

The Role of Economists and Economic Evidence in Merger Analysis

I. Introduction

The practice of Antitrust is in essence both a legal and an economic exercise. This truism is widely recognized, and, indeed, in most countries, legal and economic experts combine to analyze antitrust issues. Nowhere is this as true as in the case of mergers – in most countries with merger policies, economists and lawyers work in tandem to evaluate the potential pro- or anti-competitive effects of a proposed merger, and to conclude whether such a merger should be allowed or prevented.

This paper abstracts from the legal perspectives of merger analysis, and concentrates on the role of economists. An economist's involvement throughout a merger investigation is useful in ensuring that the correct theories are considered, that the appropriate data are collected, that the data are analyzed properly, and that economically sound decisions are reached. The paper is divided into two parts. The first part presents a short survey of administrative practices in various countries, based on survey results. The second part discusses economic analyses that are potentially available, and when, how and why such analyses are used.

II. Results of Survey on Current Use of Economists

In preparation for the ICN Workshop that took place in Washington in November 2002, questionnaires were distributed to competition agencies in numerous countries pertaining to various aspects of antitrust enforcement. Thirty-one responses were returned that shed light on how economists are integrated into the merger review process. This Section presents a short summary of the responses that pertain to the relevant questions (parts of questions 4, 5 and 23, and questions 11 and 12). For a more detailed analysis of the survey results, see the ICN Report on Investigative Techniques.

A. Intensity of Involvement of Economists

The use of economists in merger analysis in different countries spans the range of possibilities, from the almost complete absence of economist input to economists being team members (and sometimes even the sole members) in every merger examined. In many countries the inclusion of an economist in the merger review process is mandatory. In those countries in which it is discretionary, such inclusions tend to occur in the more complex cases. In a small number of countries, economists undertake the initial review of the merger, and in a minority of those mergers (those that cause the least competitive concerns) they determine policy without involving legal staff members¹. Such instances,

¹ In this respect, it may be useful to distinguish between countries with a litigation system and countries with an administrative approval system. In an administrative approval system, in each case a legal document has to be drafted (where, e.g., the jurisdiction of the competition authority has to be established,

however, are relatively rare, and for the most part economists and lawyers combine their respective expertise in an effort to reach the correct decision.

Hence, it is not surprising that the reported percentage of economists involved in merger cases out of the number of staff members *dedicated to* merger analysis ranges from 0 to 85%. Dividing the countries into low (0%-19%), medium (20%-49%) and high (50%+) intensity of use of economists in merger analysis, 8 of the 30 countries that supplied this statistic, were in the low category, 13 in the middle and 9 in the high category. Note that this refers only to the percentage of economists and not to their absolute number. Thus, for instance, both the U.S. and the E.U. are located in the low intensity category, but have a large number of economists actively involved in merger analysis.

B. Intensity of Use of Economic Analysis

The actual analyses carried out in the different countries also vary greatly. While some countries claim to make no use of economic analysis of any kind, in most countries simple market studies are conducted in order to determine market shares and determine concentration levels (generally using a measure like HHI). This requires, of course, a definition of the “market” (product and geographic), which is mostly determined through qualitative information such as conversations with players in the market (customers as well as competitors).

Some countries often use more advanced economic and econometric analyses for market definition, and competitive effects analyses. The analyses reported in the survey include, but are not limited to:

- Elasticity estimation;
- Price correlations;
- Case studies (natural experiments);
- Critical loss analysis; and
- Cross-sectional analysis.

These, and other analyses, will be discussed in more detail in the next Section of this paper.

With respect to the use of outside experts, 24 of the 31 countries use outside experts in some instances. However, it was not clear from most of the responses whether these experts were economists, industry experts, lawyers or others. Only a few countries claimed to use experts (albeit with low frequency) even in “no problem cases.” In cases raising significant competitive concerns, however, the practice of using outside experts is much more widespread.

and issues of control relationships are resolved), and lawyers are more likely to be involved by default, also in the simpler cases (from a competition viewpoint).

III The Economist's Quantitative Toolbox

The objective of this Section of the paper is to present a non-exhaustive list of the types of quantitative analyses carried out in merger cases in some agencies. These analyses can assist in, for example, delineating the markets potentially at risk from the transaction and determining the potential for and magnitude of anticompetitive effects, e.g., in assessing the likelihood of an increase in price or a decrease in quality following a merger. The list is, per force, long, but it must be noted that most of the listed analyses are used only in a small minority of cases. In many cases, qualitative information is the most readily available information, and is deemed sufficient to resolve the concerns being addressed. Quantitative evidence should be viewed as complementary to the qualitative evidence, and they are used in tandem to assess the competitive impact of the merger. The results of the quantitative analyses are generally considered in light of the qualitative evidence gathered in the case to come to an overall conclusion. For example, one may check on the consistency of the quantitative results with reliable qualitative evidence. Different decision-makers may put different weights on different types of evidence. For information on the types of qualitative information that can be of use in merger analysis, see the ICN paper on qualitative evidence.

Typically, the authority will begin the analysis of a merger with a qualitative analysis, based on such things as conversations with competitors and customers, and an initial study of the firms' internal documents. If the Authority concludes that further analysis is required and that it wants to undertake some type of quantitative analysis, it will commonly require the acquisition of information from the involved firms and/or from other non-public sources (e.g., competitors or customers). At this same time, additional collection and review of qualitative evidence is likely to occur. In preparing such data requests, it would be useful to keep the following points in mind:

- Identify at the earliest stage possible the major competitive concerns arising from the merger (usually based on the qualitative analysis), and determine which analyses to carry out and what data are required for the analyses. One of the recurring complaints from firms is that the data requests never seem to end. This is often viewed as harassment, and additional consideration of the issues at hand before the initial data request is sent will often dispel the need for additional requests. That is not to suggest that additional data requests may not become necessary; often investigations take unexpected turns, and additional or different data are required. The economist should always keep an open mind to alternative theories, and let the data convince him.
- Find out what types of data are available. It would not be beneficial to request data that cannot be compiled by the involved parties. Preliminary meetings or telephone conversations with those responsible for data collection or analysis in the firms can be quite useful.
- Ask for the minimum amount of data required to carry out the desired analyses. The gathering and processing of the data is time consuming and costly, both to the firm and to the Authority's staff. It is best to

keep the demands to a minimum, but be sure to ask for all needed data. Again, planning ahead is crucial. Note that in some cases asking for more data can be less costly to the parties than asking for less. This is the case when it is easier for the firms to provide an entire data set than to go through it to select the requested pieces.

- When presented with economic analysis by outside experts (white papers), it is quite useful to receive the data and programs used by the experts, and to carefully evaluate the reports and econometric results *before* meeting with the outside experts. In this way, the discussions with these experts are better informed and more productive. In addition, it allows the Authority to request any additional data that are needed to establish or refute the conclusions reached by the experts before confronting those experts.

Quantitative analyses can be carried out to assist in merger analysis. These analyses run the gamut from relatively simple data analysis – e.g., trends in sales or market shares – to highly sophisticated econometrics. More complicated techniques can at times provide significant additional insight into the potential competitive impact of a merger than can simple techniques. However, the downside to such techniques is that they are frequently highly resource intensive and can be more difficult to understand and explain (particularly for non-economists). In addition, they often rely on a large number of implicit assumptions, which need to be checked against reality. Note that the most complicated empirical techniques to obtain valuable insights are not always needed. Simple analyses can provide a wealth of information on the functioning of the industry and on the roles of the merging parties in that industry. As a general matter, starting with simple analyses and then determining whether more complex analyses are appropriate and worthwhile is a good way to balance these considerations. However, upfront consideration of what complex analyses might be appropriate is important to ensure that the appropriate data are requested in order to provide sufficient time to conduct the analyses and incorporate the results into the decision-making process if during the course of the investigation it is determined that such analyses would be useful. If possible, conducting multiple empirical analyses to address the key issues is useful to determine whether the conclusions from the analyses are robust to different tests. Let us emphasize that even the most rigorous quantitative analyses present only part of the story, and the results must be viewed in light of the qualitative findings.

Each type of analysis presented below contains a discussion of the various stages of the merger review in which they might arise. For a guide to, and explanation of, the various stages of a merger analysis, see the ICN paper by the Analytical Framework subgroup. The discussions below also present the function of the analyses, the minimum data necessary to conduct the analyses, some possible pitfalls in applying the analyses, and the data that can assist in avoiding these pitfalls. The order of presentation is not perfectly correlated with any specific measure of usefulness; rather, it reflects a combination of functionality, incidence, generality, and simplicity.

1. Measuring Market Shares – The purpose in measuring market shares is usually for the indication they give with respect to the ability of the post-merger firm, *as a result of the merger*, to profitably take steps (either unilaterally or collusively) that harm consumers (such as to raise prices). Generally, the estimation of market shares is the starting point of the competitive effects analysis and does not by itself show whether a particular merger is likely to be anticompetitive (although, *ceteris paribus*, the higher the combined shares, the more likely that the merger would have an anticompetitive effect). Such estimation requires a definition of the product and geographic markets, and when these are not immediately clear, analyses such as those described below can be used to help delineate the appropriate market. Once the market definition has been settled upon, the data needed to calculate market shares are generally readily accessible, since they relate to aggregate value figures. There are, however, alternative values that can be used to calculate these shares, each appropriate in different instances. Thus, for instance, when dealing with homogeneous goods, the use of units sold tends to be sufficient. However, for differentiated goods, sales are preferred to physical quantities. If the ability to serve the market is the basis for future competition, capacity measures are important, and if customers are small or move freely between producers, and there are no capacity constraints, each firm can be given an equal share. In this latter case, it is the number of firms that determines concentration. Imports into the country should be included in the analysis, and, *ceteris paribus*, the smaller the country, the more important it is to pay attention to the import market.

Some countries are content with information on the number of competitors in the market and the market shares, and if there are “enough” competitors, and the market shares of the merging firms are “sufficiently” small, the merger will not be challenged (and if the converse is true the merger may be challenged). This analysis is often carried out by calculating the HHI (Herfindahl-Hirschman Index, the sum of the squares of the market shares), and using this measure as the main competition indicator. This measure has the benefit of giving a super-proportionate weight to larger firms, which is appropriate because larger firms, indeed, tend to have a more than proportionate effect on the market.²

2. Demand Estimation / Estimation of Elasticities – Estimation of a demand function is data and resource intensive, but yields a more complete picture with respect to the likely effects of a merger than do partial analyses, such as price correlations (discussed below). The results of such estimation are useful for almost all stages of merger analysis, from defining the product or geographic market, to evaluating the plausibility of post-merger price increases.

² The U.S. has specific thresholds for HHIs, whereby if the post-merger HHI is over 1800 and the increase in the HHI is over 50, or the HHI is between 1000 and 1800 and the change is over 100, then the merger may be problematic. HHI levels below these thresholds are unlikely to raise antitrust concerns.

When the product market definition is not obvious, it becomes necessary to identify which goods are the close substitutes for the goods under consideration. If goods are substitutes, the increase in the price of one good will lead to an increase in the quantity purchased of the other good, all else held constant. Thus, cross-price elasticities should be positive. While estimation of the cross-elasticity of the demand for good A with respect to the price of good B would seem to require data on these variables alone, such an estimation procedure suffers from shortcomings. Finding a positive correlation between the two variables does not guarantee that the products are, indeed, in the same market.

First, there are alternative reasons why these values might “follow” each other, which can make a correlation spurious: for instance, an increase in disposable income would lead to increasing prices and quantities for all “normal” goods. To correct for this, and to generate reliable cross-elasticities, a demand system can be evaluated, controlling for cost and demand shifters. In addition to the data on prices and quantities for all relevant products, this procedure requires measures of these cost shifters (e.g., factor prices) and demand shifters (e.g., income figures). In collecting these data, one should consider the timing at which prices are set, i.e., if prices are set monthly, then the shifters need to be available monthly. Proper estimation of such a demand system requires the use of simultaneous equations systems. This also allows for conducting meaningful statistical significance tests.

Second, simply finding positive cross elasticities is not enough to conclude that two products are in the same relevant market. Rather, the cross elasticities must be large enough to make a price increase non-profitable (economic significance test). A test that formally captures this idea is the hypothetical monopolist test, also known as the SSNIP test. In considering and testing whether good A defines a product market, assume that good A is produced by a monopolist. The question then is, what type of constraint does the presence of other goods place on the producer of good A? If this hypothetical monopolist can profitably institute a significant and non-transitory increase in price (SSNIP) despite the existence of these other goods, then A defines a market. If not, the next best substitute is added to the market definition (requiring an understanding of what substitutes the lost sales go to) and the process is repeated.

One particular benefit from demand estimation is realized when analyzing the increased ability of the merged firm to unilaterally raise prices when goods are differentiated. In such a case, the key issue is how close a competitive constraint the merging parties placed on each other prior to the merger. If the goods produced by the merging firms are close substitutes (in the extreme case, the two goods may be closer substitutes for each other than other goods in the market), the merger removes the competition between those two goods and may result in higher prices. This will depend on how “close” is the competition between the merging parties (e.g., what is the cross elasticity of demand) and how important is the competition with other goods in the market (including how readily can firms reposition their products through changes to existing products or new product introductions). Again, own elasticities and cross-elasticities between the goods of

all the competing firms can be measured by estimating the demand function. Own elasticities are important in order to know the effect of a price increase pre-merger, and cross elasticities give an indication of whether the merging firms' products are close.

3. Actual Loss vs. Critical Loss – This test can both be used to help define the extent of the product or geographical market, and to evaluate whether the merged firm will be able to raise prices unilaterally.

When used for market definition, the test can be used in the context of the hypothetical monopolist test. To carry out this test, the critical loss and the actual loss from such a hypothetical price increase are compared. Critical loss is the level of lost sales at which the producer is indifferent about raising price. If the actual (expected) loss resulting from a price increase is expected to be greater than the critical loss, then the hypothesized price increase will be unprofitable and the market definition (good A) is too narrow.³ In order to calculate critical loss, financial data regarding the contribution margin are required. Actual loss estimation requires an estimate of own-price elasticity (which may require estimation of a demand system) or a proxy. If a demand function is to be estimated, the pitfalls discussed in the previous point are relevant.

When considering the ability of the merged firm to raise prices unilaterally, a number of adjustments to this analysis must be made. Since unilateral effects are considered, it is not a hypothetical monopolist we are concerned with, but rather a (dominant) firm with a fringe (possibly competitive). While the calculation of critical loss is much as it was above (requiring the measurement of contribution margins), the calculation of actual loss is more involved. The increase in price by the dominant firm will generally result in the fringe firms increasing production, so the residual quantity demanded from the dominant firm falls with an increase in price both because of the decreased quantity demanded (a shift along the demand curve) and because of the increase in the quantity supplied by the fringe firms. Thus, in order to get an estimate of whether such actions would be profitable, an estimate of the reaction curves of the remaining fringe firms to a price increase is needed in addition to the estimate of demand elasticity. At least in the short-run, this will depend, among other things, on the amount of excess capacity available to the fringe firms (see point 6 below). To estimate the expected expansion by the fringe firms, data on prices, production, and excess capacity of the competitive firms are required. However, production depends on more than just prices, and there may again be variables that affect both prices and production levels. To solve this problem demand and supply shifters are needed, as above.

³ Note that it may be important to test the sensitivity of different hypothesized price increases because it is possible for a larger price increase to be profitable where a smaller price increase would not be.

4. Price Correlation/Variation Analysis –When the data necessary for demand estimation are not available, one can still potentially test whether different products (or different geographic areas) are in the same market by testing whether their price paths “follow” each other. This is indicative because, if these products are in the same market, shifting of purchases between the two types of products as relative prices change will tend to cause prices to move together. Testing this hypothesis necessitates data on prices over time for all of the relevant products (geographic areas) that are viewed as potentially being in the same market. Note, in particular, that transaction prices are more informative than list prices. However, it must be reemphasized that finding a positive correlation does not conclusively guarantee that the products are, indeed, in the same market, since, as above, there are alternative reasons why prices may be spuriously correlated: a common inflationary trend, common exchange rate volatility, and common demand and cost shocks. In the former cases, inflation and exchange rate adjustments may be required for the price series. To correct for the latter factors, demand estimation again becomes necessary.

For market definition purposes, a comparison of price levels is sometimes also indicative of the level of substitutability of heterogeneous goods. If two similar goods are priced vastly differently, it is likely that the price difference reflects real or perceived quality differences, and many consumers (both those who buy at the low end and those who buy at the high end) may not consider them good substitutes. This is particularly true if there are no middle-priced goods. Of course, the real question is whether, holding quality constant, an increase in the difference in pricing between products would induce customers to substitute to the different quality good so as to make the price increase unprofitable. If a change in relative prices attributable to a SSNIP in one product causes sufficient substitution to render the price increase unprofitable, then, even though there is a gap in the price levels, the different quality products are in the same market. Thus, simply comparing prices should only be considered when the data are insufficient to carry out the SSNIP test, and its limitations should be recognized.

Price correlations can be used to address unilateral price increases by the merged firm with heterogeneous products. As in market definition, price correlations may help identify whether the products are close substitutes, since the prices of close substitutes tend to move together. If the correlations between the goods of the merging firms are more highly correlated than between those of either of the firms and prices of other substitutes, there is more likely to be an anticompetitive effect from the merger. This requires data on prices for each product, and all the caveats regarding controlling for demand and supply shifters discussed above are relevant here. Note, however, that it is the relative size, and not the absolute size, of the correlations that are of concern, so these omitted-variables concerns may be less pronounced unless there is reason to believe that they systematically affect the sizes of the correlations. However, it is at times difficult to assess what is a meaningful difference in correlations.

Price variations can also be used to negate (but not to establish) the presence of coordination among competitors. For successful coordination, the prices of the

coordinating firms should move together, particularly if goods are homogeneous. If there is a cartel agreement, prices will tend to either change in tandem, or there will be one clear leader, with other firms following the lead. With tacit collusion, on the other hand, an increase in price by one firm will serve as a signal to the others to also raise prices, but the identity of the first mover may not be fixed. An analysis of price changes by firms can yield information about the relationships between the firms' price changes, and can tell us who led, who followed, and who did not change prices (and is thus not part of the collusive agreement). If many firms do not react as predicted to price increases, collusion is likely not be a factor. In particular, a study of pricing may uncover one or more firms that act as "mavericks" in the industry, being particularly aggressive in pricing or other factors (like quality), and making successful collusion more difficult. Note that prices moving together are not necessarily indicative of successful coordination. Rather, observing price movements that bear no relationship to each other suggests that there is no coordination. Thus, this is a negative test and not an affirmative test. This analysis necessitates frequent observations on prices for each firm.

5. Natural Experiments – A careful study of the history of the industry can often yield useful information about various aspects of the merger and its expected effects. Before presenting a few illustrative examples, we note that some "natural" experiments may be of dubious value. Thus, for example, the decisions to enter and exit an industry are endogenous, and any analysis of such an occurrence must be careful to take this into account.

Consider, for example, product market definition. If the facts show that there was an increase in the tariff charged on imports of good B, one result of this increase is that there would almost certainly be an increase in the market price of good B, and B firms would increase production. Another result, if A and B are in the same market, is that there may be an increase in the price of good A (depending on the elasticity of supply of A), and A firms would increase production. Alternatively, if the issue is whether the imported good is in the same market as good B, it can be instructive to see the effect a tax on B has on import flows. Other exogenous changes could be analyzed similarly.

Similar observations could be made regarding geographic market delineation. Say we see entry into one area, and, as a result, similar price falls occur in both that area and in an adjacent market. We may conclude from such evidence that the two areas are as one from the consumer's perspective.

If data on concentration (or the number of competitors) and prices in different geographic regions or over time are available, they can be utilized to study the effects of concentration on prices. Thus, if the agency finds significant effects of concentration on price, it can estimate how the expected change in concentration from the merger will affect prices in the industry. This requires data on concentration and prices in different areas or times. However, the same pitfalls exist as in estimation of market demand, since there are factors that can affect concentration and prices simultaneously, and these should be neutralized. This same type of analysis can be used to assess whether the particular competition

between the two merging parties matters if the presence of the two parties differs over time or over geographic areas.

Changes that occurred in prices and quantities after a previous merger in the industry could be quite illuminating with respect to the expected effect of a merger. In addition, entry or exit from the industry changes market concentration, and a study could be made of how such a discrete change in concentration affected prices and quantities. Finally, changes in the legal regime, tariff rates, quotas, and so forth can provide a natural experiment regarding market reactions to disturbances. In all cases, it is important to control for other factors that may affect the market.

Instances of entry can be scrutinized to evaluate the market conditions that led to such entry. They allow one to understand not only the ease of entry into (and exit from) the industry, but also to identify the market conditions that led to entry. For instance, one could test whether, in response to price increases, imports increased or local firms entered the market. If they did, they place a constraint upon the merged firm. Thus, studies of past entry behavior can lead to a better understanding of why the merger is taking place (e.g., the optimal size of the firm has increased over time), and of the effect such entry or exit had on market performance.

6. Other Tests for Unilateral Effects – The points discussed below are in addition to those already mentioned above. The first point is relevant for both homogeneous and heterogeneous goods, while the second deals specifically with differentiated products.
 - a. Measuring Excess Capacity – As stated above, when considering unilateral price increases, the ability of the merged firm to increase price depends on the supply elasticity of the fringe firms. This, in turn, depends, at least in the short-run, on the amount of excess capacity available to the *remaining* fringe firms. Say, for instance, there is one firm with substantial excess capacity. If the other firms are unable to expand production substantially because they do not have much excess capacity, and increased capacity is a costly investment, the purchase of the firm with substantial excess capacity can allow the merged firm to profitably increase price, while such an action may have been impossible in the absence of the merger. The data needed to evaluate this concern, are excess capacity figures and information on the ease of capacity expansion. If there is much excess capacity in the hands of non-merging firms, or if it is easy to acquire, unilateral effects in the case of homogeneous goods are less likely to be significant.

One must ask why firms would choose to have excess capacity. There are many reasons excess capacity could exist, and its presence is not an indication of non-competitive behavior. This said, excess capacity could also be used to assist in the enforcement of a cartel agreement. If firms cannot expand production easily, a firm with excess capacity can

increase production and not fear retribution from other cartel members. However, if all firms have excess capacity, no firm will have as large an incentive to cheat on the cartel agreement, since all firms will increase production, triggering a large price fall. It is also possible that companies may not always want to use their excess capacity in a non-collusive market environment, namely when this would depress market prices too much. Another reason to maintain excess capacity is to maintain a dominant position. Thus, a dominant firm might invest in excess capacity as a threat to any firm considering entering. Such entry could bring about a flooding of the market by the firm. Firms in a competitive environment, however, would have little incentive to invest in excess capacity. Thus, excess capacity not justified by historical changes (e.g., a large fall in the quantity demanded or lumpiness in production), could be indicative of non-competitive behavior.

- b. Analysis of the possibility of relocation and new product introduction – As discussed above in the section on demand estimation, when the merging firms produce goods that are “close” to each other from the consumers’ perspective, the degree of competitive effect is dependent upon the ability of other firms to “fill the gap” created by the merger. If existing firms can easily spatially relocate (change the properties of their goods) or create a new differentiated product in response to a price increase by the merged firm, this will limit the firm’s incentive to raise prices. Testing this requires information about the characteristics of the goods, and the flexibility of the production process. If there were new product introductions in this industry, it can be quite illuminating to see how consumers reacted to such changes. In particular, how many shifted from the existing products to the new products.
7. Other Tests for Coordinated Effects – Coordinated effects (collusion) require the ability to reach terms of agreement, to monitor the agreement, and to enforce the agreement. The focus should be on whether the merger enhances the likelihood of collusion or the magnitude of its effects. Certain market conditions are conducive to such collusion while others are not. History is very important, and it can be most enlightening to check whether there were signs of collusion in the past. If there is no evidence of collusive behavior, and market conditions do not favor the formation and enforcement of collusive agreements, there may be little reason to expect coordinated effects to result from the merger. In addition to the analyses discussed above, the following tests can be conducted to see whether coordination exists and/or is a likely outcome of the merger.

 - a. Analyzing industry data – Summaries of industry data are useful for learning whether the underlying market conditions are conducive to coordination. Details about industry sales patterns (do total sales vary greatly over time, or are they fairly stable), customer sales patterns (are customers large with relatively infrequent purchases, or small with

regular purchasing habits), and pricing patterns (are prices highly volatile, or stable) will help determine whether collusion seems likely.

- b. Most-Favored-Nations Clause – One manner in which collusive agreements may be enforced is to use most-favored-nations clauses, which have the potential dual effects of lessening the variability in pricing across customers than might otherwise occur, and lessening the incentive to give discounts. The result of such clauses can be that, since firms have less incentive to lower prices, collusive agreements are more stable. Analysis of this potential effect can be done by (1) analyzing contracts across customers and suppliers to determine the prevalence of such contracts; (2) analyzing prices to assess the variations in price across a single supplier's customers, controlling for observable differences; and (3) analyzing negotiations with individual customers to determining the prevalence of offering individual discounts.
- c. Analyzing competitor production reactions to price changes – Competitors can be expected to react to price changes by a firm in more dimensions than price alone. Thus, an increase in the price of an important competitor can be expected to lead to an increase in price by the firm, and, if the firms are not colluding, to an increase in quantities (and market shares). In a collusive agreement, however, quantities are not expected to increase. Thus, an analysis of quantity reactions to price changes is also relevant. To conduct this test, data on quantities need to be gathered with the same resolution as the price data discussed above. Of course, prices may go up because costs increased, and this must be considered in the analysis – one would anticipate prices of competitors to generally move together as cost and other conditions change.
- d. Analyzing customer turnover - churning – If customers are large, each firm has an incentive to try to lure competitors' customers. If, in addition, orders are infrequent, such actions will be more difficult to detect. An analysis of customer turnover among different suppliers can shed light on this issue.
- e. Analyzing changes in market shares – Collusive agreements generally rely on firms getting fixed market shares. If a member of a cartel suddenly finds its market share falling, it is likely to react by cutting prices. Thus, fairly constant market shares over time would be consistent with (but do not prove) coordination, while frequent changes in market shares suggest that collusion is less likely to be occurring. The required data are unit or dollar sales for each firm.
- f. Analyzing markets with Sealed Bids – When contracts are relatively large (but relatively frequent) and are awarded via sealed bids, firms might coordinate by taking turns winning auctions, thus maintaining high prices and market shares. Such collusive methods may be simpler

to establish and enforce after a merger. Analysis of this issue requires a careful study of winning patterns and prices of winners and losers and the role of the merging parties.

- g. Analyzing the stability of costs and demand – Coordination is likely to be easier when the market is stable, and when firms are similar. Frequent changes in suppliers' costs or demand over time will cause instability in private incentives, and, thus, in production quantities and prices, making coordination difficult to maintain. In addition, if the cost structures of the firms differ, and/or changes in factor prices are different across suppliers, coordination would be difficult to maintain. This analysis necessitates data on the cost structure of the firms, and on input prices over time for each firm as well as estimates of market demand.
- h. Analysis of new product introductions – Changes in products by existing firms, changes the status quo in an industry, and can make coordination difficult to maintain. Analysis of these issues would ask: Are such changes common? How important are new products to sales?