

On the alleged invisibility of the Dutch construction cartels

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Summary

The motivation of this paper is the fact that an extensive contamination of markets in the Dutch construction sector was not detected beforehand or afterwards by a number of empirical studies. Due to a leniency tsunami of 486 leniency applicants, however, overwhelming legal evidence exists that bid rigging was rather the norm in this sector. We discuss this case because of its exceptional nature and because we are interested to find out whether the type II errors of the methodologies that were applied (i.e. non-detected violations of competition laws) justify the conclusion that forensic economics is useless if not impossible. In order to shed some light on this question we review the Dutch literature focusing on alternative methodologies. Based on the case study of the Dutch construction sector we draw some general conclusions and argue theoretical and empirical economic insights clearly create value for antitrust authorities.

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I. Introduction

Since the turn of the century it has become fully clear that bid-rigging has been widespread in the Dutch construction sector. Following the appearance of a whistle blower in November 2001 on Dutch television, a parliamentary hearing committee uncovered wide spread fraudulent behaviour that had contaminated the whole Dutch construction sector. In 2004, skilfully using stick and carrot, the minister of Economic Affairs and the Director-general of the Dutch competition authority NMa managed to create a tsunami of 486 leniency applicants.

Traditional investigative instruments of antitrust and merger control, however, had been impotent. Inside informants (e.g. a whistleblower with a cd-rom containing bid rigging data) and on site investigations in January 1999 provided “soft indications” of meetings but no legal evidence of hard core cartel activities and thus these trails were abandoned by the antitrust authorities. Importantly, a number of forensic economic investigations *avant la lettre* (to be discussed in section II) did not recognize the competition problems in the Dutch construction sector. The motivation of this paper is thus the fact that the extensive contamination of markets in an important sector of the Dutch economy was not detected beforehand or afterwards by a number of recent empirical studies. Indeed a relevant question is whether these type II errors justify the conclusion that economic detection is too difficult if not futile. Did the existing detection methods indeed not detect the construction fraud? If not, why not? Is there a need for more refined methods? Or is the exercise futile anyways? Were the tests to blame, or those that did not do anything with the results? Why were methods that appeared to work (and their results) ignored? These questions make up for the theme of this paper. We will discuss findings and review alternative methodologies. Based on this review we conclude that theoretical and empirical economic insights will probably be vital in the new (hopefully “post bid-rigging”) phase in which the construction sector will have to be closely monitored. On a more general level the case study in this paper provides some guidance for the research design of economic detection in others sectors as well.

In section II we discuss briefly three economic investigations by professional economic institutes in order to explain why some observers have informally claimed that economic analysis does not add value in antitrust (at least not in detection of cartel behaviour). Sections III to V then discuss alternative methodologies that were able to distil economic evidence and clues from the available data sets. We start in section III with the analysis of the secret accounts that stood at the basis of the activities of the parliamentary

hearing committee. Section IV takes a closer look at semi-legal co-operation between building firms (so-called combinations) and section V discusses the measurement of hysteresis on the product markets that was pioneered in the Netherlands in the mid-1990s. Section VI draws some lessons for research design of forensic economics in general.

II. Type II errors in the economic analysis of the Dutch construction sector

During the years 2000-2002 three empirical studies by professional economists were published that were clearly wrong or inapt with respect to their findings regarding the state of competition in the Dutch construction sector. These studies were either unable to identify the (substantial risks of) breaches of competition laws or the impact of hard core activities (i.e. the price increasing effects).

A detailed study by EIM was commissioned by the Ministry of Economic Affairs and aimed at charting the risks that markets were distorted (this was to be evaluated from a consumer perspective).¹ The study was meant to give some guidance to policy makers that had to set priorities for economic policy and regulation and it was not intended for anti-trust *per se*. However, the results of the study were, of course, in the public domain and were reported and analysed in the Annual report of the Netherlands Competition Authority.² After reviewing a great many structure, conduct and performance characteristics in some hundred product groups, the EIM study actually concluded that the probability of non-functioning markets was *least* in the construction sector.

A second example of a study hampered by type II error is the large forensic investigation by PwC of 388 files related to procurement auctions in the Dutch construction sector over the years 1996-2001.³ This forensic investigation is the most intensive investigation of the Dutch construction sector to date as the team consisted of 24 investigators and 12 experts (actually this is even more manpower than the NMa could devote to its antitrust activities regarding this sector). The investigation was both detailed and broad in scope. Part of the PwC study focuses on the typical accountant issues of the completeness of the documentation and the exactness of the procedures, but also some economic meat is on the bones. The PwC team analysed a great many patterns of co-operation, bidding, winning, spreads of bidding prices and underlying costs. The sobering conclusion of the PwC study is that no analytical evidence could be provided even though legal evidence of misbehaviour was uncovered in a limited number of individual case files.

A third exemplary study is a detailed statistical study by SEO/TNO on price and cost developments in the construction sector. Here the methodology requires the identification of relatively homogeneous building products that are sold both in the public sector and the private sector. Next SEO/TNO attempts to its best abilities to explain price differences for different types of buyers on the basis of cost differences. Those cases where price differences could not be explained on the basis of costs were assumed to indicate the effects of breaches of competition law. The methodology that requires very much and very detailed data was only able to detect possible competition problems in the rather narrow segment of public sector office space where over the years 1990-2000 a 14% excess price level was detected.⁴

One particular reason for the apparent lack of success of these three studies is of course that industrial economics is a relatively new field in the Netherlands. Before 1996, empirical studies related to Dutch competition issues were hardly produced by academics (although hobby-academics amongst policy makers, like the present authors, published some studies in the international academic journals). Accordingly experience was scarce and this may have had a negative impact both at the level of commissioning the studies and at the level of doing the actual studies. Anyhow, the three studies also suffered from serious methodological flaws. The EIM study was a typical old fashioned structure conduct performance study that did not take the specific characteristics of public procurement into account and it did not reflect geographical and product characteristics of the relevant markets (actually the level of aggregation was simply too high as it treated construction as a national homogeneous market). Both the PwC and the SEO/TNO studies assume that bid-rigging and hard core cartel activities are exceptions (the SEO/TNO methodology actually assumes that only public sector buyers are victims of cartels). Moreover, these studies did not recognize that perceptions of competitive price levels can and will be influenced once cartels operate on a sufficiently large scale.⁵ The implication is that neither a clear bench mark nor a control group existed for these studies, thus actually preventing the statistical detection of illegal activities.

Obviously then the impression that economics has nothing to offer to antitrust and that forensic economics is a non viable field defunct of operational value is based on wrong economics and a distorted appreciation of the relative merits of the economic method. It would be too easy to only blame the competition policy makers. In our opinion the survival of faulty methodology also reflects academic disinterest in this issue.⁶ As yet economic interest in the competition problem in the Dutch construction sector has been rather uninformed and non empirical and it is, for example, telling that a large publicly available data set on bid-

rigging has not been used in academic research so far. We turn to the analysis of this data set in order to stimulate our academic colleagues to become more critical and a bit more inventive.

III. Smoking guns (distilling economic evidence from secret records)

In 2001 a Parliamentary Board of Enquiry held hearings on bid-rigging in the Dutch construction sector. As part of its report the Committee published a whistleblower's secret records as evidence of duplicate bookkeeping. These records detailed the roughly three thousand rigged bids in which one of the major Dutch firms had been involved over the years 1986-1998.⁷ The general validity of the data has been established through formal legal procedure and informally through cross references in other secret records that have been uncovered since 2001. The publication of these handwritten double bookkeeping accounts provided a unique and detailed account of the behaviour of bid-rigging firms. The analysis of this data set is vital for policy makers because, unlike in other countries, systematic econometric analysis of procurement auctions is still lacking in the Netherlands although the methodology was available (at least in the form of working papers) when the studies discussed in the previous section were commissioned (*cf.* Table 1).

Table 1 International studies on price setting fraud in the construction sector

<i>Study</i>	<i>Period</i>	<i>Estimated increase</i>
Bajari en Summers (2002)	1994-1998	6%
Lee en Hahn (2002)	1996-1998	14%-16%
Brannmann en Klein (1992)	1975-1980	18%

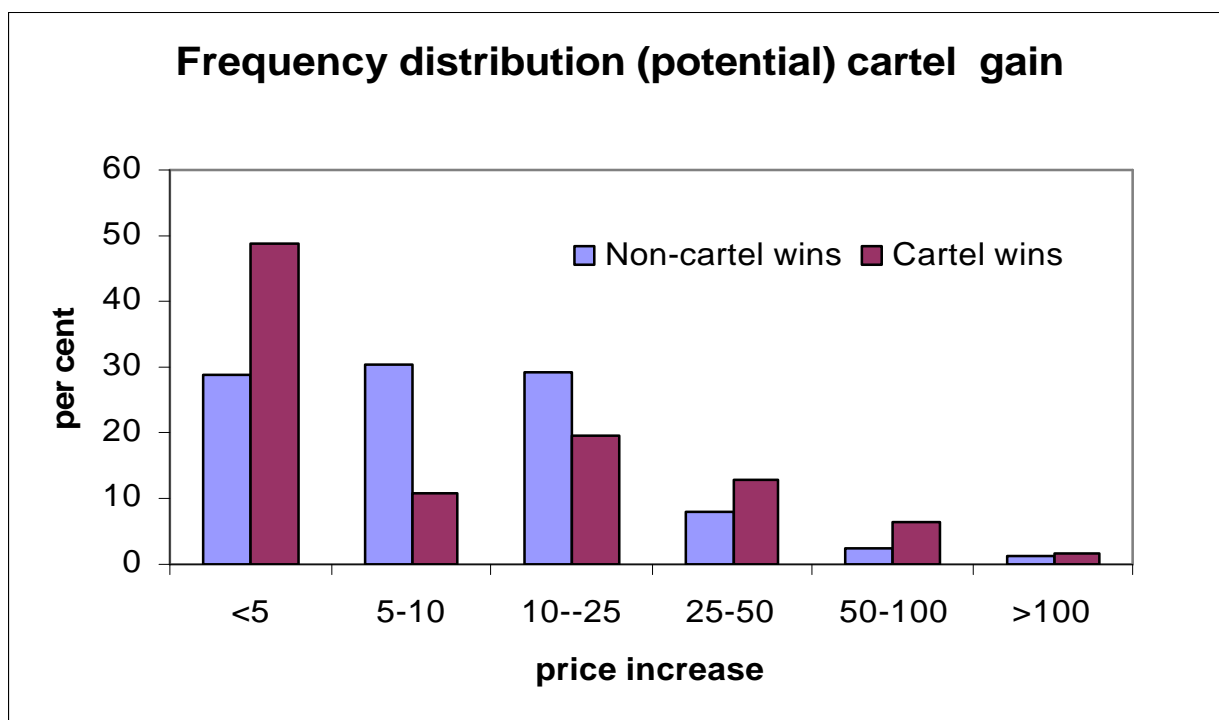
Sources P.Bajari en G. Summers, Detecting Collusion in Procurement Auctions, *Antitrust Law Journal* vol.70 (2002), 143-170 L.E. Brannmann en J.D. Klein, "The effectiveness and stability of highway bid-rigging" in: D.B. Audretsch en J.J. Siegfried (eds.), *Empirical Studies in Industrial Organisation*, 1992, blz. 61-75 I.K. Lee and K. Hahn, Bid-Rigging in Auctions for Korean Public Works Contracts and Potential Damage, *Review of Industrial Organization* vol 21 (2002),73-88

Since this data set is important and unique we pay a little bit more attention to its construction and to some of the basic descriptive statistics.⁸ The department of justice digitalized the original hand written secret accounts so that a set of eleven thousand unsorted plain text records resulted that had to be recoded before the data set could be processed. This required

the identification of projects essentially based on date of the auction and (if more than one auction occurred at the same date) either the project description or the postal code. Clearly measurement, typo's and coding errors are relevant for this manner of dataset. Moreover, coding of the records also involves judgement because the secret records had not been formulated in a consistent wording (the records actually contain two different types of handwriting). So consistency was also an issue when we transformed the digitalized textrecord into a data set that could be used in empirical analyses. It was decided early on to perform the coding pair-wise (but independently). The project manger checked whether the independent codes agreed, reviewed disagreements and made sure that the team was alerted on the right way of coding so that further disagreement could be minimized. In addition sample checks were done in which the final coding was compared with the original handwritten manuscript. Finally, cross references in other sources, original documents related to the auctions and open source material (such as Kamer van Koophandel data) were used to double check the dataset. In our opinion the digital version of the secret accounts offer a reliable description of the bid rigging in which this particular firm was involved.

The resulting data set is very rich as a great many personal observations were added to the straight forward bookkeeping. These personal observations offer many insights into the working of the cartels that operated in the Dutch construction sector. For failed attempts at bid rigging (1 in 8 attempts fails), all other bids in the auction have been recorded (as well as the identity of the bidders). The data set contains information about the number of firms that made up the cartel (one third of the cartels has 6 or more members), the mode in which cartel gains were settled (and, where appropriate, the amounts⁹), the kind of project (homes, offices, roads etc.), the characteristics of the buyer (90 per cent of the buyers is in the public sector) and even on persons actually involved in these criminal activities.¹⁰

Based on this data set, Figure 1 illustrates the impact of collusion and bid-rigging on the price level that appears to have been well in excess of the competitive level. Figure 1 summarizes two frequency distributions distinguishing between, on the one hand, cases in which the cartel failed (and here the competitive outsider that won the auction provides a useful benchmark for the competitive price level) and, on the other hand, cases where the cartel succeeded in its illegal bid-rigging activities (and here the side payments offer an indication of the price increase that was achieved). Independent of the mode of observation and of the success or failure of the cartel this figure shows that in 40% of the cases a price increase in excess of ten percent was either the result or the aim of the hard core cartel activities.¹¹



This is of course some sort of a snapshot only, as we look at the problem from the limited perspective of one particular firm that participated in a great many cartel agreements. The findings are, however, in conformity with both the international literature and the formal decisions by the Dutch competition authority (i.e. the legal basis for the fines that have been imposed) pertaining to five individual cases that were settled in December 2004 (Table 3). In the Dutch procedures this means that after a statement of objections (that was produced by the antitrust division) hearings have been held by the legal department and that after reviewing the evidence and considering all contra arguments facts have been established with sufficient certainty to base a judgement.

Case	Side payment (thousand euro)	Price increase*
3687	3	10
3692	10	8
3691	35	35
3690	50	14
3689	200	19
Unweighed Average	60	17

Source: NMa legal decisions

Obviously, the economic analysis of smoking guns, such as secret accounts, is not an instrument of detection (as the smoking gun has so to say already been detected by other, probably conventional, means), but the information that can be derived from such secret accounts often has potential if not direct applications in antitrust. Firstly, the findings help to put facts that are the basis for sanctions into perspective and provides a rough benchmark to see whether infringements have been serious or not. Therefore it is an important and relevant finding that the available national empirical studies agree on a 9 to 16 per cent price increase on average¹²). All in all it is clear that cartels did increase prices in the construction sector and this is relevant because it justifies the legal rule that effects in hard core cases such as bid rigging need no formal proof. Actually, the analysis corroborates the findings in Table 3 to some extent thus giving more credence to the facts established by the competition policy authority. Secondly, the perspective on the impact and seriousness of offences is relevant for setting priorities and for determining and reporting outcome of the competition authorities. It is relevant both in an ex ante sense (which cases to pick?) and in an ex post sense (did we pick the right the cases?). Thirdly, the econometric analyses of secret accounts can also be used to provide some guidance to antitrust on site investigators.¹³ A logit analysis of a subset of 1377 succeeded attempts to rig bids over the years 1986-1998 for which all necessary data were available shows that settlement through side payments (rather than bid rotation) is significantly more likely to occur for private sector buyers and for more complex projects.¹⁴ From the specific perspective of bid-rigging and public procurement our results may offer useful indications for detection by antitrust authorities. It is useful if one knows beforehand what type of evidence can be expected. Economic analysis thus may make the search for smoking guns more efficient.

IV. Combinations

The formation of combinations (*i.e.* project-related co-operation between two or more firms that act as one single participant in the procurement bidding process) offers an indirect channel for observing behaviour in the construction sector. The question of whether combinations are allowed under the law typically is based on (historic) data for turnover and market shares. In a nutshell: a combination is not illegal if the firms are sufficiently small vis-à-vis the construction project and the market as such. The assessment is done both by the procurement agency (which may be at the town level, at the regional level or at the national level) and by the building firms themselves (*i.e.* through self-assessment).¹⁵ An economic

detective may thus try to learn something about the occurrence or probability of unnoticed breaches regarding competition laws by observing and analysing the formation of combinations. The formation of combinations is a manner of formal co-operation which --- because of the fact that combinations unlike traditional hardcore cartels are not hidden and because of ambiguities in the regulations (*Besluit vrijstelling combinatievorming*) --- often is perceived as perfectly legal and non problematic. Because of the perceived general legality reporting on this phenomenon is less distorted than reports on traditional hard core cartels and thus the formation of combinations may be an important indicator for the occurrence of breaches of the law. Actually the Dutch competition authority started using combinations as such an indicator around the turn of the century.

A first example of the use of data on combinations is the investigation of the 100 largest construction projects auctioned by the Dutch government in the years 1998-2001 of which a good 60 per cent was won by combinations.¹⁶ One of the key findings of the econometric analyses was combination of on the one hand the existence of a positive and significant correlation between the formation of combination and the size of the construction project and on the other hand the absence of such a relationship between the number of firms in a combination and the size of the project. Indeed, it is noteworthy that even simple tabulations show that project size for two-firm-combinations on average exceeds project size for combinations of 3, 4 and 5 firms.¹⁷ Obviously projects may differ in size and in complexity and this may influence the need to work in a combination. However, it is unlikely that such explanations are relevant for the reported correlations and non-correlations. Indeed, it is noteworthy that in road construction (a rather homogeneous product in the Netherlands) in less than five per cent of the cases projects were done on an individual basis.

The results based on the data set for the 100 largest projects in 1998-2001 are corroborated by an analysis of the PwC dataset of 388 projects mentioned earlier.¹⁸ In 388 auctions 1400 bids occurred of which 600 were bids of combinations of firms and 800 were bids of individual firms. This research focussed on the winning bids showing that fifty percent of the individual bidders would have been able to do thirty per cent of the projects that were ultimately done in combinations. The PwC data set was extended by observations regarding the financial power of the holding companies (operationalised by the holding's turn over). This allows for a detailed empirical analysis of the question whether financial power could explain the occurrence of combinations.

This hypothesis, however, appears to be refuted by the facts as shown in Table 3 as the index numbers for the turnover/project size ratio is actually better for individual bidding firms than for combinations for a relevant range.

Table 3 Index numbers (holding turnover/project size) and occurrence of combinations (average combinations = 100)

	Combinations	Individual bids
<i>Number of observations</i>	634	785
Maximum value	990	1600
Median	51	45
Average	100	46

All in all the findings suggest that combinations are formed more often than would be necessary and not being necessary to do the project these combinations may be breaches of the relevant sections of the competition law. Importantly, a recent enquiry based amongst both public services and firms by SEO confirms this inference.¹⁹ Only 43 per cent of the firms believe that it could not have done the project alone. Roughly one third of the firms actually answers that one of the firms that participated in the combination could have done the project individually as well.

The antitrust implications of these findings are obvious. Using the PwC data set (that according to the forensic accountants did not indicate economic problems) and adding financial data at the holding or group level we were able to “prove” the existence of a competition problem and to come up with an estimate of the seriousness of this problem that was later confirmed by independent research.

V Product market inertia (hysteresis)

A completely different way of detection was pioneered in the early 1990s when the concept of hysteresis was applied to the Dutch product market.²⁰ Economic hysteresis relates to situations where the long run equilibrium of a system is not only a function of the exogenous variables but also depends on the initial values of the state variables and on the values of endogenous variables outside the long run solution space. Hence current values of endogenous variables also depend on lagged endogenous variables. The extent of hysteresis therefore determines the speed with which an economic system moves towards equilibrium

and this tells us something about the speed of the invisible hand, i.e. the functioning of the market mechanism. Hysteresis on the product market can be determined by means of estimated price-equations, detailing that changes in prices do not only depend on costs and the price of competing imports but also on the level and evolution of capacity utilization allowing for the determination of the product market criterion (PMIC).²¹

$$P = a_1 ULC + a_2 PM + a_3 Q + a_4 Q + a_5$$

$$PMIC = a_4 / (a_3 + a_4)$$

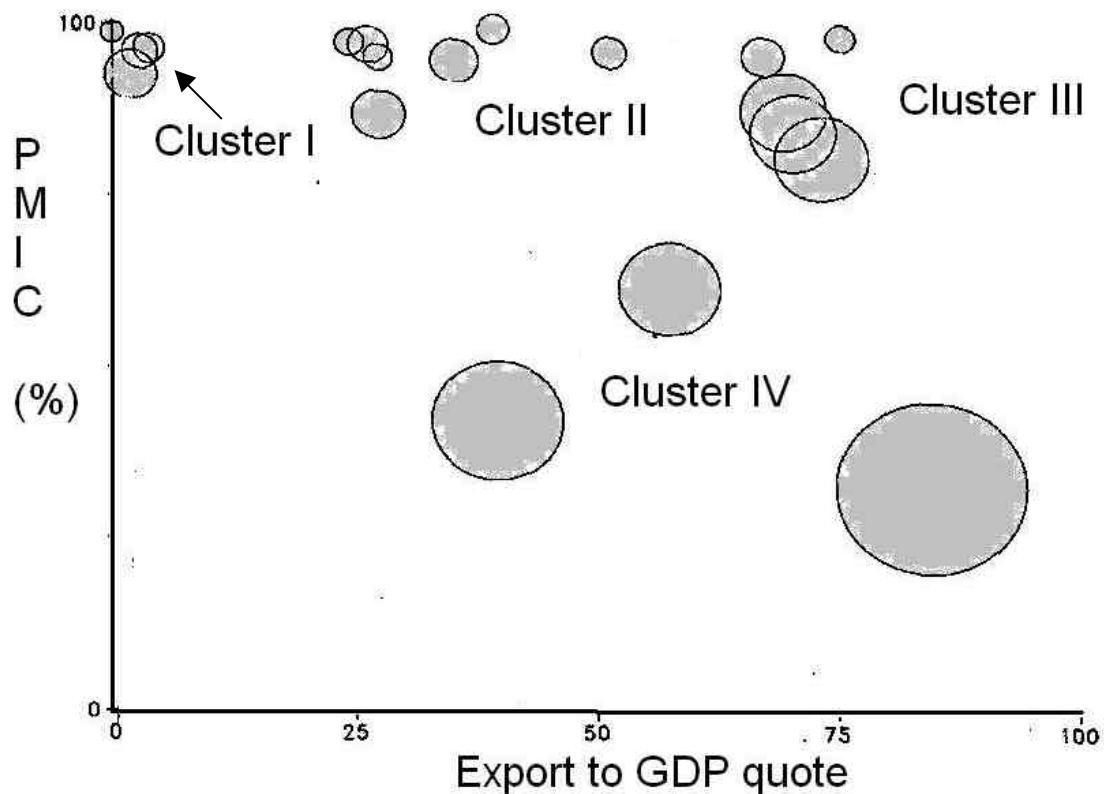
With

P	=	Price level domestic demand
ULC	=	unit labour cost
PM	=	import price level
Q	=	level of capacity utilization

The PMIC was especially useful in making international comparisons and as an input to applied general equilibrium models that investigated major policy issues such as the potential welfare gains from deregulation and stronger competition policy in terms of productivity, innovation, production, (un)employment and international competitiveness.²² However, it is noteworthy that the new methodology was also applied to chart competition problems in specific sectors in the Dutch economy (figure 2).

In the first econometric application of the methodology at the mesoeconomic level of 17 sectors four different clusters were identified on the basis of the PMIC and the export to gdp ratio. Note that product market inertia, as indicated by a high PMIC, is not a problem for the open and truly international sectors since the Netherlands is a small economy and Dutch firms will be price takers on the world market. In that case external and essentially exogenous factors determine the price level. Competition problems are therefore not indicated by a high PMIC. Problems were only indicated where the combination of substantial hysteresis and low export to gdp ratio occurred. Here the findings clearly pointed to the construction sector as one of the three major problem areas in the Dutch economy (in addition to the financial sector and medical services).²³ Indeed five years before the actual introduction of the Competition Law and the creation of market supervisors such as NMa and OPTA it was concluded on the basis of econometric analysis that the Dutch construction sector formed part of a sheltered, overregulated and highly cartelized cluster.

Figure 2, product market inertia and export to gdp ratio



Cluster I Closed sectors with substantial market inertia: medical services, banking, insurance, construction (several segments)

Cluster II Open sectors with high market inertia

Cluster III International sectors with high market inertia

Cluster IV Open sector with minor market inertia

Source: P.A.G. van bergeijk and R.C.G. Haffner, Op zoek naar dynamiek, ESB 20-1-1993, p.54

Somehow, this important result was lost and did not play a major role in the NMa's agenda in the early years of its existence. Historic developments may have been important here since the introduction of the Dutch new competition law in 1998 gave rise to more than thousand requests for a formal judgement of existing arrangements. In the first years of the NMa's existence antitrust activity was more or less demand driven by procedures and actual cartel fighting did not happen at a substantial scale before 2001. Another explanation why these empirical findings were neglected was the general lack of industrial economics expertise

within the NMa in 1998. In addition new methodologies were being applied (such as the persistence of profit approach and the estimation of mark up ratios²⁴) and came up with different rankings of problem sectors. With no feedback from actual antitrust cases a multitude of often contradictory and contested results continued to co-exist and could not offer decisive guidance to policy makers at the NMa. The important conclusion is that an evaluation of the different methodologies is in order now that sufficient knowledge about relevant cases exists within the NMa. We see the update of the earlier studies from the mid 1990s as an important topic in forensic economics.

VI. Some Lessons

The three previous sections illustrated that those who blaim economics *per se* for not having indicated the problems in the construction sector are barfing at the wrong tree. Alternative methods have been able to uncover specific problems in the construction sector. In an ex post sense the analyses in sections III and IV showed the impact and risks that can be derived by means of applied statistical analysis. In evaluating this claim, it is important to note that the findings reported in each section are derived from different data sets (official balance sheet data, questionnaires, official procedures, secret accounts, publicly available data collected by independent organizations) and that such results are thus robust for the mode of observation. In combination the results by their agreement prove the existence of substantial competition problems according to scientific economic standards. Most importantly, however, section V discussed that econometric analysis in an ex ante setting was able to indicate the existence of substantial problems in the Dutch construction sector.

Of course this begs the question of why the studies by EIM, SEO/TNO and PwC that were introduced in section II did not detect problems when obviously problems existed. It seems probable that the three investigations have not been done at the right level of analysis, were static and/or suffered from the lack of a control group or other benchmark.

Firstly, we would argue that, as a rule, the analysis of competition problems should take place at the level of the relevant market. This has been extremely problematic for the construction sector (especially regarding publicly available data) where data is reported for a national market and aggregated over many geographical markets and products. In this sense the analysis has been done at too high a level. Clearly then different questions need to be asked at different levels if one wants to produce sensible results. One homogeneous answer can only be wrong in this sector.

Secondly, non functioning markets can only be uncovered if the development over time is an element of the analysis. I.e. where possible (pooled) time series analysis should be deployed to analyse behavioural or dynamic equations correcting for appropriate exogenous influences.

A third point is that a benchmark or control group needs to be available if one wants to judge the extent to which competition in a sector is problematic. In this case it researchers appear to have neglected that cartel behaviour was not an incident but rather normal business practice in this sector thus influencing the perceptions of the competitive cost and price levels.

Actually these three points suggest a combination of dynamic analysis at the level of the relevant market with a clearly defined control group (or control period) as a best practice. The good news from the alternative methodologies that we discussed in the previous sections is that an intelligent research design offers a workable solution for these problems and a viable research agenda for forensic economics. We expect that the results from this research agenda will prove to be highly relevant for antitrust in the Netherlands

Notes

* Comments by Maarten Pieter Schinkel, Simon Bremer and Joris Pinkse are gratefully acknowledged

¹ J.P.J. de Jong en R.J.M. Vogels, *Scorekaart risico's op marktfalen. Een methodiek ter identificatie van risicovolle productgroepen*, EIM Zoetermeer, 2000.

² Annual report 2001

³ PWC, *De aanbestedingspraktijk van de Rijksoverheid in de periode 1996 - 2001 Resultaten van het kwantitatieve onderzoek* Almere 2002..

⁴ SEO/TNO Statistisch onderzoek naar prijs en kostenontwikkeling in de bouwsector, Amsterdam 2001

⁵ Vergelijk J.S. Feinstein, M.K. Block en F.C. Nold, "Asymmetric information and collusive behaviour in auction markets", *American Economic Review* 1985, blz. 441 – 459 en voor een praktijkvoorbeeld uit Rotterdam "Boekhouding Bos veroorzaakt geen schade opdrachtgevers", *Cobouw* 13-1-2004.

⁶ An exception is the MA thesis of B. Overvest, *Games Contractors Play*, University of Groningen, 2004.

⁷ (Tweede Kamer 2002)

⁸ P.A.G. van Bergeijk and P. Meulmeester, *Some Misconceptions Concerning Bid-Rigging: Sobering Lessons from the Bos-shadow Accounts*, ACLE conference, February 17, 2005.

⁹ In one case the settlement was in bottles of wine.

¹⁰ The secret records e.g. mention the dead of a co-conspirator and note that his claim should be kept silent.

¹¹ Our method actually under estimates the price increase.

¹² The patliamentary committee of enquiry estimated a 8,8% price increase over the years 1986-1998. Note that it is also relevant that this is in line with the international studies.

¹³ Also the probability that an bid rigging attempt succeeds can be predicted rather accurately on the basis of this dataset (Van Bergeijk and Meulmeester op cit.).

¹⁴ P.A.G. van Bergeijk, S. Bremer and P. Meulmeester, *Internal settlement in bid-rigging cartels: Empirical findings from the Dutch construction sector*, mimeo 2006.

¹⁵ F. Felsö, J. Mulder and B. Baarsma, *Samen sterk of beter alleen?* SEO Amsterdam, 26 XI 2004, pp. 50 , 68.

¹⁶ CapAnalysis, *Scan van de Nederlandse bouwsector*, 13 juni 2002, blz 23-26..

¹⁷ This conclusion is reinforced if the largest construction project (the TGV railroad) is excluded from the data set, as in that case projects of individual firms on average exceed the projects of 3, 4, 5 and 6 firm combinations. An other relevant result is the absence of a relationship between the number of bids and the number of combinations amongst the bidders

¹⁸ C. van Gent et al, *Basisboek markt- en micro-economie*, Wolters Noordhoff 5^e edition, 2004, pp. 62-64.

¹⁹ F. Felsö, J. Mulder en B. Baarsma, Samen sterk of beter alleen? SEO Amsterdam, 26 november 2004.

²⁰ S.K. Kuipers, Marktwerking en werkeloosheid in Nederland in de jaren dertig en tachtig, KNAW: Amsterdam 1991 and Bergeijk, P.A.G. van, R.C.G. Haffner and P.M. Waasdorp, 1993, Measuring the speed of the invisible hand: The macroeconomic costs of price rigidity, *Kyklos* 46, No. 4, 529-544.

²¹ P.A.G. van Bergeijk and R.C.G. Haffner, Privatization, deregulation and the macro-economy, Edward Elgar 1996.

²² P.A.G. van Bergeijk, G H.A. van Hagen, R A. de Mooij and J van Sinderen Endogenizing technological progress: The MESEMET Model, *Economic Modelling*, 14 (1997) pp. 341-367

²³ P.A.G. van Bergeijk and R.C.G. Haffner, Op zoek naar dynamiek, *ESB*, 20-1-1993. Concrete evidence that problems were rightly predicted is provided by the cases that led to substantial fines including the following NMa cases 2910 (interpay), 2658 (mobile telecomoperators) and 2873, 2906, 3054, 3055, 3064, 3272, 3687 and 3689-92 (construction).

²⁴ A Kleijweg and H Nieuwenhuijsen The dynamics of firm profits in manufacturing Netherlands official statistics Volume 11, autumn 1996, 29-39 and M.A. van Dijk and P.A.G. van Bergeijk, "Resource misallocation and mark-up ratios: An alternative estimation technique for Harberger triangles" *Economics Letters* (1997) 54 (2), 165-167