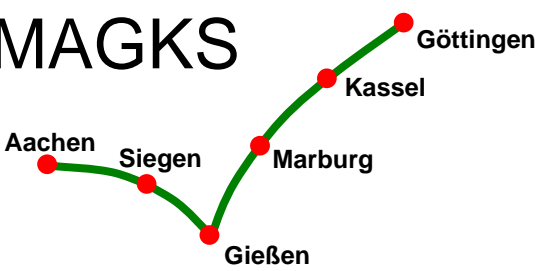


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A Note on Competing Merger Simulation Models in Antitrust Cases: Can the Best Be Identified?

Oliver Budzinski[#]

Abstract: Advanced economic instruments like simulation models are enjoying an increased popularity in practical antitrust. There is hope that they – being quantitative predictive economic evidence – can substitute for qualitative structural analysis and lead to unambiguous results. This paper demonstrates that it can be theoretically impossible to identify the most appropriate simulation model for any given merger proposal. Due to the inevitable necessity to reduce real-world complexity and multi-parameter character of merger cases, the comparative fit of proposed merger simulation models with mutually incompatible predictions can be the same. This is valid even if an ideal antitrust procedure is assumed. This insight is important regarding two aspects. First, the scope for partisan economic evidence cannot be completely eroded in merger control. Second, simulation cannot eliminate or substitute for qualitative reasoning and economically informed common sense.

JEL: L40, C15, K21, A11

Keywords: merger simulation, merger control, antitrust, economic evidence

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1. Introduction

Advanced economic instruments like econometric methods and, in particular, simulation models are enjoying an increased employment in practical antitrust. Since merger control must take a forward-oriented approach in the sense that it attempts to evaluate the likely effects on competition resulting from the merger, i.e. future effects, simulation models represent an especially attractive tool for an ex ante competition policy.¹ They are, however, somewhat connected to (ex post) econometric analysis, since the (most commonly game-theoretic oligopoly) models must be calibrated with past data in order to reproduce the relevant market as it is now. Against the background of the calibrated model, the effects of the proposed merger on market prices and quantities as well as on consumers and producers rents are predicted.²

The availability of these advanced techniques to quantitatively predict merger effects plays an important role for the increasing economization of antitrust, starting with the sometimes labelled Post-Chicago antitrust policy in the U.S. (Brodley 1995; Baker 1999a; Hovenkamp 2001) and continuing for instance with the so-called more economic approach in European competition policy (Christiansen 2006; Neven 2006; Röller & Stehmann 2006; Budzinski 2008a).³ The practical use of these instruments as quantitative economic evidence, however, poses a couple of challenges. One obvious but important one is the need to identify the ‘right’ – the most appropriate – model for any given case. This problem has two dimensions,

(i) a policy dimension that refers to party interests (including experts working for the competition authority or the merging companies or their competitors/customers/suppliers) as well as to the problem whether law courts are sufficiently equipped to understand and appropriately deal with the proposed models, and

¹ This stands in contrast to cartel policy that deals with detecting and sanctioning illegal collusion pursued by market participants and, therefore, necessarily represents an ex post competition policy. The third traditional area of antitrust, the governance of abusive and predatory strategies, in particular by dominant and powerful market leaders, somewhat represents a mixture of ex ante and ex post competition policy: while the controversial strategy usually is actually taking place at the point of time of the antitrust intervention, the ex post element, its effect on competition in the relevant market often at least partly relate to the future (f.i. the predatory strategy has not yet driven the adversely affected competitors off the market), the ex ante element.

² “Merger simulation is an approach for predicting post-merger prices using information about pre-merger market conditions, while building on assumptions about the behavior of firms and costumers” (Weiskopf 2003).

³ In Europe and in particular in Germany this has recently triggered a lively debate about the adequate role model and guiding principles for competition policy (e.g. Hellwig 2006; Mantzavinos 2006; Haucap 2007; Gormsen 2007; Schmidt 2007; Schmidt & Voigt 2007; Schmidtchen et al. 2007; Weizsäcker 2007; Budzinski 2008a, 2008b; Kerber 2008).

(ii) an analytical dimension that deals with the principal availability of a ‘best’ model, even if no political or procedural distortions existed.

While there is a considerable amount of literature on the policy dimension, little can be found on the analytical dimension. This paper demonstrates against the background of a simple meta-theoretical model that analytical limitations to the identification of the most appropriate model for any given merger proposal exist.

2. Merger Simulation Models in Antitrust

Merger Simulation Models (MSMs) are based upon assumptions regarding market behaviour of suppliers and customers and contain several parameters:⁴

- a. Choice of a functional form for demand that appropriately matches customer behaviour. Frequently proposed models include linear, log-linear, logit, AIDS (Almost Ideal Demand System) or multiple-step demand.
- b. Derivation of own- and cross-price elasticities (either via estimation or via empirical deduction).
- c. Decision about (relevant) competitors that shall be included in the model. This can partly be a consequence of the derived cross-price elasticities (market delineation); however, sometimes the estimation of elasticities demands some kind of pre-decision about relevant competitors itself. Furthermore, mathematical feasibility might represent a limitation here.
- d. Calibration of the demand systems. The parameters are specified in such a way that the calculated elasticities as accurate as possible yield the prices and market shares actually observed in the pre-merger market (at a – somewhat arbitrarily – defined point of time).
- e. Decision about the competition model. Competitive interaction is modelled by assuming an oligopoly model that most closely describes the competition between the firms in the market. Typical choices are (homogeneous and heterogeneous) Cournot models, (heterogeneous) Bertrand models and auction models. Note that the chosen form of competition pre-merger must be prolonged into the post-merger

⁴ There is an extensive amount of excellent literature on MSM, in particular on the technical issues, that cannot be reproduced here comprehensively. Seminal contributions including an overview character include Baker & Rubinfeld (1999); Epstein & Rubinfeld (2001), Weiskopf (2003), Ivaldi & Verboven (2005), and Werden (2005).

equilibrium. A merger-induced change in the way the firms are competing with each other can typically not be accounted for (due to the implied lack of empirically sound calibration).

- f. Calibration of the supply systems including derivation of marginal costs (and other cost figures) (either via estimation or via empirical deduction).
- g. Estimation of expected post-merger effects on costs in order to include efficiency gains from mergers.
- h. Scenario of strategy adaptation, i.e. presumptions about strategy responses to the merger by the merging companies as well as by the remaining competitors (within the chosen competition model, see above), like for instance product repositioning, marketing campaigns, rebate schemes or market exit.
- i. Scenario for the likelihood of post-merger market entries.
- j. Scenario for effects on innovation activities and strategies.
- k. Other industry specific parameters like regulation, external technology development, internationalisation of market boundaries, etc.
- l. Eventually, the new equilibrium after the merger must be simulated using the model that was calibrated with pre-merger empirical data but adjusting market shares to the post-merger situation.

While a – f (and l, of course) represent somewhat necessary elements of a MSM, g – k are often treated more reluctantly due to inherent difficulties for adequate modelling. However, they nonetheless represent important features of the market that are to be simulated.

High hopes are connected to the use of MSMs in practical merger control. “Merger simulation (...) eliminates much of the subjective and idiosyncratic judgment otherwise inherent in the assessment of mergers” (Crooke et al. 1999: 206) and Werden (2005: 43) argues: “With merger simulation, transparent formal economic modelling substitutes for intuition. Merger simulation thereby replaces subjective and unverifiable surmise with objective and verifiable calculation”.

One of the first ever antitrust cases in which a MSM was used⁵ is Interstate Bakeries/Continental Baking (U.S. 1995). The U.S. Department of Justice commissions the development of a MSM based upon Bertrand competition and logit demand. However, the model did not influence the outcome of the case which was settled by an out of court agreement (Werden 2000). In Kimberly-Clark/Scott (U.S. 1995), the developed MSM remained inconclusive regarding its results (Hausman & Leonard 1997). The first successful use of MSM is usually ascribed to Staples/Office Depot (U.S. 1997), a merger related to the U.S. market for office products (in particular wholesaling). The availability of a large amount of scanner data allowed for a comprehensive calibration of the MSM that predicted post-merger price increases by about 10 per cent in average. During the procedure, the merging parties presented their own simulations that diverged in terms of the employed econometric methods (yielding contrary results) while accepting the model designs. Although the law court did not substantially rule about the differing econometric methods, the Federal Trade Commission eventually succeeded and the merger was blocked (Baker 1999b; Baker & Rubinfeld 1999).⁶

The European Commission employed a MSM during the control procedure of the eventually abandoned Volvo/Scania merger proposal (1999-2000). Against the background of Bertrand competition and nested logit demand, price increases ranging from 7 to 23 per cent were predicted, at maximum reduced by 5 per cent points due to potential efficiency gains (Ivaldi & Verboven 2005). However, the model received harsh criticism because of its simplifying assumptions as inter alia the ignorance of rebates, triggering the comment of Walker (2005: 478): “a study based on prices nobody pays for trucks“. The Commission eventually dropped the MSM. This was different in Lagardère/Natexis/VUP (2003) when the Commission referred to the commissioned Bertrand competition and nested logit demand MSM (regarding specific publishers markets) in its decision – as one of many parts of evidence (Ivaldi 2005). The merger was conditionally cleared. Within the EU Member States, the Nuon/Reliant case (Netherlands 2003; energy markets) involved competing models by the competition authority and the merging parties with the consequence that the court dismissed the MSMs altogether as being unreliable and arbitrary (da Maa & Zwart 2005).

Cases involving both the EU and the U.S. are General Electric/Honeywell and Oracle/PeopleSoft. In GE/Honeywell (2001; aviation techniques) competing and incompatible

⁵ The following does not attempt to provide a comprehensive listing. Instead, it is merely referred to landmark cases. A much larger body of cases exists in which MSMs played some (although often no decisive) role.

⁶ The MSM was one element of a much broader body of evidence against the merger.

models not only resulted from the involvement of the merging parties but also from differing assessments about the appropriate basic models among the competent merger control authorities. Referring to different concepts of industrial economics, namely different theories of leveraging, the U.S authorities concluded clearance whereas the Commission prohibited the merger. Specialised economists reflect these incompatible stances in their theoretical treatments of the case (Evans & Salinger 2002; Nalebuff 2002; Reynolds & Ordovery 2002; Gerber 2003) – without achieving consensus. In Oracle/PeopleSoft (2003; software industry) both the U.S. antitrust authorities and the European Commission developed a simulation model. Despite using different auction designs, both models predicted significant and considerable anticompetitive price increases within a comparable range as a consequence of the merger proposal. However, the U.S. antitrust authorities failed to prove their case in the courtroom, in particular because Oracle managed to cause doubts about the appropriateness of the employed MSM. Weeks after the U.S. court decision, the European Commission made an u-turn and cleared the merger despite it previously had announced its intention to challenge it (Budzinski & Christiansen 2007).

A famous non-merger case with conflicting models about the (anti-) competitive effect is Microsoft, where the economic experts of the parties (in studies and in testimonies) concluded welfare effects ranging from severe damages for consumer welfare up to compelling advantages for consumers due to immense efficiencies. This also triggered an academic debate that failed to reach a consensus about the appropriate model for this case (Bresnahan 2001; Fisher & Rubinfeld 2001; Gilbert & Katz 2001; Schmalensee 2001; Werden 2001; Evans et al. 2005).

Different from forensic economics (and its methods), merger simulations deals with the prediction of effects that lie in the future. Therefore, they – for principle – entail a larger degree of uncertainty that, moreover, is more difficult to quantify, than forensic methods that attempt to identify facts of the past. This enhances the sensitivity of the instrument in regard to the adequateness of the model assumptions. Each MSM inevitably must simplify the underlying real case (complexity reduction) in order to create meaningful information. With the words of Joan Robinson (1962: 33): “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.”

At the same time, the inevitable simplification and complexity reduction offers scope for the construction of competing models and their injection into antitrust cases by interested parties – as it has happened in the some of the existing cases of the application of MSM (see above).

As a consequence, a selection problem comes into existence: which MSM among the competing proposals is most adequate for a given case, i.e. mirrors most closely the relevant features of the simulated real case / market? The multi-parameter character of merger cases (see above a – 1) implies that different models with mutually contrary conclusions regarding the pro- or anticompetitive impact of a given merger proposal refer to differing ways of reducing real-world complexity. In other words, the elaborate modelling of one parameter usually comes at the expense of a stronger simplification of another, so that incompatible MSMs of the same case simplify on different parameters or, respectively, put their modelling emphasis on different parameters.⁷ This selection problem possesses two dimensions:

- (i) The policy dimension refers to political interests of experts (working for the competition authority or the merging companies or their competitors, customers or suppliers) as well as to the problem whether law courts and judges are sufficiently equipped to understand and appropriately deal with the proposed models. The procedural challenges posed by concurrent economic expert testimonies are intensively discussed in the literature (e.g. Mandel 1999; Posner 1999; Hovenkamp 2002).
- (ii) Apart from this reasoning, the analytical dimension refers to the theoretical availability of a ‘best’ model. If no distortions by biased experts, interested parties and insufficiently equipped authorities existed (*ideal antitrust procedure*), would it then be possible to unambiguously identify the most appropriate model among the available ones – given that each model must simplify reality?

3. A Simple Theory of the Comparative Fit of Merger Simulation Models

3.1 Merger Simulation Models and Reality: Modelling the Distance

As argued in the preceding section, MSMs must necessarily always simplify a given real case and reduce its complexity. Now let any real competitive market be characterised by n parameters so that the vector $\bar{x} = (x_1, x_2, \dots, x_n)$ represents a complete (ideal) representation of that market. Any model $\bar{m} = (m_1, m_2, \dots, m_n)$ necessarily deviates from the real market, thus

$$m_1 \neq x_1; m_2 \neq x_2; \dots; m_n \neq x_n$$

⁷ A simultaneous increase in the complexity of each parameters modelling has its limits because of the necessity to reduce real-world complexity.

always holds. These deviations can differ among a set of models $\bar{m}^\alpha, \bar{m}^\beta, \bar{m}^\gamma, \dots, \bar{m}^\zeta$ constructed to represent (specific/core features) of that market:

$$m_1^\alpha \neq x_1 \wedge m_1^\alpha \neq m_1^\beta \wedge m_1^\beta \neq x_1, \text{ etc.}$$

Conceptually, a distance A between a given model \bar{m}^α and the real market can be defined as the sum of its deviations regarding the individual parameters.

$$A^\alpha = |\bar{x} - \bar{m}^\alpha| = \sum_{i=1}^n |x_i - m_i^\alpha|.$$

3.2 Identifying the Best Simulation Model for a Merger Case: an Impossibility Theorem

Given this conceptual framework, it can now easily be shown that a ‘most appropriate’ model might be impossible to identify even under the assumption of the absence of all types of political and procedural distortions (‘ideal antitrust procedure’). If a model \bar{m}^β possesses the characteristic

$$\bar{m}^\beta \neq \bar{m}^\alpha,$$

however,

$$A^\alpha = |\bar{x} - \bar{m}^\alpha| = A^\beta = |\bar{x} - \bar{m}^\beta|,$$

$$\text{with } \sum_{i=1}^n |x_i - m_i^\alpha| = \sum_{i=1}^n |x_i - m_i^\beta|$$

is fulfilled, then it is theoretically impossible to determine which of the two competing models is closer to reality. The intuition is that while both models have to simplify reality \bar{m}^α simplifies on other parameters than \bar{m}^β . In other words, each model focuses on attempting to represent some – in its view – core features at the inevitable price of neglecting others. Since \bar{m}^α concentrates on other core parameters than \bar{m}^β , both can be equally distant to reality despite being different (and deriving different conclusions for antitrust). The ‘more appropriate’ model cannot even be identified in an ideal antitrust procedure.

A very simple example can clarify this. Imagine the following relations of the parameters of two models \bar{m}^α and \bar{m}^β

$$m_1^\alpha \neq m_1^\beta, m_2^\alpha \neq m_2^\beta, m_3^\alpha = m_3^\beta, \dots, m_n^\alpha = m_n^\beta,$$

with the properties

$$|x_1 - m_1^\alpha| + |x_2 - m_2^\alpha| = |x_1 - m_1^\beta| + |x_2 - m_2^\beta|.$$

If

$$m < x \cap m, x \in N^+,$$

then the simplified expression

$$m_1^\alpha - m_1^\beta = m_2^\beta - m_2^\alpha$$

holds. Consequently, both models are equally distant from reality.

4. Implications and Conclusion

This paper demonstrates that it can be theoretically impossible to identify the most appropriate simulation model for any given merger proposal. Due to the inevitable necessity to reduce real-world complexity and multi-parameter character of merger cases, the comparative fit of proposed MSMs with mutually incompatible predictions can be the same. This is valid even if an ideal antitrust procedure – i.e. the absence of partisanship among economic experts and the assumption of perfectly working authorities and courts – is assumed.

The paper does not argue, however, that it is never possible to say anything about the appropriateness of competing models. In particular, if MSMs violate common standards of accurateness and economic methods, it is very well possible to exclude such from a sound antitrust analysis (Werden et al. 2004; Solow & Fletcher 2006; Werden 2007). However, once specified standards are met by all MSM proposals, an identification of the ‘best’ might inevitably depend on a non-scientific value judgement since it cannot be selected unambiguously with scientific methods. This insight is important regarding two aspects. First, the scope for partisan economic evidence cannot be completely eroded in merger control, irrespective of the sophistication of procedures. It remains illusionary to assume that predictive economic evidence compels consensual and unambiguous assessments of welfare effects upon which economic experts will eventually agree. Second, the high hopes of replacing structural and more lump-sum antitrust analysis by quantitative case-by-case calculation of the actual effects must be limited. Simulation models do represent an additional

instrument providing valuable insights. However, they cannot eliminate or substitute for qualitative reasoning and economically informed common sense.

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