The Oracle/PeopleSoft Case: Unilateral Effects, Simulation Models and Econometrics in Contemporary Merger Control

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Abstract

An increasingly important part of contemporary merger control both in the US and the EU is unilateral effects analysis, particularly with regard to oligopolistic mergers. In practice, this requires econometric analyses of past market data and, above all, the construction of simulation models in order to quantify the price effects in each specific case. The review of the merger between the software firms Oracle and PeopleSoft in 2003/04 has been the most important instance of parallel application of these sophisticated economic tools by the EU and US authorities so far. This makes an in-depth study of the case going from the controversial issue of market definition to the specificities of the competitive assessment worthwhile. Therefore, we highlight certain similarities as well as (minor) differences between the EU and US proceedings. Interestingly, despite serious initial concerns the transaction was not blocked nor even required to be modified in the any of the two jurisdictions. We derive a number of interesting insights and, in particular, point out problems and lessons associated with the use of sophisticated economic tools in contemporary merger control. In addition to case-specific factors, the major insights encompass the continued relevance of market definition, the need to accompany predictive economic evidence with compatible reasoning and the benefits of including the economics of dynamic and evolutionary competition.

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1. Introduction

Sophisticated economic tools are used in contemporary merger control to an increasing extent on both sides of the Atlantic. A particularly important area is represented by unilateral effects analysis, which is based on theoretical insights from industrial economics on welfare-decreasing effects of oligopolistic mergers.[1] While it was already incorporated in the US authorities' Merger Guidelines with the fundamental 1992 revision, it only recently entered EU Merger Control after a controversial debate on the existence of a respective gap under the old Merger Regulation. Against this background of convergence, we look at the software firm merger Oracle/PeopleSoft as the most important case of parallel application of this relatively new concept so far. Interestingly, however, despite serious initial concerns the transaction was not blocked nor even required to be modified in any of the two jurisdictions. This merits an in-depth study of the case going from the controversial issue of market definition to the specificities of the competitive assessment. We extend the existing literature on this case by focusing from a non-partisan perspective on the economic assessment of the merger and, in particular, on implications following from the use of sophisticated economic evidence, such as simulation models.[2] We highlight certain similarities as well as differences between the EU and US proceedings and, in particular, point out certain problems associated with the use of sophisticated economic tools in contemporary merger control. In addition to case-specific factors these relate to the more fundamental issues of market definition, the principal nature of predictive economic evidence as well as the underlying notion of competition.

The paper is organised as follows. The second part provides a brief overview of the underlying theories as well as practical application of unilateral effects analysis by means of simulation models. The third part of the paper describes the review of the Oracle/PeopleSoft merger going from the controversial issue of market definition to the economic evidence used. The fourth part compares the proceedings in the US and the EU and employs Oracle/PeopleSoft to illustrate lessons and problems associated with the use of merger simulations and predictive economic evidence. Part 5 offers some conclusions.

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[1] With the term *oligopolistic merger*, we denote a merger between two or more enterprises, which takes place in a market that has the *distinctive* characteristics of an oligopoly both before and after the merger. Consequently, mergers towards single-firm dominance or mergers within polypolistic (or quasi-polypolistic) markets do not belong to oligopolistic mergers. The typical scenario is a merger that reduces the number of considerable market participants from 5 to 4, or 4 to 3, or sometimes even 3 to 2. In addition, competitors without considerable market shares may be active in the relevant market.

[2] See for case descriptions *Käseberg* (2005), *Monopolkommission* (2006, paras 620-631), *Pflanz* (2005) and *Ruiz Calzado* (2005). The use of economic tools is briefly discussed by *Bottemann* (2006, 91-93), *Epstein/Rubinfeld* (2004, 66-70) and *Zimmer* (2006). Furthermore, participants of the proceedings have published their view (*Bengtsson* 2005; *McAfee* 2004).

2. Theory and Practice of Unilateral Effects Analysis

2.1. The Economics of Unilateral Effects

The analysis of unilateral effects as one type of anticompetitive effect of concentrations was incorporated in merger control at a relatively recent date. This was in line with the development in economic thinking, which only provided thorough analyses during the 1980s. Originally, economic theory as well as practical merger control focused on mergers, (i) which created a monopoly or comparable situations (quasi-monopoly), or (ii) which facilitated post-merger collusive behaviour. To begin with, from an economic perspective, a quasi-monopoly exists when the market power of the merged firm allows it to unilaterally raise prices, i.e. independent from the reaction of the remaining (fringe) competitors. Absent efficiencies, a merger that creates such a discretionary leeway for a market leading enterprise is generally deemed to be anticompetitive and welfare-reducing (*Farrell/Shapiro* 1990; *Kamien/Zang* 1990). Hence, a prohibition is the preferable policy treatment. Correspondingly, in EU Merger Control the prohibition criterion of market dominance enshrined in the original Merger Regulation from 1989[3] addressed such mergers towards monopolisation or single firm dominance (*Bishop/Walker* 2002, 263-265). The same applies to the "substantial lessening of competition" standard applied by the US authorities (*DoJ/FTC* 2006, 26-27; *Hovenkamp* 1999, 505).

In addition to this single-firm dominance, economic theory long discovered the potential for anticompetitive effects in oligopolies where the remaining market participants do not compete with each other but, instead, resort to collusive behaviour, even without explicit agreements, in order to maximise joint profits. Oligopoly theory has found that such *coordinated effects* require specific characteristics of the relevant market(s) and firms in order to become a plausible consequence of an oligopolistic merger.[4] In line with these findings, the European Commission has created the concept of collective dominance to capture these effects in merger control (e.g. *Bishop/Walker* 2002, 271-288; *Briones Alonso* 1993; *Winckler/Hansen* 1993). It, thereby, more or less closely mirrored the already well-established

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[3] Council Regulation (EEC) No 4064/89 of 21 December 1989 on the control of concentrations between undertakings, in: Official Journal L 395, 30.12.1989, pp. 1-12.
[4] The seminal contribution was *Stigler* (1964). See the more recent overviews by *Feuerstein* (2005), *Ivaldi et al.* (2003a), *Jacquemin/Slade* (1989) and *Levenstein/Suslow* (2006). Put briefly, the probability of coordinated effects increases with a decreasing number of competitors, increasing homogeneity of products and cost structures, increasing market transparency, increasing barriers to entry, decreasing innovation dynamics, increasing record of former collusion, and decreasing probability of detection and sanctions. Furthermore, multimarket contacts, experience with coordination in the past and a stable economic environment facilitate coordinated behaviour. In theoretical terms, coordinated effects mirror the stabilization problem of cartels in a world with anticartel law.

practice of coordinated effects analysis by the US authorities (*DoJ/FTC* 1997, sec. 2.1; *DoJ/FTC* 2006, 18-25; *Hovenkamp* 1999, 510-519).

Starting in the 1980s, new insights from industrial economics have increasingly indicated the possibility of a third distinct type of anticompetitive effects from mergers in oligopolies.[5] There can be a discretionary margin for a merged firm to profitably raise prices unilaterally even though it is not dominating its market post-merger but, instead, remains 'only' one among few oligopolists. Consequently, oligopolistic mergers may well have anticompetitive effects other than coordinated post-merger interaction. In order to clarify things, these two effects must be differentiated carefully. A good starting point is the delineation by *Willig* (1991, 292): "Unilateral effects are changes in the actions of the merging firms that would be profitable for them as a result of the merger if the nonparties did not alter their actions or the nonparties reacted unilaterally themselves. Coordinated effects are changes in the actions of the merging firms that would be profitable for them as a result of the merger only if the changes are accompanied by alterations in the actions of the nonparties that are motivated in part by fears of reprisals" (similarly *Bishop/Walker* 2002, 287). The decisive difference, therefore, lies in the nature of the strategic relationship between the merged firm and its remaining competitors.

The core idea of unilateral effects is that a merger between two competitors (A and B) removes one firm (B) as a competitive constraint for the other (A), thus increasing the margin for pricing A's product (and vice versa). Industrial economists have analysed the conditions, under which a merger would make such a price increase profitable for the merged company. In general, this is more likely in heterogeneous markets, for example where products are differentiated in terms of their characteristics or where producers are spatially dispersed so that competition is localised in a geographic sense. As a corollary, consumers have heterogeneous preferences for the individual suppliers' goods. More precisely, the decisive factor is the closeness of competition between the suppliers or the degree of substitutability between their products as opposed to those supplied by other producers. This must be

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[5] See the overviews by *Baker* 1999a, 188-191; *Bishop/Walker* 2002, 265-270; *Ivaldi et al.* (2003b); *Willig* 1991; *Werden/Froeb* 2006. Although quite similar ideas had already been developed by *Chamberlin* (1933) and *Robinson* (1933), the recent discussion started with the initial contribution by *Salant/Switzer/Reynolds* (1983), demonstrating the impossibility of both profitable and non-collusive price increasing mergers in homogenous oligopolies. However, this induced further research demonstrating that anticompetitive unilateral effects are possible if products and/or production processes are heterogeneous. See inter alia *Baker/Bresnahan* 1985; *Deneckere/Davidson* 1985; *Perry/Porter* 1985; *Levy/Reitzes* 1992; *McAfee/Williams* 1992; *McAfee/Simons/ Williams* 1992; *Hausman/Leonard/Zona* 1994; *Werden/Froeb* 1994. More recently, this line of research has been extended to auction markets. See inter alia the work by *Brannman et al.* (2000), *Dalkir et al.* (2000), *Tschantz et al.* (2000), *Waehrer* (1999) and *Waehrer/Perry* (2003).

calculated for every specific case either in the form of so-called diversion ratios[6], e.g. between firms A and B (D_{AB}), or the relevant cross-price elasticities of demand.[7] Anticompetitive effects can be expected if the relevant figures for the merging firms' products are sufficiently high, implying that, given a price increase, a significant part of the lost sales of A would be diverted to the formerly independent product of B. Thus, negative welfare effects can occur well below single-firm dominance and even in scenarios where the merged entity does not acquire the market-leader position at all.

Table 1: Illustration of Unilateral Effects (adapted and modified from *Bishop/Walker* 2002, 265)

Firm	S_0	S_1	Diversion Ratio with reference to A
A	100	80	--
B	100	115	0.75
C	250	251	0.05
D	100	102	0.10
E	50	52	0.10
AB	**200**	**195**	**--**
AD	**200**	**182**	**--**

S_0 sales at initial prices; S_1 sales after A's hypothetical price increase

Consider as an illustration table 1. Suppose that in a hypothetical example initially there are five competing suppliers in the relevant market (A to E) with C being the market leader and accounting for the largest sales volume S_0 at initial prices. A potential merger between the second and third largest firm A and B would, therefore, not lead to singe-firm dominance. Coordinated effects are not likely either given the heterogeneity of products and consumer preferences. However, it could give rise to unilateral effects. In order to assess this possibility, one needs to look at the change in sales volume after a hypothetical price increase for A's product. In the hypothetical example, most of the lost costumers of A would be absorbed by B, thus yielding an only slightly reduced post-merger sales volume S_1 for AB (195) and a

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[6] The diversion ratio indicates what portion of the reduction in sales of a given product resulting from a price increase – other conditions being equal - is absorbed by another product. Expressed as a formula this gives e.g. for firms A and B $D_{AB} = \dfrac{S_1^B - S_0^B}{\left| S_1^A - S_0^A \right|}$. The concept goes back to *Shapiro* (1996).

[7] The cross-price elasticity of demand indicates how strongly the quantity of demand for a given product changes in response to changes in the price of another product, assuming that all other conditions remain constant.

high value of the diversion ratio D_{AB} (0.75), which indicates a very intense competitive relationship between the two firms' products. Under such a constellation, a merger between A and B would most likely conduct a price increase on A's product profitable, which is the very essence of unilateral effects.[8] Contrariwise, a potential merger between firms A and D would probably not give rise to significant unilateral effects for the simple reason that most costumers would turn away from the merged entity AD after an increase in the price for A's product. This can clearly be seen from the strongly reduced hypothetical sales volume S_1 for AD (182) and the low value of the diversion ration D_{AD} (0.10), respectively.

2.2. Merger Simulation Models and other Types of Economic Evidence

In practice the assessment whether a particular merger is likely to cause substantial unilateral effects makes an in-depth case analysis necessary. In order to accomplish this, a number of sophisticated tools have been developed in competition economics during the last decade. The two principal types of instruments are simulation models and econometric analysis, which are complementary in some respects. In addition to looking at the firms' closeness of competition as described in the preceding section, other aspects of the real-world markets, such as potential efficiency gains from the merger or strategic reactions by the competitors, must be included in the analysis.

The most innovative method in accomplishing this is the construction of so-called merger simulation models, which have played an important role in the Oracle/PeopleSoft case studied below.[9] Advocates of the simulation approach emphasise its superiority to what they call the "traditional" or "qualitative" merger analysis focusing on market definition and related structural indicators, above all market shares. Their claim is usually based on two arguments.[10] Firstly, simulation models are held to be more transparent since the model construction requires the exact determination of the underlying assumptions. Secondly, the results are held to be more objective and more precise because they are deduced logically from the underlying model and are of a quantitative nature. Effectively, simulation models are said to provide reliable projections of the price and quantity effects of a given merger at least

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[8] However, in order to establish unilateral effects other factors must be included in the analysis such as potential efficiency gains from the merger or repositioning by the competitors (see sec. 2.2).

[9] There is a growing literature on simulation models. The most important contributions include *Baker/Rubinfeld* 1999, 414-416; *Capps et al.* 2003*; Dubow et al.* 2004; *Epstein/Rubinfeld* 2001; *Epstein/Rubinfeld* 2004; *Kokkoris* 2005; *Walker* 2005; *Weiskopf* 2003; *Werden* 2005; *Werden/Froeb* 2006; *Werden et al.* 2004.

[10] For example, *Werden* (2005, 43) postulates: "Merger simulation thereby replaces subjective and unverifiable surmise with objective and verifiable calculation."

for the short term. In principle, this relates quite well to the limited time horizon of assessments in merger control, which usually encompasses two to three years.[11]

Weiskopf (2003, 57) characterizes merger simulation as "an approach for predicting post-merger prices using information about pre-merger market conditions, while building on assumptions about the behaviour of firms and consumers". In more detail, the model construction consists of several steps. To begin with a decision must be made on the basic functional (mathematical) form. Available alternatives include the Antitrust Logit Model (ALM), possibly in a nested version, the Almost Ideal Demand System (AIDS) and various kinds of auction models. Then, the model parameters must be specified. In differentiated goods markets, this concerns the precise nature of competition, the customer preferences and the firms' cost structure. More specifically, the form or structure of the given market and the primary competitive parameters must be determined (price, quantity, capacity).[12] The most common choice here is the Bertrand model for price competition in differentiated products markets with the degree of substitutability between the different products being incorporated by means of the abovementioned diversion ratios or cross-price elasticities. Market shares generally represent a less adequate source of information in this regard. Finally, merger-related cost changes such as expected efficiency gains and the likely reaction of competitors to the merger need to be incorporated. Merger-related efficiency gains are subject to an intense separate debate in theoretical as well as empirical industrial organization, which shows that they are difficult to predict in individual cases (e.g. *Farrell/Shapiro* 1990; *Tichy* 2001). Competitor reactions, such as the repositioning of their products or even of the actual entry of formerly potential competitors from nearby markets, are equally difficult to incorporate as for example the long-term experience with entry analysis in merger control both in the EU and the US has shown (e. g. *DoJ/FTC* 2006, 37-47; *Lindsay* 2006, 480-499).

The two principal methods for finding the parameter values are estimation and calibration. Estimation means that they can be calculated directly from datasets. For example, demand elasticities may be estimated from past market data. By contrast, calibration refers to the indirect determination of the parameter values. "A model is calibrated when its parameters are quantified from casual empiricism or unrelated econometric studies or are chosen to guarantee that the model precisely mimics some particular feature of the historical data" (*Hoover* 1995,

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[11] In the EU the general practice of the Commission is to focus on the merger effects over the next two to three years (*Lindsay* 2006, 76-78). In the US, the agencies employ a comparable time horizon. For example, the relevant period for the consideration of entry is two years (*DoJ/FTC* 2006, 45-46; *Hovenkamp* 1999, 534-536).

[12] Price competition is also known as Bertrand behaviour, whereas competition in quantities is referred to as Cournot behaviour. Possible complications include the modelling of sequential decision-making à la Stackelberg (e.g. *Huck* et al. 2001) and of dynamic changes in reaction patterns in conjectural-variation models (e.g. *Kolstad/Wolak* 1986; *Pfaffermayr* 1999).

25).[13] Things are slightly different with regard to auction or bidding markets (*DoJ/FTC* 2006, 31-34; *Van Dijk* 2005, 88-94). The simulation model must then reflect the characteristics of the procurement process such as the number of stages involved. However, parameter specification is facilitated by the fact that information on the (distribution of) winning and losing bids and on the participants therein is usually sufficient.

The possibility of estimating the parameter values already refers to another method of assessing unilateral effects in individual real-world cases, namely the use of econometric methods such as multiple regression analysis (e. g. *Baker/Rubinfeld* 1999, 406-414; *Bishop/Walker* 2002, 327-377). The objective here is to identify the structure of the competitive interrelations from past market data. In standard differentiated goods markets, this may involve the estimation of the abovementioned diversion ratios and cross-price elasticities or other indicators of the intensity of competition. The analysis again differs considerably if buyers conduct auctions to select suppliers and determine transaction prices (*Baker/Rubinfeld* 1999, 416-421; *Bishop/Walker* 2002, 432-441; *Dalkir et al.* 2000). There, the focus can be on the number and, particularly, the identity of the bidding suppliers and whether they influence the bidding behaviour. Most importantly, the significance of market share figures is much smaller. The ability of a certain firm to submit a credible bid is much more important than the actual share of won bids in the past.

2.3. Application, Cases, and Guidelines

Against this background of theoretical insights and practical tools developed by competition economics, the competition authorities in the US and the EU have made increasing use of unilateral effects analysis in recent years. The US antitrust agencies were the first to adopt this line of thought in their 1992 revision of the Horizontal Merger Guidelines (HMG).[14] As a result, it is now regarded as one of the most important developments in the so-called "Post-Chicago Antitrust" (e.g. *Hovenkamp* 2001, 332). In detail, section 2.2 of the US HMG is entirely devoted to the "lessening of competition through unilateral effects" (*DoJ/FTC* 1997). The agencies therein deal with two principal cases, namely markets where firms offer differentiated products and such where they are distinguished primarily by their capacities. For both scenarios, the Guidelines state a combined market share of at least 35 per cent as a typical prerequisite for considerable unilateral effects.

The US authorities have also gathered a fair amount of case practice with unilateral effects (*DoJ/FTC* 2006, 25-36). One prominent case of application was the proposed combination of

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[13] *Hoover's* article deals particularly with quantitative macroeconomics, where similar problems regarding model specification are discussed.
[14] See inter alia *Shapiro* 1996; *Starek/Stockum* 1995; *Baker* 2003; *Denis* 1993, 513-515.

the babyfood producers Heinz and Beech-Nut in 2000/01, which was a 3-to-2-merger with Gerber being the market leader (*Baker* 2004; *Leary* 2001). Although the merging firms did not challenge Gerber's leading position, the merger was successfully challenged in court by the Federal Trade Commission (FTC). Another landmark case from the FTC's practice was the proposed office superstore merger between Staples and Office Depot in 1996/97 (*Baker* 1999b; *Dalkir/Warren-Boulton* 2004). The FTC relied predominantly on econometric analyses, which demonstrated that the presence of the merging firms significantly constrained each other's pricing behaviour in local markets (e. g. *Baker* 1999b). An important early case of the DoJ was the combination of the two leading producers of consumer paper products Kimberly and Clark–Scott in 1995.[15] By estimating the relevant demand elasticities using scanner data the DoJ found considerable potential for significant price increases and, therefore, negotiated a consent decree requiring the divestiture of assets concerning certain product types. In Vail Resorts–Ralston Resorts, the DoJ in 1997 intervened against the merger between the two largest owner-operators of ski resorts in Colorado.[16] It used a Bertrand merger simulation model, which demonstrated the likelihood of a significant post-merger increase in lift-ticket prices at the acquiring firm's resorts. The merger simulation also indicated that divestiture of Ralston's Arapahoe Basin resort would substantially prevent price increases. Consequently, that remedy was eventually implemented through a consent decree.

In regard to EU Merger Control, with the reform process from 2002 onwards, a controversy started whether unilateral effects in oligopolies were covered by the market dominance test or whether there was a gap in the 'old' Merger Regulation, i.e. some types of anticompetitive mergers could not be challenged because neither single-firm nor collective market dominance was involved.[17] In the course of the establishment of the so-called more-economic approach, unilateral effects analysis along with efficiency defence elements was explicitly introduced into EU Merger Control, firstly manifesting in the switch from the market dominance concept to the broader and more general prohibition criterion of "Significant Impediment to Effective Competition" (SIEC), secondly in the newly issued EU Horizontal Merger Guidelines (*European Commission* 2004; see also *Voigt/Schmidt* 2004). However, a closer look at the case-law reveals that the Commission had already examined unilateral price effects in narrow oligopolistic markets prior to the reform, and, thereby, also resorted to econometric methods in some cases, primarily relating to bidding markets (*Van Dijk* 2005, 94-96). A fitting

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[15] United States v. Kimberly-Clark Corp. and Scott Paper Co., available at http://www.usdoj.gov/atr/cases/kimber0.htm.
16 United States and the State of Colorado v. Vail Resorts, Inc., Ralston Resorts, Inc., and Ralston Foods, Inc., available at http://www.usdoj.gov/atr/cases/vailre0.htm.
[17] See e.g. *Vickers* 2004; *Völcker* 2004; *Ehlermann et al.* 2005; *Baxter/Dethmers* 2005; *Fingleton* 2003; *Christiansen* 2006, 22-24.

example is the General Electric/Instrumentarium case in 2003[18], which involved manufacturers of certain types of medical equipment (also *Bishop/Lofaro* 2005; *Blumenthal* 2005, 3-4; *Bottemann* 2006, 94-95). Other earlier examples include the cases Philips/Agilent[19] and Philips/Marconi Medical Systems[20], both from 2001, which also concerned certain healthcare markets (also *Bishop/Walker* 2002, 439), and Philip Morris/Papastratos[21] from 2003, which affected the Greek cigarette market (also *Lindsay* 2006, 277 and 544). In the latter case, the Commission accepted a simulation model submitted by the parties in order to disprove any potential for price increases. Finally, in the Lagardère/Natexis/VUP[22] case (2004; concerning markets related to French-language book publishing), the Commission relied inter alia on a simulation model in order to establish the potential for post-merger price increases (also *Ivaldi* 2005; *Lindsay* 2006, 544). Eventually, Lagardère sold a substantial part of the acquired business so that the transaction could be cleared.

Taken together, competition economics nowadays provides a number of sophisticated tools for analysing unilateral effects in real-world markets, which are frequently applied by the EU and the US authorities. However, the injection of econometric evidence and, in particular, simulation models in merger control procedures causes a number of new problems with which both antitrust authorities and courts as well as merging enterprises have to deal. The Oracle PeopleSoft case represents an outstanding example in this regard. In the US, it was the first time that a full-blown merger simulation model has been discussed in the courtroom (*Bottemann* 2006, 91; *Werden* 2005, 46), while in the EU it represents the first instance that the Commission economists developed a simulation model in-house.[23] From a detailed analysis of this landmark case, important lessons on the use of economic inputs in merger control can be learned.

3. An In-depth Study of the Oracle/PeopleSoft Case

3.1. The Concentration at Issue

The Oracle/PeopleSoft case resulted from the hostile bid by the US software company Oracle for its US rival PeopleSoft in June 2003. Moreover, in July 2003 PeopleSoft itself completed

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[18] Case No COMP/M.3083 - GE/Instrumentarium, in: Official Journal L 109, 16/04/2004, pp. 1-63.

[19] Case No COMP/M.2256 - Philips/Agilent Health Care Solutions, in: Official Journal C 292, 18/10/2001, pp. 1-10.

[20] Case No COMP/M.2537 - Philips/Marconi Medical Systems, in: Official Journal C 321, 16/11/2001 p. 12.

[21] Case No COMP/M.3191 - Philip Morris/Papastratos, in: Official Journal C 258, 28/10/2003, p. 4.

[22] Case No COMP/M.2978 - Lagardère/Natexis/VUP, in: Official Journal L 125, 28/04/2004, pp. 54-60.

[23] In a few earlier cases, the Commission had simulation studies prepared by external experts such as by *Ivaldi/Verboven* (2001) on the Volvo/Scania case in 2001 and by *Ivaldi* (2005) on the Lagardère/Natexis/VUP case in 2004.

the takeover of JD Edwards, another smaller competitor. These transactions affected a part of the market for business software, namely that for enterprise application software (EAS) (*EU*, paras 15-54; *US*, pp. 2-16). [24] Put briefly, EAS serves to facilitate the management of large business or other organisations at the corporate or branch level. Functions include the management of corporate finances, customer relations or project resources. EAS is typically sold in integrated packages ("suites") covering several functionalities, while individual sales limited to certain sub-functions also occur. The products are differentiated in terms of functionality. Transactions typically are done on an individual basis and are organised by the corporate customers as a competitive bidding process involving several steps. Accordingly, pricing is described as "a deal-and-customer-driven process" with discounts of up to 90% compared to the initial list price being possible. Beside the initial licence, subsequent maintenance and support including bug-fixing or product updates are contracted as well and priced separately in the form of annuities in the order of around 20% of effective licence price. Taken together, markets exhibit a high degree of price discrimination

Oracle and PeopleSoft were the second and third largest vendor of EAS worldwide behind the German firm SAP. Therefore, the takeover was subject to intensive review by the US DoJ and the European Commission, which argued along broadly similar lines. Both the DoJ and the Commission originally expected serious anticompetitive effects and intended to prohibit the merger. Due to the respective institutional setting this took different procedures despite substantial agreement (*Venit/Kolasky* 2000). The DoJ had to bring the case to court and, hence, filed suit before Judge Vaughn Walker of the District Court of Northern California on 26 February 2004. In the accompanying press release it boldly stated that "the result of this merger would be higher prices, less innovation, and fewer choices" (*DoJ* 2004a). In the solely administrative process in the EU, the Commission opened an in-depth investigation and expressed its intention to prohibit the transaction in its Statement of Objections on 12 March 2004[25] based on a similar expectation of anticompetitive effects. Yet, the US Court refused to grant an injunction on 9 September 2004 and the DoJ announced its reluctance to appeal on 1 October 2004. Shortly afterwards, the Commission granted unconditional clearance to the transaction on 26 October 2004.

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[24] For reasons of brevity the District Court for the Northern District of California's Judgement from 09/09/2004 is referred to as '*US*' throughout this article, while the final decision by the European Commission of 26/10/2004 is cited as '*EU*'. The official documents are available at http://www.usdoj.gov/atr/cases/f205300/205388.pdf and http://ec.europa.eu/comm/competition/mergers/cases/decisions/m3216_en.pdf, respectively.

[25] The Statement of Objections itself is not publicly available, but it is referred to several times in the final decision (e.g. *EU*, paras 4, 21, 55, 125, 146, 162, 187, 188, 197).

3.2. The Controversy over Market Definition

Both authorities conducted a detailed analysis regarding the precise definition of the relevant market, which was contested by Oracle. This had profound consequences for the following analysis of the competitive impact of the transaction as well.[26]

3.2.1. DoJ versus Oracle in the US Trial

In addition to presenting an impressive number of witnesses (among them ten customer witnesses as well as five industry witnesses[27]), the DoJ distinctly relied on the market definition by its economic expert *Kenneth Elzinga* from the University of Virginia. In terms of the product dimension, *Elzinga* advocated a separation of the EAS market in horizontal and vertical respects relying on a set of product, customer and performance characteristics (*US*, 48-103). The consequent relevant market was the high function FMS and HRM market, which comprised the licensing and maintenance of integrated suites for Human Resources Management (HRM) and Financial Management Systems (FMS) sold to "large complex enterprises". *Elzinga* cited several sources to substantiate these claims, namely so-called discount approval forms (DAFs)[28], a report on the HRM market by Gartner Research, information from customers and consulting firms and internal documents from firms in the sector. Of them, the analysis and tabulation of more than 200 DAFs from Oracle had the greatest weight. They showed that the presence of PeopleSoft and SAP (122 and 81 times, respectively) served as the primary justification for extraordinary discounts, while smaller competitors were of much les significance (16 times for Lawson and less than 10 times each for Microsoft and AMS).

In geographical terms, the DoJ and *Elzinga* claimed the relevant market to be limited to the United States (*US,* 131-134). The main justification was the purportedly "local" and on-going relationship between the vendor and the consumer. *Elzinga* also presented market shares and HHI numbers calculated on the basis of confidential sales data obtained by the DoJ (*US*, 101-102). He applied a minimum threshold purchase of $500,000 per customer to identify high function FMS and HRM. The market share figures are included in table 2. The calculated pre-merger HHI in the high function FMS market was 2800, which would increase to 3800 post-merger. Regarding the high function HRM market, an initial HHI value of 2800 and a post-

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[26] The discussion on market definition is better documented in the US trial, while more material is available on the analysis of possible anticompetitive effects by the European Commission. The following exposition reflects this imbalance.

[27] Interestingly, these included Philip Wilmington and Richard Bergquist, both high executive officers of PeopleSoft, which opposed the takeover, as well as Richard Allen, formerly at JD Edwards, and Douglas Burgum of Microsoft Business Solutions.

[28] Discount approval forms (DAFs) must be filled in by the firms' salespersons and approved by an official, if the discount to be offered in a certain procurement process exceeds their range of discretion, e.g. 20 to 25 percent in the case of Oracle (*US*, 96).

merger value of 5700 were calculated. All these findings suggested a massive increase in concentration and represented a major reason for the DoJ to intervene against the merger.

Table 2: Different Market Share Calculations in the US Trial (*Source: US,* 102, 137/138)

Company	DoJ/*Elzinga*		Oracle	
	US high-function FMS market (%)	US high-function HRM (%)	Global FMS market (%)	Global HRM market (%)
PeopleSoft	31	50	12	11.3
Oracle	17	18	16.8	3.1
Oracle/PeopleSoft combined	48	68	28.8	14.3
SAP	39	30	19.2	11.9

During the trial, Oracle contested the market definition by the DoJ in a very detailed manner (*US,* 103-124). Oracle also presented a number of industry and other witnesses.[29] Of the greatest importance were, however, the testimonies of the two economic experts *Jerry Hausman* from MIT and *Thomas Campbell* from UC Berkeley. They argued that the applied criteria were inconsistent and too imprecise to justify the vertical separation of the market. More specifically, they would lead to the erroneous exclusion of certain large transactions from the high-function markets.[30] Moreover, inter alia mid-market vendors and incumbent systems had to be included in the product market as viable substitutes. In terms of geographic scope, they argued for worldwide markets relying inter alia on the product characteristics, the location of the market leader SAP in Germany and the empirical observation that prices in Europe constrained prices in the US, and vice versa (*US,* 134-138). Oracle also provided own market share calculations with significantly lower figures both for the merged entity and SAP and, consequently, made the merger appear less anticompetitive. Table 2 compares the figures submitted by the parties.

The Court then found fault with the DoJ's market definition in several respects and, thus, largely followed Oracle (*US*, 124-130; 138-141). It criticised the evidence submitted by the DoJ as "circumstantial and highly qualitative" and pointed out "several shortcomings". Especially the lack of quantitative evidence was decisive: "But the court cannot delineate product boundaries in multi-billion dollar merger suits based upon the mere notion that there is 'something different' about the merging products and all others, especially when that

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[29] These included Richard Knowles of SAP America and Jay Coughlan of Lawson Software.
[30] For example, *Hausman* pointed to the exclusion of the large nationwide insurance company ManuLife as well as firms Johnson & Johnson and Safeway from the high-function market, although they passed the threshold for costumers with high functional needs. The apparent reason was that they bought their EAS from vendors other than Oracle, PeopleSoft and SAP (*US*, 116).

'something different' cannot be expressed in terms to make a judgment of the court have meaning" (*US*, 126). More specifically, in product terms the Court held that inter alia outsourcing and the use of incumbent software presented viable substitutes for certain customers. It also rejected the exclusion of mid-market vendors Lawson, AMS and, in particular, Microsoft, which it expected to become „a major competitor for up-market business" in the future (*US*, 129). Contrary to the DoJ, the Court also found the markets to be global in scope. In this context, the Court explicitly cited the rejection of the Elzinga-Hogarty-Test (by one of its inventors!) as another shortcoming.

3.2.2. The European Commission's Struggle to Delineate the Relevant Markets

The European Commission in turn defined the markets as worldwide in geographic scope and, similar to the DoJ, as comprising high-function FMS and HRM solutions for large enterprises with complex functional needs in product terms (*EU*, paras 55-180; also Monopolkommission 2006, paras 620-628). This was operationalised by certain "proxies", namely net licence value in excess of 1 million € and customer size of at least 10,000 employees or of more than 1 billion € annual revenues. The Commission named SAP, Oracle and PeopleSoft as main suppliers, but it also included Lawson, Intentia, Microsoft and QAD (only FMS) as vendors in the relevant markets. Among the other „occasional bidders", Microsoft received particular attention as to its size, developer capacities and future plans for the relevant products. On that basis, it was finally held to be a mid-market player, but to be able to serve the needs of some large customers and, therefore, to represent a possible competitive restraint on the big players. Finally, the Commission also calculated two sets of market shares despite stated difficulties in obtaining exact figures (*EU*, paras 181-186). Table 3 gives the figures derived from an industry study by Gartner, which are not confined to the relevant high-function markets, but show the total worldwide licences revenues in 2002.

Table 3: Market Share Figures of the European Commission (*Source*: *EU*, para 184)[31]

Company	FMS	HRM
Oracle	16%	13.5%
PeopleSoft	9%	30%
JD Edwards	3%	2.5%
Oracle/PeopleSoft/JD Edw. Combined	28%	46%
SAP	51%	40%
Lawson	4%	9%
Intentia	1.5%	1.5%

[31] The Commission cites the following source*: Gartner, ERP Market Experiences Further Decline: Market Statistics, 2002, published 2003*.

IFS	0.5%	1%
QAD	1%	-
Microsoft	14%	2.5%

The table above shows Oracle, PeopleSoft (including JD Edwards) and SAP to be the main players in both markets. SAP would still clearly lead the market in FMS, whereas a combined Oracle/PeopleSoft would take the lead in HRM. A direct comparison with the figures from the US trial in table 2 is only possible for the figures presented by Oracle, which are arguably based on a comparable market definition. Still, the values differ considerably, thus testifying to the difficulty of obtaining correct figures.

3.3. The Case Assessment on Both Sides of the Atlantic

Following market definition both authorities expected anticompetitive effects to arise from the merger. Although the legal prohibition criteria were different, the theories used by the authorities and the arguments put forward were quite similar. Both focused on non-coordinated or unilateral effects.

3.3.1. The US Trial before the District Court of Northern California

In the trial before the US District Court of Northern California, the DoJ primarily argued that Oracle and PeopleSoft competed in a "localised" sphere (a "node") within the US high function FMS and HRM market, thus giving rise to the potential for significant unilateral effects (*US*, 142-147). An important point was the exclusion of SAP from this "node" because it was deemed to be a weaker competitor being less flexible and having lower reputation in the US. The Court, however, rejected the underlying customer and consulting firm testimonies as well as that from a SAP representative as being too selective. Instead, it pointed at the high market shares of SAP, declaring: "…the most persuasive testimony from customers is not what they say in court, but what they do in the market" (*US*, 146).

In addition, the DoJ relied on regression analyses and a simulation model by his expert *Preston McAfee* of the California Institute of Technology (*US*, 147-151; *McAfee* 2004). Firstly, *McAfee* analysed data obtained from a survey among Oracle sales representatives. Based on a regression with three variables (competitor, net revenue, discount percentage) he concluded that the presence of PeopleSoft had a 0.097 effect on the discount given by Oracle, i.e. 9.7 percent greater discounts. Using a wider dataset including information from the DAFs used by *Elzinga*, he ran a second regression, which produced a 0.136 effect of PeopleSoft's presence. The Court accepted this as evidence of intensive competition between the two firms, while at the time finding it insufficient to establish localised competition between them.

Hence, it called for a more complete analysis including the DAFs by PeopleSoft and SAP. Moreover, the Court found a lack of "thorough econometric analysis" such as diversion ratios (*US*, 156).

Secondly, *McAfee* constructed a calibrated simulation model in order to estimate the post-merger price increases. Publicly available information on the specification details of the model is, however, somewhat scarce. From the verdict as well as from the transcript of *McAfee*'s testimony, it can be inferred that it was an English auction model in order to account for the observed multiple rounds of bidding (*US*, 150-151; *McAfee* 2004). The market shares calculated by *Elzinga* were used as a proxy for how often each competitor wins a contest. The figures were, however, modified in order to incorporate a category of contests, where the customers finally chose not to purchase an integrated EAS package from one of the three firms in the model but bought a point solution elsewhere or kept their incumbent system. *McAfee* assumed two scenarios with figures of 15% respectively 20%. His model also contained an assumption on the degree of competitiveness in the industry prior to the merger. In this context, *McAfee* reportedly introduced a parameter labelled "total value of the product that accrues to the buyer" ("buyer accrual" estimates), for which he took a range of values between 0.5 and 0.9. The higher this figure, the more competitive is the industry. Finally, *McAfee* decided not to incorporate efficiency gains since he did not expect marginal costs to be affected by the merger. On that basis, he expected prices in the high function FMS market to increase by anywhere from 5 percent (0.5 accrual variable) to 11 percent (0.9 accrual variable). In the high function HRM market, he estimated price increases in the order of 13 to 30 per cent.

Taken together, the Court held that convincing evidence of localised competition between Oracle and PeopleSoft was lacking. Moreover, it plainly rejected the simulation model because of its reliance on 'flawed' market share data (*US*, 151). Only at a very late stage of the trial, the DoJ then raised the possibility of coordinated post-merger effects between the merged entity and SAP. The Court, however, also dismissed this variant, mainly because of the heterogeneity of the products and the lack of price transparency (*US*, 141-142). Therefore, the Court concluded that the DoJ failed to establish that the merger would result in anticompetitive effects and declined to issue an injunction against the merger. The Justice Department subsequently decided not to appeal the verdict, although an official called it "disappointing" (*Barnett* 2004, 13; *DoJ* 2004b). This rendered it irrelevant that the Court subsequently rejected Oracle's efficiency defence as well (*US*, 158-162). The company claimed efficiencies to result from two causes, namely significant cost-savings in many areas

of business and an increase in scale, i.e. customer base. The Court, however, found these claims "flawed and unverifiable".

3.3.2. The Arguments of the European Commission

The European Commission, after the initial investigations, found that the transaction would lead to non-coordinated effects and, accordingly, issued a sharp Statement of Objections. This expectation was based, firstly, on the general finding of a "significant group of customers for whom there would essentially be only one supplier left after the transaction" (*EU*, paras 187-189). These included those customers, who prefer to run their software on a non-Oracle database, those who would like to terminate their relationship with one supplier and those who prefer to obtain parts of their software from two different sources. Secondly, the Commission relied on a data set and regression analysis submitted by PeopleSoft (*EU*, para 197). Based on data about the firm's discounting behaviour in 101 competitive bidding situations, this analysis apparently showed a significant influence of the number of bidders on the discount given by PeopleSoft. Thirdly, also at a rather early stage of the proceedings, the Commission constructed a calibrated simulation model in order to estimate the effects of the merger on prices and consumer welfare (*EU*, paras 191-196).

Fortunately, some details of the model were published separately later (*Bengtsson* 2005). The core is a sealed-bid auction model in order to capture the characteristics of the purchase processes of EAS. It is further assumed that the specific needs differ between customers with only them knowing the relative fit of the offered products. The vendors know the identity of their competitors but are uncertain about the relative quality, i.e. the monetary value to the customers. This uncertainty is captured by the standard deviation of average quality. As a consequence, bid behaviour is based on a calculation of expected profits depending both on the price and the probability of winning the contest in question. Costs are ignored in the model since they are assumed to be mostly sunk before an individual contest and, thus, irrelevant to bidding behaviour. Not only the effects on prices are estimated, but also the change in "customer surplus", i.e. the customers' monetary gain from the purchase of EAS. Thereby, the Commission attempted to quantify the effect of the withdrawal of the PeopleSoft product from the market. In order to account for the possibility of efficiency gains, two different scenarios were calculated regarding the average quality of the post-merger product by Oracle ("optimistic"/"pessimistic"). Three suppliers are included, which are meant to resemble SAP, Oracle and PeopleSoft. Eventually, the model was calibrated in order to conform to certain stylised facts of the markets in question, namely the industry perception

regarding the product quality of the three suppliers, observed market shares and estimates on the frequency of unsuccessful bid contests with no sale taking place finally.

On that basis, one model was calibrated to resemble the high-function HRM market. Prior to the merger, the products of SAP and PeopleSoft were considered equal in quality. The (lower) relative quality value for Oracle was then computed from its observed pre-merger market share of 12 per cent. The Commission considered the frequency of unsuccessful bid contests to be in range of 1 to 10 %, which in turn means that the probability of sale in the pre-merger scenario is realistic between 90 and 100%. Finally, efficiency gains in the optimistic scenario then mean that the product of Oracle post-merger equals that of SAP in quality. The complete results are given in table 4 with the grey shaded area representing the realistic range. Generally, a higher degree of quality uncertainty leads to lower prices demanded by the vendors. Accordingly, the price increases are greater for lower levels of uncertainty. In the concrete case prices are expected to rise by 6.8 % in the pessimistic and 14.1 % in the optimistic scenario at the high end of the realistic range of uncertainty. At the low end, they are expected to rise by 21.1 % and 25.5 %, respectively. Taking into account the reduction in choice as well this leads to losses in customer surplus around 38 % in the pessimistic scenario and between 19.2 % and 15.5 % in the optimistic scenario, respectively. All in all, the simulation model clearly suggests anticompetitive effects for the market of HRM software even with substantial efficiency gains.

Table 4: Simulation results for HRM software (Source: Bengtsson 2005, 144)

Uncertainty (st.dev.)	0.1	0.2	0.3	0.4	0.5	0.6	1
Relative quality of Oracle	0.886	0.772	0.658	0.5475	0.45	0.3635	0.05
Market share of Oracle (%)	12.0	12.0	12.0	12.0	12.0	12.0	12.1
Effects on price (%)							
Pessimistic	48.6	48.5	39.4	21.1	11.3	6.8	1.5
Optimistic	37.5	37.5	35.7	25.5	17.9	14.1	9.0
Probability of sale (%)	100	100	100	99.5	97.2	93.7	80.5
Effect on customer surplus (%)							
Pessimistic	-12.1	-26.2	-37.8	-39.0	-38.2	-37.8	-38.1
Optimistic	-5.5	-12.0	-18.6	-19.2	-17.0	-15.5	-13.5

The results were equally clear-cut for the specification resembling FMS and, in fact, showed detrimental effects of an even greater extent. The entire results are listed in table 5. This time, the Commission firstly used for calibration the stylised fact that SAP offers a superior product quality than the other two producers, whose products are of equal quality. The results for a standard deviation equal to one could, therefore, not be calculated since this would have required negative qualities for both Oracle and PeopleSoft. Secondly, the pre-merger market shares of Oracle and PeopleSoft were taken to be roughly equal around 15 % each. The optimistic scenario as regards efficiencies here means a 10 % improvement in quality for Oracle's post-merger product due to merger-related synergies. Again judging from the pre-merger probability of sale the range of realistic results this time covers standard deviations between 0.3 and 0.5, which again represent the grey shaded columns three to five in table 5. Accordingly, the expected price increases ranged from 13.9 % to almost 30 %, while the loss in customer surplus amounted to 17.9 % - 25.2 %. Taken together, the simulation results clearly indicate anticompetitive effects for the FMS market, which are not outweighed by efficiency gains.

Table 5: Simulation results for FMS (Source: Bengtsson 2005, 146)

Uncertainty (st.dev.)	0.1	0.2	0.3	0.4	0.5	0.6	1
Relative quality of Oracle and PeopleSoft	0.842	0.685	0.528	0.405	0.308	0.217	n. a.
Market share of Oracle and PeopleSoft (%)	15.0	15.1	15.0	15.0	15.0	15.0	
Effects on price (%)							
Pessimistic	41.9	41.9	29.9	18.5	14.3	12.1	
Optimistic	27.3	34.8	28.0	17.8	13.9	11.9	
Probability of sale (%)	100	100	99.72	95.88	89.64	83.51	
Effect on customer surplus (%)							
Pessimistic	-8.1	-19.3	-25.2	-21.4	-19.2	-18.1	
Optimistic	-5.5	-12.0	-18.6	-19.2	-17.0	-15.5	

During the further course of the proceedings, however, the Commission backed away from these initial findings. On the one hand, the initial market definition turned out to be too narrow, especially with regard to the number of relevant suppliers. Hence, the Commission refrained from basing its final decision on the described simulation results (*EU*, para 196).

Moreover, the regression analysis of PeopleSoft's discounting was later discarded as "rather crude and simplified" and "based on a somewhat limited number of bids" (*EU*, para 197). On the other hand, new evidence became available in a later phase of the proceedings, above all data by Oracle on its bidding behaviour (*EU*, paras 137-144; 198-205). The first dataset covered 728 bids from the period 2001-2003. Two more datasets stemmed from the US proceedings and were derived from Oracle's internal discount approval forms and its North American Sales Representative Survey. None of the analyses showed a distinctive influence of the identity or the number of the bidders. Especially once the size of the deal was included as a variable, the number of bidders had no more explanatory power on the level of discounts granted. Taken together, this apparently convinced the Commission that it could not sufficiently prove unilateral effects. Like the US Court, it also rejected the finding of coordinated effects (*EU*, paras 206-214). The main reasons were the difficulty of reaching a common understanding as regards the terms of coordination, asymmetry in market shares, heterogeneity of products and reduced market transparency.

With regard to the EU proceedings, additional case-specific factors may have been relevant at the time the decision was reached (*Ruiz Calzado* 2005). Firstly, the failure of the DoJ to successfully challenge the merger before the court may have influenced the Commission to clear the case (*Fox* 2005, 586-587). Secondly, the "gap" discussion with regard to the old Merger Regulation, under which Oracle-PeopleSoft was notified, may have played a role.[32] Thirdly, the Commission possibly wanted to avoid another defeat before the Court of First Instance in the face of the previously lost high-profile cases Tetra Laval-Sidel, Airtours-First Choice and Schneider-Legrand (see also *Stroux* 2002; *Temple Lang* 2003).[33]

4. Discussion and Reflections

4.1. Comparison of Market Definition and Competitive Assessments

The course and the final outcome of the proceedings in the US and in the EU show a number of fundamental similarities. The merger initially raised serious concerns by both competition authorities. To begin with, both authorities based their concerns on a relatively narrow product market definition (horizontal and vertical division of the EAS market; see sec. 3.2). Restricting the market to certain high-function software packages sold to large customers made the case appear as a 3-to-2 merger with SAP and the combined Oracle/PeopleSoft being the relevant suppliers. In both cases, however, this market definition came under attack in the

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[32] Some indication can be found in *EU*, para 187.
[33] Case T-342/99 – Airtours v Commission, 06/06/2002; Case T-310/01 - Schneider Electric v Commission, 22/10/2002; Case T-5/02 – Tetra Laval v Commission, 25/10/2002.

course of the proceedings. The complete exclusion of smaller suppliers such as Lawson and Microsoft turned out to be a particularly vulnerable point. However, particularly regarding the EU case, the question arises why the simulation model has not been extended once it was realised that more competitors (though at present significantly smaller ones) had to be taken into accounted. *Botteman* (2006, 96, footnote 95) reports that "(…) Claas Bengtsson, the economist from the Office of the Chief Economist who acted in this case, explained that the integration of additional players into the model no longer resulted in consistent – across the board – price increases." If it is true that an extended simulation model inevitably produced inconclusive results (i.e. price increases are still forecasted for the majority of scenarios but not throughout all scenarios) due to the increased complexity, then the simulation method did not suffice in providing unambiguous evidence, and, thus, did not contribute to overcome the shortcomings of qualitative assessments.

Concerning the features of the employed simulations models, the US and the EU model differ in regard to their respective specification details. In terms of the auction mechanism, *McAfee* used an English auction model (also ascending bid, oral or open auction). One key point is the assumption of complete information, since the bidders are aware of each other and bids are announced publicly. Moreover, as stated in his testimony, *McAfee* assumed the bidders to know the buyers' valuation of their own and the others' products. By contrast, the Commission opted for a (presumably first-price) sealed bid auction model. Therein, each bidder is assumed to independently submit a single bid, without seeing the other bids. Further information asymmetries were assumed with the value of the product being private knowledge of the customers. In addition, the economists relied on differing market definitions and hence on different market statistics to calibrate their models.[34]

Table 6: Comparison of Selected Simulation Results

Expected price increase in market	McAfee	European Commission[1]
High Function FMS	5 – 11 per cent	6.8 - 21.1 per cent
High Function HRM	13 – 30 per cent	14.3 - 29.9 per cent

[1] For reasons of comparability the figures relate to the pessimistic scenario without efficiencies.

Both models, however, employ rather basic auction mechanisms given the variety of models currently available (e.g. *Klemperer* 2004). Despite the differences, the simulation results for comparable settings yield quite similar figures in terms of expected price increases as table 6

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[34] Unfortunately, the concrete figures used are not published comprehensively so that a direct comparison is impossible.

demonstrates.[35] Prima facie this adds force to the expectation of higher post-merger prices since it indicates a certain robustness of the findings. This can, firstly, be qualified by a look at the theoretical and empirical work in economics on auctions. On a general level, *Vickrey* (1961) established the "revenue equivalence theorem", which states that under certain conditions sealed-bid and open auctions yield equivalent results. There is also some empirical support for this proposition e.g. from US timber auctions (e. g. *Hansen* 1986). Secondly, the work on (unilateral) merger effects in auction markets[36] is also relevant here. *Tschantz et al.* (2000) demonstrate the similarity of effects under different auction settings. This finding in turn serves to confirm the technical quality of both simulation models used in the Oracle/PeopleSoft case. Moreover, *Tschantz et al.* (2000) establish the degree of symmetry between the merging and the non-merging firms as a crucial conditional factor. This helps to explain the uniform finding of larger expected price increases in the HRM market, where the merged entity would achieve a market position comparable to that of the remaining competitor SAP. Thus, judging from the general work on auctions in economics, the pattern of results of the studies used in Oracle/PeopleSoft seems plausible.

In summary, the independently created and differently specified merger simulation models of the US and the EU both produced clear and plausible results: the merger was forecasted to be price increasing and customer welfare reducing. Yet, despite the unambiguous result of the economic instruments, the DoJ failed to prove its case in the courtroom and the Commission, after initially submitting a sharp Statement of Objections, finally cleared the merger without significant conditions or remedies - a rather rare event in EU Merger Control. Nevertheless, both the US Court and the European Commission explicitly endorse the usefulness of simulation models for the impact assessment of mergers (*US*, 45; *EU*, para 195).[37] Accordingly, a stronger use of this method in the future can be expected. Hence, it is worthwhile to analyse the lessons from the failure of the two best-equipped antitrust authorities in the world in order to prove the anticompetitive effects of the Oracle/PeopleSoft merger by using merger simulation models and to inquire whether there are systematic problems associated with sophisticated economic evidence. The latter would hint to reform

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[35] Comparable settings here refers to the range of the parameters figures in the EU model, which were characterised as realistic above. i.e. where the probability of sale lies between 90% and 100%.

[36] See fn. 5 above.

[37] For instance, the European Commission wrote: "The Commission therefore maintains as a general point that this kind of simulation model can be a useful tool in assisting the Commission in making the economic assessment of the likely impact of a merger" (EU, para 195).

pressure in merger policy in order to avoid cumulating erroneous permissions of anticompetitive mergers ("false positives").[38],[39]

4.2. Lessons from and Problems beyond Oracle

4.2.1. Market Definition Does Matter!

A lesson from Oracle/PeopleSoft is that, despite contrary claims, market definition does matter in unilateral effects cases with merger simulation models. The controversy over the adequate market delineation and the subsequent derivation of market shares represented a decisive element in the respective merger control proceedings. To some extent, the initial analysis of the DoJ (as well as the initial stance of the Commission) was indeed problematic. Irrespective of the adequacy of separating so-called high-function markets, the exclusion of all competitors except for SAP, Oracle and PeopleSoft seems to be factually controversial and at least with regard to potential competition inadequate (Microsoft as a 'small' but financially powerful competitor with shining prospects in the market).

However, from a theoretical perspective, market delineation problems should generally not be important in unilateral effects analysis with differentiated products since the market delineation becomes somewhat endogenous (e.g. *Walker* 2005, 476-477; *Werden* 2005, 45). In heterogeneous oligopolies, the competitive distance between the market participants differs and, since merely oligopolistic mergers of oligopolists supplying comparably close substitutes are relevant, the outside border of the relevant market (i.e. the oligopolists with the lowest cross-price elasticity to the overtaking enterprise, which, yet, is just high enough to be considered within the market) is not so decisive. In Oracle-PeopleSoft, the US Court explicitly assessed it to be a considerable advantage of unilateral effects analysis by merger simulation models that they may replace the ambiguous task of delineating the relevant markets.[40]

However, the necessity to calibrate simulation models with the current market situation actually requires (i) to identify all relevant competitors and (ii) deriving their accurate market

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[38] A type I error is said to occur, if a merger with negative welfare effects is wrongly allowed ("false positive"), whereas a type II error denotes an erroneous prohibition of a merger, which would have increased welfare ("false negative"). The terms are, however, used inconsistently in the literature. We follow *Polinsky/Shavell* (1989).

[39] However, there might be a rather simple alternative explanation for the outcome of the Oracle-PeopleSoft case that cannot be neglected: the merger was procompetitive and both the US and the EU authorities, the two best equipped antitrust authorities in the world, initially produced flawed competitive assessments of the case (thus, a prohibition would have represented a type II-error or "false negative"). We do not want to evaluate how likely this is. If this was indeed true, however, our question would alter to: why did the use of sophisticated quantitative economic techniques led the agencies to a wrong assessment in the first place? This is especially relevant since the Oracle/PeopleSoft case reportedly took up a substantial part of the enforcement resources of the authorities (e.g. *Barnett* 2004, 12-13).

[40] "Merger simulation models may allow more precise estimations of likely competitive effects and eliminate the need to, or lessen the impact of, the arbitrariness inherent in defining the relevant markets" (US, 45).

shares. In practice, the 'inherently arbitrary' task of delineating the relevant markets cannot automatically be avoided by the implementation of merger simulation models. Ironically, the court rejected the simulation model exactly because it did not consider all relevant competitors and failed to include all the relevant products[41] – in other words, the results of the simulation model were rejected because of a precedent inadequate market delineation! In fact, experience from the US shows that this is a more general problem.[42]

Despite unilateral effects analysis, in theory, downplays the importance of accurate and exact market delineation, practical merger control policy is ill-advised to take market definition easy. An inaccurate delineation of the relevant market represents a good and easy target for raising doubts on the adequacy of the presented economic evidence in the courtroom. In particular, shadows of doubt can be cast on the validity of the results of merger simulation models, allowing the opposition to completely discard the model. In consequence, the 'ambiguous' and 'arbitrary' task of market definition remains an important ingredient of merger control.

4.2.2. On the Nature of Predictive Economic Evidence

Next to the preceding lesson, Oracle/PeopleSoft reveals two types of general problems with the use of sophisticated economic instruments as predictive, quantitative evidence. The crux with ex-ante merger control is that it requires to 'look into the future' – namely to predict post-merger price and output changes. However, in an indeterministic world, exact quantitative predictions of the future represent an a priori impossibility since the future is not encapsulated in the present. Furthermore, every model must significantly reduce the complexity of reality[43] (otherwise it is of no help[44]). As a consequence, any particular merger simulation model is highly sensitive to the chosen assumptions (e.g. *Walker* 2005, 479-483; *Werden* et al. 2004, 14-21). Since it is impossible to comprehensively include realistic assumptions (i.e. no complexity reduction), a particular merger simulation model is generally subject to criticism regarding the adequacy of its assumptions.

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[41] The Court wrote: "Accordingly, because this merger simulation is based upon these unreliable data, the court concludes that the simulation results are likewise unreliable" (US, 151).

[42] Similarly, an economic model was rejected by an US court because of a deficient market delineation producing wrong market shares in Concord Boat vs. Brunswick Corp. (*Walker* 2005, 486-487). In another case, the merger between two of the three leading suppliers of computer disaster recovery services (SunGard Data Systems and Comdisco, in 2001), the DoJ suffered defeat before the court in an unilateral effects case and again the issue of market definition and the availability of substitute solutions played a crucial role (*Gidley/Balto* 2002).

[43] See for example *EU*, para 193: "For models to be mathematically tractable it is necessary to make simplifying assumptions and in this process it is important to ensure that the essential mechanisms that are left in the model adequately reflect the reality."

[44] "A model which took account of all the variegation of reality would be of no more use than a map at the scale of one to one." (*Robinson* 1962, 33).

It is important to realise that neither aspect speaks against the use of simulation models and econometrics in merger control proceedings. However, exorbitant expectations and excessive demands on predictive economic evidence must be avoided. Economic tools are different from (foretime-oriented) natural science-evidence methods such as genetic fingerprints (identifying a concrete individual with 99.9 % certainty) and cannot quantify the future development of the relevant markets at comparable certainty levels. Instead, they can describe scenarios against the background of clearly defined and explicit assumptions. This insight yields a couple of implications:

- Generally, there is not only one 'right' model to describe a given merger. The inevitable necessity to simplify the actual case and the consequent possibility to produce competing models with (sometimes diametrical) differing results renders the consensual identification of the single 'right' model highly unlikely. The parties to the merger control procedure – the competition authorities, the merging enterprises, competitors of the merging enterprises – have differing interests and, thus, competing models with mutually incompatible predictions about the (pro- or anti-) competitive impact are likely to be produced and injected into the procedure.[45] Actually, in many merger control procedures, competing models were presented.[46] Diverging interests of the merging parties (due to its character as a hostile takeover) motivated in Oracle-PeopleSoft even one of the parties to the merger – PeopleSoft – to provide economic evidence supporting the anticompetitive effects of the merger. Therefore, concurring simulations models producing divergent predictions are likely to be the rule instead of the exception.

- If the results of merger simulation models shall be used as evidence in the courtroom, the applicable standard of proof must be adjusted to the nature of predictive economic

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[45] *Posner* (1999, 1536-1538) refers to this as the problem of partisanship inherent in expert testimonies. However, even if no interests were involved, the simplifying character of all models can prevent an unambiguous identification of the best suited model. The complexity reduction of different models can refer to differing parameters of the real case, so that competing models can be equally distant to the real case – and, nevertheless, produce incompatible predictions about the (pro- or anti-) competitive impact. Arguing theoretically rigorous, in such an extreme case, it is impossible to identify the relatively best model – even in the (unrealistic) absence of distortions through interests.

[46] A prominent example is the GE/Honeywell merger of 2001, which provoked intense debates not only between the US and EU authorities but also among economists (e.g. *Patterson/Shapiro* 2001; *Drauz* 2002; *Evans/Salinger* 2002; *Nalebuff* 2002; *Pflanz/Caffarra* 2002; *Reynolds/Ordover* 2002; *Gerber* 2003; *Morgan/McGuire* 2004). The most prominent non-merger case is probably Microsoft, where numerous economic experts produced strongly differing evidence, almost covering the complete spectrum between pro- and anticompetitive effects (e.g. *Bresnahan* 2001; *Fisher/Rubinfeld* 2001; *Gilbert/Katz* 2001; *Schmalensee* 2001; *Werden* 2001; *Evans/Nichols/Schmalensee* 2005).

evidence.[47] For instance, given its characteristics (simplifying models, contestable assumptions, imperfect foresight), a beyond reasonable doubt (i.e. certainty) standard is inappropriate, in particular in combination with a one-sided burden of proof allocation (since no model can mirror the real case to a waterproof extent). The inherent problems with the standard of proof in merger control were also highlighted by the CFI's recent Impala Judgment[48] (also *Aigner et al.* 2006).

- Quantitative economic evidence needs to be accompanied by qualitative reasoning and 'traditional' evidence. For instance, the econometric evidence presented by Oracle during an advanced phase of the merger control proceedings demonstrated that neither the participation of PeopleSoft, nor the number of bidders provided explanatory power for the amount of discounts granted by Oracle (see section 3.3). Apart from discussing the validity of the data and the explanatory adequacy of the econometric model[49], it would be interesting from an economic perspective, however, to discuss the implications for competition in these markets and Oracle's position in it. In economics, it is not a trivial phenomenon that the number of competitors does not influence the price-setting behaviour of an oligopolist (ostensibly) without market power. Furthermore, what does it imply for the heterogeneity/homogeneity of the oligopoly that the identity of the bidding competitors is without significant influence? In addition, an overwhelming amount of (though more anecdotic) evidence from the witness testimonies stood in sharp contrast to the econometric insights.[50] As far as information is publicly available, neither of these questions has been discussed in order to appropriately interpret and assess the results of the econometrics.

In summary, securing the considerable benefits of predictive economic evidence in merger control cases demands an adequate framework for their employment.[51] This particularly includes accompanying ('traditional') analysis and a realistic view on the capability and explanatory power of sophisticated economic instruments.

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[47] See for an elaborate and formal analysis of the interplay between standards of proof and predictive economic evidence against the background of Oracle/PeopleSoft *Budzinski/Christiansen* (2006). See more generally *Botteman* (2006), *Lindsay* (2006, 66-75) and *Vesterdorf* (2005).

[48] Case T-464/04, *Impala v Commission*, Judgment of the Court of First Instance, 13/07/2006.

[49] Since the respective information is confidential and not publicly available, a respective assessment cannot be made. Therefore, we assume that the econometric analysis is perfectly accurate.

[50] See section 3 of this paper and particularly *Bengtsson* (2005).

[51] A related aspect of securing the fruitful contribution of economics to competition policy enforcement concerns the adequate degree of differentiation both in the underlying rules and in case-specific analysis. As a general condition, the increasing costs of engaging in case-by-case economic analyses instead of relying on more general rules must be weighed against the improvement in decision quality. See in more detail *Christiansen* (2006, 30-38) and, in particular, *Christiansen/Kerber* (2006).

4.2.3. The Nature of Competition

A second line of general problems lies in the nature of competition itself. Merger simulation models focus on short-term price and output effects. However, there is more to competition than these important effects. Competition represents a superior coordination mechanism for economic behaviour because it induces allocative efficiency (short-term welfare effects), innovative efficiency (long-term welfare effects), adaptive efficiency (keeping the economy flexible regarding changing environments; evolutionary welfare effects), consumer sovereignty (producers are induced to adjust their supply according to the preferences of the consumers), and contributes to economic freedom (liberal welfare effects) (*Budzinski* 2004, 15-16). *Scheffman* (2004) and *Walker* (2005, 487-488, 489-490) point out that non-quantifiable and non-price elements of competition – like e.g. barriers to entry and exit, buyer power, brand, promotion and placement effects, shelf space competition, strategy effects on/of market participants, etc. – can hardly be included in merger simulation models since the available price-theoretic standard models (Bertrand and Cournot oligopoly competition; auction models) do not capture these dimensions of competition.[52] Furthermore, the dynamic and evolutionary dimension has to be taken into consideration. Competition is an evolutionary process of creative and adaptive (re-) actions, inherently dynamic and endogenously producing innovation. The innovation-generating dynamics of competition, which imply that the process of competition is not perfectly anticipatable, represent the core of competition theories in the legacy of Schumpeter.[53]

Econometric evidence necessarily relies on past data. Merger simulation models, which are calibrated with past and present market data and stylised market facts (e.g. market shares; in Oracle-PeopleSoft among others also estimates on the frequency of unsuccessful bidding processes), implicitly assume that the patterns of competition in the respective market can be extrapolated from the past to the future. However, at the heart of Schumpeterian competition lies the creative character of competition, destructing hitherto existing patterns and creating new ones, generating innovation in a broad sense (encompassing new products, new processes and technologies, but also new modes of behaviour). Particularly a merger in a narrow oligopoly represents a profound change in the competitive environment. This considerably enhances the likelihood of 'structural interruptions', making extrapolations particularly problematic. For instance, in Oracle-PeopleSoft, the future role of Microsoft (either increasing its engagement in the high-function market or concentrating on alternative markets) represents one such factor, while the evolving technological requirements in this innovation-

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[52] See also the *Froeb/Scheffman/Werden* (2004) debate.
[53] See e.g. *Clark* 1963; *Kerber* 1994; *Metcalfe* 1998; *Langlois* 2001; *Budzinski* 2003, 19-25; *Kerber* 2006.

intensive market another one. To which extent does the econometric insight that PeopleSoft was no particular constraint on Oracle in the past imply that it will not be in the future (if the merger is blocked)?

Schumpeterian and evolutionary competition theories emphasise the dynamics of competition and its innovation-generating character. Therefore, it becomes important that the markets remain open and prone to evolutionary dynamics (as opposed to sclerotic structures). The strengths of the economic techniques discussed in this paper refer to the important short-term price and output effects. The more long-term dynamic and evolutionary effects are much more difficult to predict quantitatively. However, they are equally important regarding the overall welfare effects. If longer-term, non-quantifiable effects are neglected, long-term welfare losses must be expected.

Thus, *dynamic and evolutionary competition economics* should be included in the overall competitive assessment.[54] Qualitative aspects are as important as quantitative ones as the future is not determined and, thus, not perfectly predictable (the merger event itself can cause structural interruptions, etc.). Open markets and maintaining the adaptability and innovation capabilities of markets in the future represent targets of competition policy that are equally important as short-term efficiency effects in regard to overall, short- plus long-run welfare. A more systematic integration of evolutionary and dynamic competition economics could lead to the adoption of a *principle of caution* according to which in case of doubt (i.e. insecurity about the short-term effects) a primacy of the protection of agile competitive markets (and a frustration of paths to sustainable sclerotic, inelastic markets) is implemented.

5. Concluding Remarks

Unilateral effects analysis represents an increasingly important part of contemporary merger control both in the US and the EU, particularly with regard to oligopolistic mergers. Competition economics has developed a number of sophisticated tools for practical application such as econometric analyses of market data as well as the construction of simulation models in order to quantify the case-specific effects. The review of the merger between software firms Oracle and PeopleSoft in 2003/04 has been the most important instance of parallel application of the simulation technique by the European Commission and the US Department of Justice so far. The in-depth study of the case going from the controversial issue of market definition to the specificities of the competitive assessment highlights more similarities than differences between the EU and US. Interestingly, despite

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[54] For first approaches and comparable suggestions, albeit for different areas of competition policy, see e.g. *Audretsch et al.* 2001; *Kerber/Vezzosso* 2005; *Langlois* 2001; *Budzinski* 2004.

serious initial concerns the transaction was not blocked nor even required to be modified in the any of the two jurisdictions. We derive a number of interesting insights and, in particular, point out problems and lessons associated with the use of sophisticated economic tools in contemporary merger control. In addition to case-specific factors, the major insights encompass the continued relevance of market definition, the need to accompany predictive economic evidence with compatible reasoning and the benefits of including the economics of dynamic and evolutionary competition.

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