *Logistics and Transportation Review*, 31–2: 97–124.
- Stigler, G., 1964, 'A Theory of Oligopoly', *Journal of Political Economy*, 72: 44–61.
- Tirole, J., 1988, *The Theory of Industrial Organization*, MIT Press.