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Merger simulations in EU merger control: what have we learned?[1]

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Abstract

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Keywords: European Commission, merger simulations, price impact, systematic review

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1 Introduction

It has been 25 years since the first time the European Commission (Commission) used a simulation in a merger investigation.[4] Since then, simulations have been employed and presented by both the Commission and the merging parties in a number of cases. Simulations in EU merger control had their heyday in the middle of the 2010s, when 11 Phase 2 merger reports included a simulation analysis. Since then, the enthusiasm of the 2010s had vaned and the last merger decision that reports the results of a merger simulation was in 2018. This does not necessarily mean simulations are no longer used internally—they may still serve as screening tools for identifying high-risk mergers or as aids for structuring the economic analysis of a case. Nevertheless, the high cost of producing such simulations likely limits their broader use, and they are now not included in published decisions.

There have been numerous papers discussing various aspects of merger simulations in EU merger control.[5] To join this body of work, we qualitatively and quantitatively review merger simulations in Commission mergers. Although merger simulations have been applied much more sparingly by the Commission than by their US counterparts, details of the simulations are more consistently available in the Commission's published decisions. This transparency in how simulations are presented in Europe enables us to undertake this systematic review, through which we aim to achieve two things.

First, we seek to understand the reasons behind the decline in the use of merger simulations in recent years. Second, we aim to identify which elements of past simulations have proven useful, in the hope of rebuilding confidence in simulation techniques as valuable tools in merger investigations. Along the way, we test several hypotheses put forward in prior academic and policy discussions.

We begin with a qualitative review of how the Commission and merging parties have approached simulations, focusing on their modelling choices and core assumptions. We find significant disagreement around key modelling decisions – such as the treatment of countervailing factors – while other areas, like the use of instrumental variables and modelling of information asymmetries, appear less contentious.

We then turn to a quantitative analysis of the predicted post-merger price effects from these simulations. We explore whether different modelling approaches or industry experience are associated with systematically higher or lower price change predictions. We also examine whether a consistent difference exists between estimates produced by the Commission and those submitted by the merging parties, which could reflect divergent assumptions or methodologies.

The remainder of the paper is structured as follows. We begin with a brief overview of merger simulation methodology. This is followed by our qualitative review of simulation practices in Commission decisions. We then present our quantitative findings and conclude with a discussion of their implications.

2 Merger simulations

Merger simulations are quantitative analyses used to predict the potential effects of a proposed merger on market outcomes, such as prices, quantities, and consumer welfare. Based on estimated or available data on key features of the market they can simulate and compare the market as it is, with

[4] European Commission Decision in *Volvo/Scania*.

[5] See, for example, Budzinski et al (2022), Valletti et al. (2021), Buettner et al. (2016) and Mariuzzo et al. (2019).

how the market would be in various counterfactual scenarios. For example, by comparing outcomes in a market with and without the merger, one can understand if that merger is likely to be anticompetitive or not.

Merger simulations provide a number of advantages over other, so-called 'price-pressure' techniques – such as 'upward pricing pressure' (UPP) and the gross upward pricing pressure index (GUPPI). First, in a simulation setting, one can calibrate the likely change in price and quantities for all firms in the market, not just for the merging firms. Second, they account for various competitive responses and feedback effects between the merging parties and their competitors. Together, therefore, the simulation provides a more complete assessment of the impact that the merger may have on consumers.

Furthermore, the formal framework of simulations means that the assumptions behind the price impact predictions have to be made explicit, and relying on calculations compared to intuition adds accuracy and better related predictions of economic theory. Moreover, merger simulations can more accurately capture substitution between products. Finally, merger simulations can be very useful for both the competition authority and the merging firms when determining which divestments would be the most appropriate (if required), as they can be used to test the price and volume impacts of the merger for any redistribution of assets (brands, products or even geographic areas) between competitors.

The main disadvantage of merger simulations is that they can be difficult to apply well – their sophistication often comes at the cost of additional data requirements, more complex decisions (assumptions) about how to represent competition in the real world, and more time needed for the analysis. Moreover, all estimations have to be judged in light of the assumptions made. Because the estimated price effects are sensitive to the functional forms of demand (and costs), this sensitivity limits the power of the analysis. Finally, a 'standard' merger simulation only predicts the short-term price effects of a merger without considering the impact of future entry, product repositioning and other structural changes.[6]

There is an increasing literature that looks at how well merger simulations can predict post-merger price changes. Some of these provide evidence of simulations that accurately predict price changes, for example, Nevo (2000) looking at two mergers in the ready-to-eat cereal industry in the US, Pinske and Slade (2004) looking at two mergers in the UK brewing industry, Friberg and Romahn (2015) on a merger in the Swedish beer market, or Björnerstedt and Verboven (2016) for a merger in the market for painkillers in 2016. Balan and Brand (2023) found that merger simulations used in hospital mergers in the US perform well on simulated data.

Other papers have been less positive about the accuracy of simulations. Looking at the US airline industry, Peters (2006) found that a simulation based on a variant of a nested logit demand model, was only modestly able to accurately predict post-merger prices. In addition, Weinberg and Hosken (2013) analysed two mergers in the motor oil and breakfast syrup industries, and found that their simulations based on a range of demand models predicted small price effects in the former industry and large price effects in the latter, though in reality prices rose considerably more in the former compared to the latter. Weinberg (2011) is similarly scathing of the accuracy of simulation predictions. Finally, in ongoing work, Illanes et al. (2024) look at 37 US mergers and find that simulations have very limited predictive power, although the authors emphasise that these results are preliminary.

[6] Although one might be able to infer the direction of those effects and consequently whether the result is an upper/lower bound effect, etc.

Merger simulations work by combining a model of demand with a model of supply. Parameters of the two sides of the market are calibrated using existing information and data on the market as it is, or estimated using various econometric methods. The former approach (we use the shorthand '**calibrated merger simulation**' to refer to these) is less data and time intensive. Instead of estimating parameters, these parameters are calibrated using the predicted structural relationships between observed variables.

Where data and resources allow, the supply and demand parameters can be estimated ('**econometric merger simulation**'). For example, such econometric estimation of the demand parameters, based on rich, granular data can – if implemented correctly – can capture consumers' preferences between the products sold within a given industry that could be much more informative than documentary evidence – particularly in complex mergers involving many products where it may be difficult to otherwise disentangle the effects they have on each other – or case precedents (which could either be outdated or incorrect in the first place). This can help already at the market definition stage,[7] even if one does not proceed to actually running a fully-fledged merger simulation. Moreover, merger simulations do not require the market to be defined in the first place – provided the demand side of the model can sufficiently capture the switching patterns between all products, the merger simulation can directly predict price changes for all products.

Using calibrated or estimated parameters, a market equilibrium is then defined, and the merger is accounted for by transferring and combining assets. Finally, the model predicts how the pricing incentives of both the merging parties and the other competitors in the market are affected by the change in assets, holding all other features of the market unchanged. It does this by calculating predicted post-merger prices and quantities either at the level of the merging firms, or at the level of the whole market. If one expects the merger to generate efficiencies, these can be incorporated into the simulation as well.

Merger simulation is not a one-size-fits-all technique. The critical issue in its application is that one must design the model so that it provides a useful approximation of how demand and supply work in the real market. This requires making assumptions. For instance, on the supply side, one needs to understand and approximate the way firms compete and supply products, which is likely to differ by industry. Is the relevant product homogeneous or heterogeneous, do firms compete on prices, or quantity, or innovation? Similarly, on the demand side, one has to decide on the best approximation of consumer choices and preferences, for example, whether these are best described by linear demand models, discrete choice models, demand system estimation models, survey-based models, or multi-sided demand models. The calibrated simulations we analysed in this paper typically impose linear demand, which permits heterogeneous substitution patterns, but has the advantage that it requires data only on margins and diversion ratios.[8] The applicability of the chosen model and the credibility of the assumptions have often been contested between the Commission and the merging parties. We turn to a detailed discussion of these assumptions in the next section.

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[7] See, for example, *Unilever/Sara Lee*, where the demand model ultimately used for the merger simulation was first used to determine whether 'male' and 'non-male' deodorants belonged to the same product market or not. European Commission Decision in *Unilever/Sara Lee*, paras. 92-94.

[8] The Commission noted that the specific assumption of linear demand "*is conservative as other forms of demand, such as log-linear demand, would imply a higher predicted price increase*." European Commission Decision in *Hutchison 3G Italy/Wind JV*, supra note 23, Annex A at para. 10.

2.1 Our dataset of merger simulations

Since the first occurrence in 2000 (*Volvo/Scania*), merger simulations have been used in 17 mergers assessed by the Commission. Their use increased from 2010, peaking in 2014-2016, a period in which seven cases presented price-impact predictions based on some form of merger simulation method. Since then, there have only been two cases using simulations, both in 2018.

Table 1: Timeline of mergers featuring merger simulation

Year	Case	Industry	Phase	Model type	Author
2000	Volvo/Scania	Automobiles	Blocked	Bertrand (econo. demand, NL)	European Commission
2003	Philip Morris/Papastratos	FMCG	1 no commitments	Bertrand (econo. demand, NL)	NERA
2004	Lagardere/Natexis	Book publishing	2 with commitments	Bertrand (econo. demand, NL)	European Commission
	Oracle/Peoplesoft	Enterprise software	2 no commitments	Auction	DOJ
				Auction	European Commission
2007	Thales/Finmeccanica	Aerospace	2 no commitments	Auction	Unknown complainant
2010	Kraft Foods/Cadbury	FMCG	1 with commitments	Bertrand (econo. demand, NL)	Compass Lexecon
	Unilever/Sara Lee	FMCG	2 with commitments	Bertrand (econo. demand, NL)	European Commission
2012	Outokumpu/Inoxum	Metals	2 with commitments	Bertrand (bespoke)	European Commission
2014	Hutchison 3G UK/Telefonica Ireland	Telecoms	2 with commitments	Bertrand (cal. demand)	European Commission
				Bertrand (cal. demand, NL)	Compass Lexecon
				Bertrand (econo. demand, BLP)	European Commission
	Ineos/Solvay JV*	Chemicals	2 with commitments	Bertrand (bespoke)	Charles River Associates
	Telefonica Deutschland/E-Plus	Telecoms	2 with commitments	Bertrand (cal. demand)	European Commission
				Bertrand (econo. demand, BLP)	European Commission
				Bertrand (econo. demand, NL)	European Commission
2015	Demb/Mondelez	FMCG	2 with commitments	Bertrand (cal. demand, NL)	Unknown
	Orange/Jazztel	Telecoms	2 with commitments	Bertrand (cal. demand)	European Commission
2016	Hutchison 3G Italy/Wind JV	Telecoms	2 with commitments	Bertrand (cal. demand)	European Commission
				Bertrand (econo. demand, RCs)	Compass Lexecon
	Hutchison 3G UK/Telefonica UK	Telecoms	Blocked	Bertrand (cal. demand)	European Commission
2018	Fortum/Uniper	Energy	1 no commitments	Cournot	European Commission
	T-Mobile NL/Tele2 NL	Telecoms	2 no commitments	Bertrand (cal. demand)	European Commission
				Bertrand (econo. demand, RCs)	Compass Lexecon**

Notes

** Price rise estimates redacted in the decision.*

*** Market to which the merger simulation refers does not have associated market shares in the decision.*

Across these 17 cases, 24 different merger simulations were produced by either the Commission, or a small group of economic consultancies representing the merging parties. This concentration of simulations among the Commission and the largest consultancies speaks to the complexity of the task to deliver simulations in a robust and reliable way. These assessments typically include a set of baseline estimates presented in the relevant decision, and most include further estimates from various sensitivity/robustness checks. Finally, as we will elaborate on later in the paper, most simulations were deployed in mergers in the telecoms sector.

3 A qualitative review of the Commission's use of merger simulations

The Commission's merger decisions discuss economic evidence in detail, including the assessment of merger simulation models. This includes not only the results of the models, but also the modelling assumptions used as inputs, and how related issues were debated by the two sides.[9]

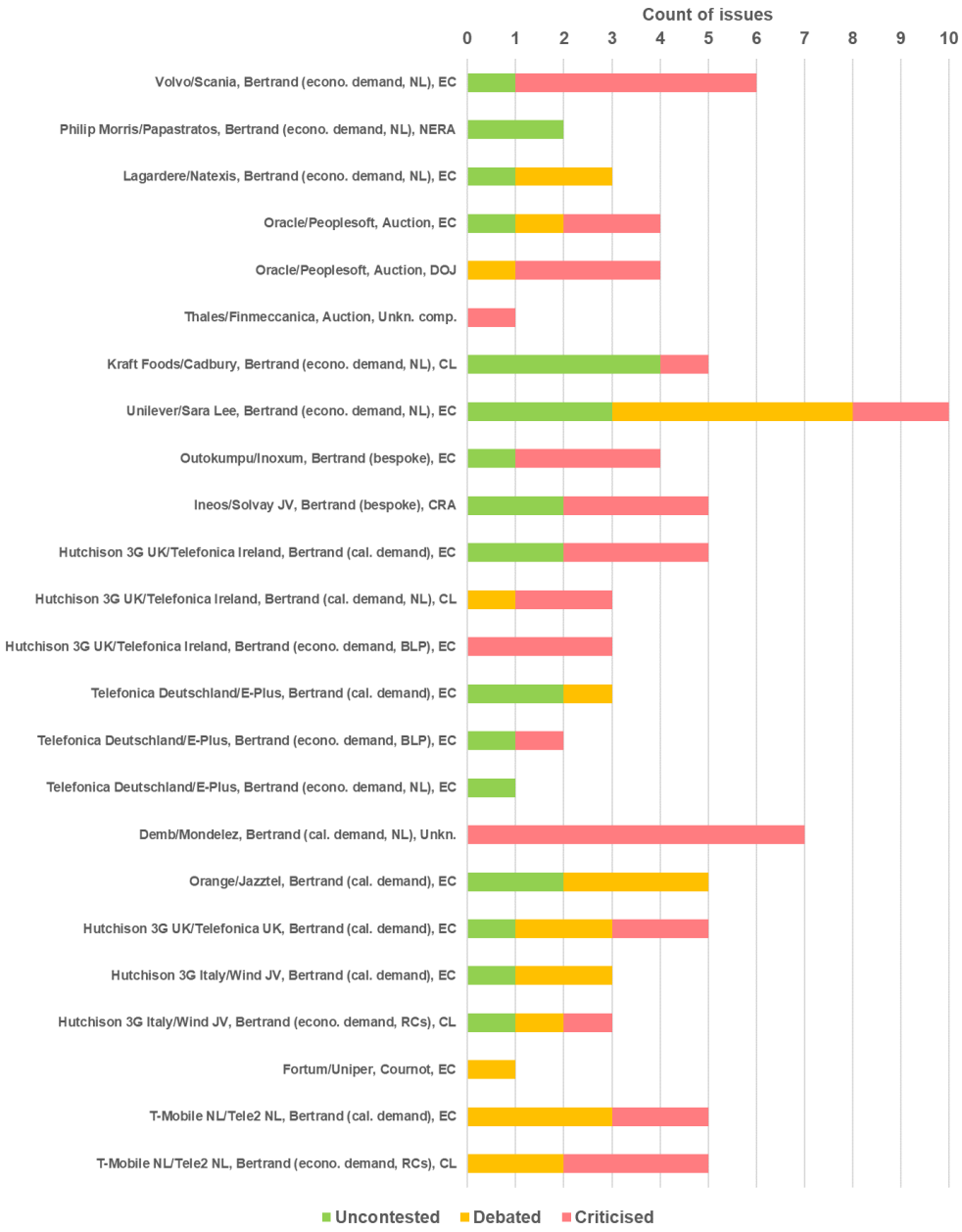
Using this information, we assessed if a given merger simulation approach can be considered 'successful' or not based on how much the modelling assumptions and predictions were criticised (or accepted) by the other side. We defined modelling choices and assumptions to be '*uncontested*' if the

[9] For some (earlier) cases, we found more information (both for this qualitative analysis and the later quantitative analysis) than was presented in the decisions, in academic articles commenting on the cases. These were: Ivaldi and Verboven (2002), Table 5 (for *Volvo/Scania*); and Budzinski and Arndt (2007), Tables 3-4 (for *Oracle/PeopleSoft*).

other side did not criticise it or agreed with the way it was implemented, '*debated*' if the other side criticised it but in response the model's author tried to address it or showed evidence as to why it would not have a material impact, and '*criticised*' if the other side contested the modelling issue and it was not subsequently addressed. We note that our analysis is contingent on the information available in the case report. We had no access to other information that was privy to the parties and the Commission. Of course, such an assessment is inherently subjective. Moreover, due to the adversarial nature of the debate between the Commission and the merging firms in the decisions, the fact that model features were criticised by the other side may not necessarily mean that the simulation was controversial *per se*.

In Figure 1, we list the 24 merger simulations (sorted chronologically) prepared either by the Commission or the merging parties in the 17 cases that featured them. The bars show the number of uncontested/debated/criticised issues for each case. For example, the merger between coffee manufacturers DEMB and Mondelez, which was approved subject to a set of remedies after a Phase 2 investigation, included simulations presented by the merging parties that were seemingly strongly criticised by the Commission. On the other hand, in the telecom merger between Orange and Jazztel, there was more agreement between the Commission and the merging parties on how the Commission's simulation was run. Interestingly, Figure 1 shows that the level of agreement (issues that were uncontested) dropped over time, from 12 in the first eight models (spanning 2000 to 2010), 9 in the next eight (spanning 2012 to 2014), to only 5 in the final eight (spanning 2015 to 2018).

Figure 1 - Modelling issues and the outcomes of simulations used in Commission merger review, and how they were debated by each side (sorted chronologically)



To understand why some of the simulations were less contested between the parties, in Figure 2 we identified the main grounds of agreement or disagreement, focusing on specific questions such as modelling choices, technical inputs such as data, and the outcome of the simulations.

Figure 2 - Modelling issues and the outcomes of simulations used in Commission merger review, and how they were debated by each side

In general, certain modelling issues have arisen more than others, and have been more strongly debated. For example, the modelling of countervailing factors was discussed more than the approach to modelling contestable customers. Moreover, model choice and the realism of the model's assumptions often appeared controversial, whereas models which were built on a model deployed in a previous merger were less controversial. This, perhaps, is not surprising, as the choice of the simulation method and the assumptions can lead to widely differing price-impact predictions. Understanding these areas of agreement and disagreement between the Commission and the merging parties can be useful when deploying a merger simulation. In the following sections we discuss these in more detail.

3.1 Methodology

The simulations in our sample frequently **build on previous models** (a model used in a previous merger), suggesting that the effort required to develop and evaluate a successful simulation in one case can benefit subsequent cases.[10] This perhaps provides one explanation as to why half of the 24 simulations in our sample were in the telecoms industry. This tendency to rely on earlier models was seen as a positive in some of the cases.[11] For example, the Commission's simulation in *Unilever/Sara Lee* in 2010 closely followed the merging firms' simulation in *Kraft Foods/Cadbury* from earlier in the same year. Moreover, in *Unilever/Sara Lee*, the Commission was willing to use a model put forward in a previous case by the merging firms' economists.[12] In other cases,[13] particularly the later telecoms cases, the fact that the Commission continued to use some of the same methodological choices, without necessarily considering how they could be improved, was raised as a concern by the merging firms.

Even where simulations were built on previous models, **modelling choices** were probably the most contested between the parties. Even the most fundamental steps, such as the choice of the model could be controversial, for example because of disagreements on the type of auctioning structure used in an auctioning model,[14] or whether the modelling assumptions implied a realistic pre-merger world,[15] or because the chosen model produced "*implausible interim metrics*" (such as demand elasticities) and therefore implausible final predicted price effects.[16]

Other contested modelling assumptions include discussions on whether the simulation captured how competition worked in the book publishing industry,[17] whether the degree to which both the Commission's and DOJ's simplifying assumptions made their respective models was unrealistic,[18] whether some of the assumptions used were too "*extreme*",[19] or because the merger occurred at the manufacturing level, but the input data used for the simulation recorded sales at the retail level, with the model simply assuming away any impact on the results from the margin earned between these two levels of the supply chain.[20]

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10 *Volvo/Scania*, *Kraft Foods/Cadbury*, *Outokumpu/Inoxum*, *Hutchison 3G UK/Telefónica Ireland* and *Hutchison 3G Italy/Wind JV*.

11 *Philip Morris/Papastratos*, *Lagardère/Natexis*, *Unilever/Sara Lee* and *INEOS/Solvay JV*.

12 *Kraft Foods/Cadbury.*

13 *Telefónica Deutschland/E-Plus*, *Orange/Jazztel*, *Hutchison 3G UK/Telefónica UK*, *Hutchison 3G Italy/Wind JV* and *T-Mobile NL/Tele2 NL* (two simulations).

14 In *Oracle/PeopleSoft*, the Commission and DOJ both submitted simulations in their respective merger reviews, based on an auction structure to the market. However, the auction structures they used were different: the DOJ's model was an 'English' auction where competitors bid in turn in an ascending manner, whereas the Commission's model was 'first price sealed bid'.

15 In *Outokumpu/Inoxum*, the Commission acknowledged that its chosen Bertrand-Edgeworth model could not account for customer switching costs, customer multi-sourcing, and the costs to customers from changing their product mix, and hence that the simulation predicted more competition pre-merger than reality, meaning that the simulation would predict relatively more of a fall in competition post-merger and larger rise in prices. As the simulation applied in *INEOS/Solvay JV* was largely the same, the same issues applied there as well.

16 *Hutchison 3G UK/Telefónica Ireland.*

17 *Lagardère/Natexis.*

18 *Oracle/PeopleSoft*.

19 *Thales/Finmeccanica*, *Outokumpu/Inoxu*m, and *INEOS/Solvay JV*.

20 *Volvo/Scania* and *Unilever/Sara Lee*.

Part of designing a simulation study is to choose between dynamic versus static models,[21] and to decide whether a simulation should account for possible **countervailing factors** such as buyer power, entry and product repositioning. In some cases, there was no disagreement between the Commission and the merging parties,[22] but in most of them the use or omission of these countervailing factors was contested,[23] for example, because the Commission argued for circumventing these effects in the analysis because they manifest over the long-run and would be too complex to account for them within the short-run focus of a merger review,[24] or because the Commission disagreed with the merging parties' analysis showing how the merger could increase product quality (a form of product repositioning).[25]

Around half of the simulations used discrete choice models to model demand. The main drawback of these models is the so-called '**independence of irrelevant alternatives**' (IIA) problem, which limits the ability of the data to capture substitution patterns between products. Of the discrete choice models used, the most popular form was 'nested logit', whereby products are organised into different nests (one-level) or even sub-nests (two-, three-level etc.). The choice of the nesting structure inevitably assume some level of discretion. Consequently, these modelling choices were often debated between the parties.[26]

More specific modelling assumptions relate to how **efficiencies and quality competition** are accommodated by the simulations. In some cases the Commission accepted some efficiency claims made by the merging firms and factored them into its simulations,[27] or at least in the sensitivity analysis.[28] On the other hand, the Commission debated the technical aspects of the merging firms' models in other cases, for example, where the merging firms quantified the efficiencies (increasing

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21 In *Unilever/Sara Lee*, which concerned the market for deodorants, there was a debate as to how realistic the Commission's simulation was given that it was 'static', whereas it was pointed out that deodorants were storable and thus would be purchased more and stockpiled in periods of price promotions. The problem was not dealt with explicitly in the model, but instead the Commission pointed towards academic literature that showed that static models with storable products would underestimate merger price effects.

22 In *Telefónica Deutschland/E-Plus*, the Commission presented arguments as to why product repositioning due to the merger was unlikely, citing an academic study where the conditions for it to occur were not present in the telecoms industry in Germany. Similar arguments were also made as regards the EC's simulation in *Hutchison 3G UK/Telefónica UK*.

23 *Unilever/Sara Lee*, *Hutchison 3G UK/Telefónica Ireland*, *Orange/Jazztel*, *Hutchison 3G Italy/Wind JV* and *Fortum/Uniper*. Not accounting for countervailing factors was criticised in *Volvo/Scania*, *Lagardère/Natexis*, *Oracle/PeopleSoft* (two models), *Thales/Finmeccanica*, *Unilever/Sara Lee*, *Outokumpu/Inoxum* and *INEOS/Solvay JV*.

24 *Unilever/Sara Lee.*

25 *Hutchison 3G UK/Telefónica Ireland.*

26 In *Volvo/Scania*, the Commission's one-level nested logit model was criticised by the merging parties for not overcoming the IIA problem, whereas in *Kraft Foods/Cadbury* the Commission was receptive to the merging firms' one-level model, arguing that it attenuated the IIA problem and furthermore relied on fewer parameters needing to be estimated compared to alternative demand models such as the AIDS model. In *Unilever/Sara Lee*, the Commission argued that its two-level nested model provided a good trade-off between the 'simple' logit model on one hand, that is computationally simple but suffers from the IIA issue, and the full BLP model (Berry, et al, 1995) on the other, which overcomes the IIA property but comes at the price of increased computational complexity and in the Commission's view less stable results. Moreover, it showed that the results were robust to different alternatives. Finally, in *DEMB/Mondelez* the Commission argued that the merging firms' use of nested logit was inappropriate – specifically having two coffee types as different 'nests'. The Commission judged the market to be narrower (implying that it instead should have run separate simulations for each coffee type).

27 *Orange/Jazztel* and *Hutchison 3G Italy/Wind JV*.

28 The Commission's model in *T-Mobile NL/Tele2 NL*.

network coverage in telecoms markets).[29] The parties have also criticised the Commission's reluctance to account for efficiencies in some of the cases.[30]

Theoretically, simulations based on econometrically estimated demand and supply parameters can circumvent the need for **market definition**, therefore the assumptions used in the simulations can have an impact on what the market is considered to be. This is not always without dispute between the Commission and the merging parties. For example, there has been disagreement on whether the Commission's model had a nesting structure for its demand function that followed the actual market definition,[31] or whether the merging firms were right to infer on the relevant market from their estimation of the demand system.[32]

3.2 Inputs

We identified two main issues under the inputs used for simulation. The first one relates to the treatment of the **outside good**. Although there is some common ground in this respect between the Commission and the merging parties,[33] there has been disagreement between the Commission and the merging parties on either how the outside good was calculated and its resulting size,[34] or the choice to exclude some products from the analysis (implying that they would instead sit within the outside good),[35] or excluding them completely,[36] or whether the Commission was right to assume away the outside good in its baseline simulation, and only include them in a robustness analysis.[37]

Another key input into the simulations is the **data** used. In some cases the Commission acknowledged the merging firms' criticisms regarding the type of data input into its simulation, and adjusted the input data accordingly.[38] In other cases criticisms related to the choice of data for calculating diversion ratios between the firms in the market,[39] the choice of lower quality data when allegedly better data was available,[40] or combining input data sources in a non-consistent way.[41]

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29 *Hutchison 3G Italy/Wind JV* and *T-Mobile NL/Tele2 NL*, where merging firms relied on novel models, and used online surveys to estimate consumers' willingness to pay for certain mobile tariff characteristics (e.g., data allowance, speed), and then used these valuations to predict the consumer surplus effects of the mergers (on top of any increase in price pressure brought about by the concentration).

30 For example the DOJ's simulation in *Oracle/PeopleSoft* for not being able to account for efficiencies, and the Commission's simulation in *Hutchison 3G UK/Telefónica Ireland* for focusing on price rather than quality competition and not accounting for possible quality increases.

31 *Lagardère/Natexis*, or *Volvo/Scania.*

32 In *DEMB/Mondelez* the merging firms submitted a separate demand estimation study, arguing that two coffee types that the parties' sold belonged in the same product market. The Commission dismissed this model, finding instead that the products were in separate markets, and that the merging firms' simulation should not have included both segments as separate nests in a single model, but instead had two separate models.

33 The Commission and merging firms agreed on how the outside good should be factored into the simulation (how to model the choice of not buying the product in question at all) in *Hutchison 3G UK/Telefónica Ireland* and *Telefónica Deutschland/E-Plus*.

34 *Volvo/Scania* and *Hutchison 3G UK/Telefónica UK*.

35 *DEMB/Mondelez*.

36 *T-Mobile NL/Tele2 NL*.

37 *Orange/Jazztel*.

38 *Orange/Jazztel*.

39 *Hutchison 3G UK/Telefónica UK*.

40 The DOJ's simulation in *Oracle/PeopleSoft* and the merging firms' simulation in *Hutchison 3G UK/Telefónica Ireland*.

41 The Commission's econometric BLP-based simulation in *Hutchison 3G UK/Telefónica Ireland* and the merging firms' simulation in *DEMB/Mondelez*.

3.3 Outcomes

The simulations often influenced the choice of the proposed **set of divestments**, but we observed some inconsistency in the decisions. For example, in some cases the merging firms' simulation was deployed in some countries but not others despite the merging firms' combined shares being similarly high across them all. As a result, divestments were not required in some of the countries where the simulation was deployed.[42] In another case the merging firms initially proposed divestments on a certain expected 'broad' market definition – its simulation, once accounting for this divestment, showed that the price increase would be reduced to 2%.[43] Nevertheless, the Commission decided upon narrower product markets, for which the initial proposed divestment would not alleviate all of its competition concerns. As a result, the final divestment package was larger, consisting of more brands.

Some of the simulations produced **results that were overly sensitive** to small changes in the inputs. These issues arose solely in the simulations based on particularly sophisticated econometrically-estimated demand (i.e., BLP or random coefficients (RCs) models), as compared to simpler models such as nested logit. As a result, other methods were needed to estimate them, such as numerical methods, which could allegedly produce 'unstable' results that were harder to replicate.[44]

The **realism of elasticities** predicted by the simulation is a key factor in the price rises it predicts, and is one of the key assumptions behind a simulation model. For example, in *DEMB/Mondelez*, because the simulation was judged to have been applied to the wrong market definition (see above) the substitution patterns it predicted were also judged to be unrealistic.

Finally, some other cases produced results, where the parties contested the **precision of the predictions**. The Commission used various methods to address these criticisms, for example using Monte Carlo simulations to estimate confidence intervals.[45]

As the above overview suggests, methodological issues such as model choices or modelling assumptions in merger simulations are most likely to be contested between the Commission and the merging parties. This is not surprising, as the choice of the simulation method and the assumptions can lead to widely differing price-impact predictions. In the following section we aim to further understand what drives these price-impact estimates.

3.4 The role of the Chief Economist

Although the Chief Economist and the Chief Economist Team (CET) operate within the structured institutional framework of the European Commission, they do have independence in judgements of economics, for example what economic evidence is put forward by the CET in mergers, as well as

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42 See for example *Kraft Foods/Cadbury.* In *Unilever/Sara Lee*, it was noted that the countries in which divestments were ultimately required corresponded to the countries in which the simulation predicted price rises of 2% or more.

43 *DEMB/Mondelez.*

44 *In Hutchison 3G UK/Telefónica Ireland*, the merging firms argued that the Commission's BLP model was "*overly sensitive to the underlying method*" – the Commission ultimately placed no evidentiary weight on its own model. In *Telefónica Deutschland/E-Plus*, the merging firms argued that the Commission's BLP model – due to its increased complexity relative to simpler logit models – was "*highly unreliable*" and that its other nested logit model deployed in the case "*better fits the data*". In *T-Mobile NL/Tele2 NL*, the Commission argued that the merging firms' RCs model was computationally intensive and produced "*unstable*" results.

45 *Unilever/Sara Lee.*

influencing how the CET should interpret economic evidence put forward by the merging parties in merger review, and whether to rely on merger simulations at all in a merger case.

Table 2 below lists each Chief Economist and their respective tenures. As can be seen, Massimo Motta oversaw the busiest period in terms of merger simulations deployed, which coincided with the wave of telecoms mergers.

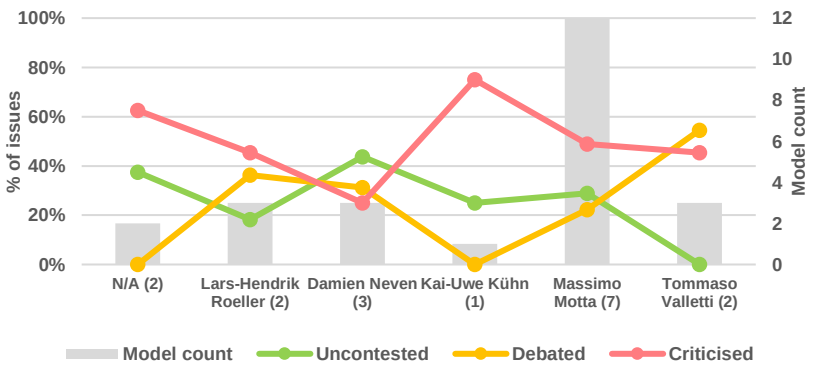
Table 2: List of DG Comp Chief Economists and the cases featuring merger simulation they oversaw

Chief Economist	Tenure	Case featuring merger simulation	Decision date
N/A		Volvo/Scania	15/03/2000
		Philip Morris/Papastratos*	02/10/2003
Lars-Hendrik Roeller	01/09/2003 - 31/08/2006	Lagardere/Natexis	07/01/2004
		Oracle/Peoplesoft	26/10/2004
Damien Neven	01/09/2006 - 30/04/2011	Thales/Finmeccanica	04/04/2007
		Kraft Foods/Cadbury	06/01/2010
		Unilever/Sara Lee	17/11/2010
Kai-Uwe Kühn	01/05/2011 - 31/08/2013	Outokumpu/Inoxum	07/11/2012
Massimo Motta	01/09/2013 - 31/08/2016	Ineos/Solvay JV	08/05/2014
		Hutchison 3G UK/Telefonica Ireland	28/05/2014
		Telefonica Deutschland/E-Plus	02/07/2014
		Demb/Mondelez	05/05/2015
		Orange/Jazztel	19/05/2015
		Hutchison 3G UK/Telefonica UK	11/05/2016
		Hutchison 3G Italy/Wind JV*	01/09/2016
Tommaso Valletti	01/09/2016 - 31/08/2019	Fortum/Uniper	15/06/2018
		T-Mobile NL/Tele2 NL	27/11/2018

*Note: * Although the decision dates of these cases are during the tenure of the Chief Economist that followed, it is likely that any key decision making would have been made by the previous Chief Economist*
Sources: https://en.wikipedia.org/wiki/Tommaso_Valletti; https://sites.google.com/site/massimomottawebpage/; https://www.acm.nl/en/about-acm/conference-impact-assessment-of-interventions-of-competition-and-consumer-authorities/speakers; https://cepr.org/about/people/damien-neven; https://ec.europa.eu/commission/presscorner/detail/en/memo_10_682; https://www.e-ca.com/wp-content/uploads/2022/03/eca-cv-lhroeller.pdf

We also looked at how contested some of the modelling issues were when using simulations under the different Chief Economists. Figure 3 below shows the share of modelling issues that were uncontested/debated/criticised for each. As can be seen, the share of modelling issues that did not face any debate or criticism at all decreased over the period, to zero during Tommaso Valletti's tenure, while the share of issues that were debated or criticised rose.

Figure 3 – Share of uncontested/debated/criticised modelling issues, by Chief Economist



4 The likely price effect predicted by simulations

In reviewing the price effects predicted by merger simulations, we focus on three main hypotheses, which both relate to issues that formally or informally have been formulated by previous commentators or by the Commission itself. More specifically, we test whether simulation outcomes depend materially on the methods and models used, and on whether it matters for the price estimates whether the simulation was conducted by the Commission or the merging parties' economists.

4.1 Do simulation outcomes depend on the method?

When compared to simpler price-pressure methods, there is some understanding that simulations (under certain assumptions) produce larger price-increase predictions. For example, Valletti and Zenger (2021) rank price-pressure methods and calibrated simulations (with isoelastic demand), and show that isoelastic simulations produce larger price increases than illustrative price rise (IPR), gross upward pricing pressure index (GUPPI), or compensating marginal cost reduction (CMCR).[46]

Similarly, when looking at different types of merger simulations, Froeb et al (2003) find that different assumptions regarding the shape of the demand curve can have a large effect on the resulting elasticity estimates and thus price increase predictions.

In the Commission mergers that have featured merger simulations, the two most popular models were: (i) Bertrand supply combined with econometrically estimated demand parameters (10 of the 24 simulations put forward) and (ii) Bertrand supply combined with calibrated demand parameters (8 of the 24 simulations put forward). We are not aware of any work analysing whether these two types of model are likely to produce systematically different post-merger price predictions.

A priori, if the assumptions behind the calibrated simulations are aligned with the core parameter estimates of the econometric simulations, there is no economic reason why predictions using one method should be different from the predictions of the other. On the other hand, differences in the assumptions behind calibrated versus estimated demand parameters, or differences in how efficiencies are taken into account can lead to differences in estimates

Despite this, whilst formal explanations are not given, there is some speculation among practitioners that econometrically estimated simulations are possibly more likely to produce lower predicted price increases. For example, in *Hutchison 3G UK/Telefónica UK*, the merging parties argued that: "*When in previous mergers where the Commission has complemented pricing pressure analysis with demand estimation based merger simulation techniques, those alternatives produced much lower predicted price increases*."[47]

4.2 Do simulation outcomes depend on whether they were prepared by the Commission or the merging parties?

In principle, there should be no reason to believe that predictions coming from models developed by the Commission or the merging parties' economic advisors would be different. In an ideal world there would exist a single method which would produce reliable estimates that do not hinge on who is conducting the study, i.e. the estimates presented by the Commission should not systematically differ from the estimates of the merging parties. But if different methods produce consistently different estimates, and if the Commission or the merging parties are more/less likely to rely on certain methods,

[46] See also Buettner et al. (2016).

[47] European Commission Decision in *Hutchison 3G UK/Telefónica UK*, Annex A, para. 244.

this could lead to differences in the price-impact estimates. Some commentators have indeed argued that the outcomes of merger simulations can be 'gamed', particularly given the different incentives that the European Commission and merging parties might have in a merger review.[48]

Different assumptions can also lead to different estimates, and if the assumptions used by the Commission are systematically different from those used by merging parties, it can lead to systematically different estimates. One might expect that this would be more likely to be so in the case of calibrated models, where more hinges on the assumed information used for characterising demand and supply.

4.3 Have companies in the telecoms industry received 'unfair' treatment from the Commission?

There have been numerous telecoms mergers in the EU since 2010, many of which were characterised as '4-to-3'. In most of these cases a merger simulation, as well as other economic models such as UPP, have been used to determine the possible consumer harm caused by the merger.[49]

It has been noted that, due to the nature of the telecoms industry, oligopolistic markets where a large share of players' costs are fixed, a merger simulation would be more likely to predict higher price rises than an equivalent model applied to mergers in other industries would.[50] Therefore, if the Commission had an incentive to prohibit the merger, a merger simulation might be a fruitful avenue for showing competitive harm – and commentators have argued that this may explain why merger simulations were so popular in this industry and not others.[51]

In addition, it has been argued that data availability may have also played a role: in *Hutchison 3G UK/Telefónica UK* (a merger which was blocked by the Commission in 2016), the merging parties argued: "*The use of [UPP] as key evidence would also give rise to an arbitrary discrimination against mergers in markets where [UPP] data is available*".[52]

4.4 Our sample of price-impact estimates

Each data point in our price-impact dataset represents a given 'player' in the market (the merged entity,[53] a competitor, or the market as a whole), for a given product-geographic market combination,

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[48] See, for example, Tommaso Valletti, What Have The Consultants Ever Done For Us? "*When things get more "sophisticated"—we then talk about merger simulations—with calibration exercises that again depend on a couple of parameters that the consultancies know exactly how to put in front of the agencies to get the merger approved. Worst case scenario: the consultant identifies, scientifically of course, a (typically miniscule) "surgical" divestiture that the company promises to spin off. Merger approved. Hurray.*"

[49] Of the cases that have featured merger simulations, the industry that has featured the most is telecoms (6 of 17).

[50] See, for example, Thilo Klein, The General Court's CK Telecoms Ruling: Towards a Re-assessment of Unilateral-Effects in Merger Review: "*The Commission's model is driven largely by two variables: the diversion ratios between the parties, which will tend to be high in a concentrated industry like mobile telecoms, and the parties' gross margins, which will be high because most of the costs of network operators are fixed. In combination, these two factors drive high price forecasts.*"

[51] See, for example, Katarzyna Czapracka, "No Magic Number" Means "No Magic Number": Will the EU Court Turn the Tide on 4-to-3 Mobile Mergers in Europe?

[52] European Commission Decision in *Hutchison 3G UK/Telefónica UK*, Annex A, para. 244. Although they explicitly refer to the UPP model in the quote, it applies equally to the merger simulation used.

[53] In some cases the price rise for each individual merging firm is presented. However, given a variable of interest in explaining the price rise is the (change in) market concentration, in these cases we computed the simple average across each merging firm's individual price change – see more detail below.

for a given merger simulation model, for either the baseline analysis or a sensitivity, deployed in a given merger case. For example, in *Volvo/Scania*, the Commission deployed merger simulations in 16 countries (where the geographic market was deemed to be national), for two types of truck ('rigid' or 'tractor', following the product market definition), showing predicted price rises for two 'players' (the merged entity and for all other competitors together). For each estimate, a further sensitivity check was also run. Because all of these would produce a separate price-impact estimate, in this case, we have $16 \times 2 \times 2 \times 2 = 128$ observations in our sample.

Because simulations were run and reported differently in each case, there is considerable variation in the data available from these simulations. The first column in Table 3 below shows the number of simulations where estimates were reported at the firm level (merging firms and their competitors), at the level of the merged entity, and/or at the market level. The table distinguishes between baseline estimates, and estimates from sensitivity checks.

Table 3: How merger simulation results are presented across assessments

			Baseline models		Incl. sensitivity models	
Price change estimates presented in merger simulation	Number of assessments*	%	Number of price change estimates	%	Number of price change estimates	%
Merging firms**, Competitors, Market	8	36%	159	47%	697	73%
Market	6	27%	33	10%	55	6%
Merged entity	4	18%	14	4%	56	6%
Merged entity, Market	2	9%	21	6%	22	2%
Merged entity, Competitors	1	5%	64	19%	64	7%
Merging firms**, Market	1	5%	48	14%	64	7%
Total	**22**	**100%**	**339**	**100%**	**958**	**100%**

Notes

** For which combined market share and increment information is available*

*** Presented at the level of merged entity in the counts in the table, for comparison with the other firm types and consistency with how they are counted in the analysis later*

To make the price-change predictions comparable across all simulations, where an assessment presents price-change estimates separately for each merging firm, these are combined together and a simple merger-level average price rise computed.[54] This is also more consistent with how we record market share data, which is at the level of the merged entity.

This gives us a sample of 339 baseline estimates, of which 114 price change estimates were for the merged entity in total, a further 123 for competitors, and 102 for the market as a whole. The merger simulations also include a further 619 sensitivity estimates for the impact of the merger on prices (of which, 156 are for the merging parties, 326 for competitors and 137 for the market as a whole).

When comparing the models used in each simulation, Table 4a shows that most (222 baseline and 833 including sensitivity) price change estimates are from simulations where demand parameters were not estimated from data ('calibrated models'), particularly when including sensitivity checks, which is unsurprising, as these models rest on a wider range of assumptions regarding demand parameters (i.e. more sensitivities are presented around these assumptions). Around a third of the baseline estimates (117 estimates), and 10% of all estimates including sensitivities (125 estimates) were based on an econometric estimation of demand parameters ('econometric models').

[54] In the appendix we show that our regression analysis is robust to instead calculating an average weighted by each merging firm's individual market share.

Table 4a: Number of price change estimates by model type

Model type	Number of assessments	Baseline models		Including sensitivity models	
		Merged entity	Merged entity + competitors + market	Merged entity	Merged entity + competitors + market
Econometric demand	9	42	117	42	125
Bertrand supply (nested logit demand)	*6*	*37*	*94*	*37*	*102*
Bertrand supply (BLP demand)	*2*	*2*	*9*	*2*	*9*
Bertrand supply (random coefficients demand,	*1*	*3*	*14*	*3*	*14*
Calibrated demand	13	72	222	228	833
Bertrand supply	*6*	*51*	*177*	*165*	*731*
Auction	*3*	*0*	*15*	*0*	*29*
Bertrand supply (nested logit demand)	*2*	*11*	*20*	*11*	*21*
Bespoke Bertrand supply	*1*	*6*	*6*	*48*	*48*
Cournot	*1*	*4*	*4*	*4*	*4*

Notes

** For which combined market share and increment information is available*

Table 4b shows the breakdown of simulations and their estimated price change estimates by economists. Unsurprisingly, most simulations (298 baseline predicted price changes and 916 including sensitivities) come from the Commission. Moreover, the Commission seems more likely to report a larger number of sensitivity estimates in its assessments. Roughly 12% of all baseline price-change predictions, and around 4% of all estimates (including sensitivities) were delivered by the merging parties. Whilst the competition authority estimates are almost entirely from the Commission, our sample also includes the US DOJ's simulation in *Oracle/PeopleSoft*, and a simulation done by an unknown complainant in *Thales/Finmeccanica*, which, given their small sizes in the sample, were dropped from the subsequent analysis.[55]

Table 4b: Number of price change estimates by firm

Firm	Number of assessments	Baseline models		Including sensitivity models	
		Merged entity	Merged entity + competitors + market	Merged entity	Merged entity + competitors + market
Merging parties	5	15	38	15	39
Compass Lexecon	*3*	*6*	*19*	*6*	*19*
Unknown	*1*	*9*	*18*	*9*	*19*
NERA	*1*	*0*	*1*	*0*	*1*
Competition authority	17	99	301	255	919
European Commission	*15*	*99*	*298*	*255*	*916*
*Others***	*2*	*0*	*3*	*0*	*3*

Notes

** For which combined market share and increment information is available*

***One assessment produced by the DOJ (in Oracle/Peoplesoft, included here as a comparison to the Commission's model in the same case); and one produced by an unknown complainant to the merger (in Thales/Finmeccanica) and thus also acting against the merging parties*

As shown in Table 4c, most price change estimates are for telecoms, followed by fast moving consumer goods, and then a long tail of other industries covering one case each. In telecoms, merger simulations seemed to have become self-reinforcing precedent, which may explain why it was used more in this industry compared to the others.

[55] We show in the appendix that our results are robust to the re-inclusion of these observations.

Table 4c: Number of price change estimates by industry

Industry	Number of assessments	Baseline models		Including sensitivity models	
		Merged entity	Merged entity + competitors + market	Merged entity	Merged entity + competitors + market
Telecoms	11	60	210	174	764
FMCG	4	10	38	10	47
Enterprise software	2	0	14	0	28
Automobiles	1	32	64	32	64
Metals	1	6	6	48	48
Energy	1	4	4	4	4
Book publishing	1	2	2	2	2
Aerospace	1	0	1	0	1

Notes

** For which combined market share and increment information is available*

4.5 Key variables

In our more detailed empirical analysis of the drivers of price impact estimates we collected data on the following variables:

- **Price-change**: the price change (price increase) estimated by the merger simulation, expressed as a percentage of pre-merger prices. In some decisions the price-change prediction is redacted into 5 or 10% ranges; in these instances, the midpoint is used.
- **Telecoms (experience)**: whether the merger simulation was deployed in a merger assessment in the telecoms industry, or not. Because simulations in EU merger control were predominantly in the telecoms sector (most other markets only had one simulation), this variable can also be interpreted as an approximation of experience in doing simulations in a given market.
- **Econometric demand**: whether the parameters in the demand model in the merger simulation were estimated econometrically, or not.
- **Author**: whether the merger simulation was prepared by the competition authority (the Commission) or an economic consultancy acting on behalf of the merging parties.
- **Combined share**: the combined market share of the merging parties. We use this as a measure of market concentration. For approximately 15% of the price impact observations the public decisions do not provide a corresponding combined share (or increment, see below).
- **Increment:** the change in market concentration caused by the merger, equal to the smaller market share of the two merging firms.
- **Synergies**: a binary variable to indicate whether merger-related efficiencies were considered in the simulation.
- **Phase 2**: a binary variable to indicate whether the case went to Phase 2 or not.
- **Blocked**: a binary variable to indicate whether the merger was eventually blocked.
- **Competitor / market**: binary variables to indicate whether a price estimate is for a competitor or the market as a whole (where both are zero, the price estimate refers to the merged entity).
- **Sensitivity**: a binary variable to indicate whether the predicted price impact was a sensitivity to the baseline simulation put forward.

Summary statistics for the main characteristics of the analysed merger simulations are given in Table 5, broken down into pairwise comparisons by the simulation method (econometric demand vs. calibrated demand), by author (European Commission vs. merging parties) and by industry (telecoms

vs. others). In each column, and for each pairwise comparison, we report the t-statistics and p-values for the difference between the means. The table includes all baseline (i.e., non-sensitivity) price change estimates for the merged entity, competitors and the market as a whole (272 observations).[56] In the appendix, we present the same table, showing (a) only estimates for the merged entity, and (b) including the various sensitivity checks that are made available.

Table 5: Summary statistics by the main variables (merged entity+competitors+market; baseline estimates)

Method	Statistic	Price change	Combined share	Increment	Synergies (0/1)	Phase 2 (0/1)	Blocked (0/1)
Econometric demand	mean	0.034	0.419	0.167	0.009	0.964	0.582
	sd	0.047	0.173	0.089	0.095	0.188	0.496
	N	110	110	110	110	110	110
Calibrated demand	mean	0.079	0.389	0.121	0.105	0.975	0.148
	sd	0.068	0.116	0.052	0.307	0.156	0.356
	N	162	162	162	162	162	162
t-test	t	6.053	-1.708	-5.409	3.167	0.557	-8.395
	p	0.000	0.089	0.000	0.002	0.578	0.000
European Commission	mean	0.064	0.402	0.140	0.069	0.984	0.358
	sd	0.064	0.145	0.073	0.254	0.127	0.480
	N	246	246	246	246	246	246
Merging parties	mean	0.038	0.390	0.134	0.038	0.846	0.000
	sd	0.061	0.117	0.070	0.196	0.368	0.000
	N	26	26	26	26	26	26
t-test	t	-1.964	-0.405	-0.451	-0.596	-4.052	-3.791
	p	0.051	0.685	0.652	0.552	0.000	0.000
Telecoms	mean	0.071	0.369	0.120	0.058	1.000	0.155
	sd	0.064	0.108	0.048	0.235	0.000	0.363
	N	155	155	155	155	155	155
Other industries	mean	0.049	0.444	0.166	0.077	0.932	0.547
	sd	0.063	0.169	0.091	0.268	0.253	0.500
	N	117	117	117	117	117	117
t-test	t	-2.811	4.488	5.311	0.618	-3.360	7.496
	p	0.005	0.000	0.000	0.537	0.001	0.000
Total	mean	0.061	0.401	0.140	0.066	0.971	0.324
	sd	0.064	0.142	0.073	0.249	0.169	0.469
	N	272	272	272	272	272	272

Notes

** For which combined market share and increment information is available. Excludes market-level estimates for simulations where estimates for the merged entity or competitors are available. Excludes the DOJ's simulation in Oracle/PeopleSoft, and an unknown complainant's simulation in Thales/Finmeccanica*

The price-change column provides some descriptive evidence to the hypotheses introduced above. Price increase predictions are lower when using econometric estimation of demand parameters in comparison to calibrating them, even though econometric simulations were applied in markets that were becoming slightly more concentrated. Price increases are predicted to be higher when the simulation was done by the Commission in comparison to the merging parties, though the difference

[56] In our analysis we focus primarily on the predicted price changes on the merged entity and its competitors. However, as shown in Table 3, there were some merger simulations deployed in some relevant markets where only a price impact for the market as a whole was provided – we therefore include these in the sample for the subsequent analysis (but not the other market-level estimates), including a dummy to control for these observations in the regressions.

is (marginally) statistically insignificant. Finally, the predicted price increase is higher in the telecoms industry, even though the markets in the telecoms mergers were not becoming as highly concentrated on average.

In addition, simulations relying on econometrically estimated demand parameters were more likely in cases that ended up being blocked by the Commission. This is more likely to do with the Commission using econometrically estimated demand parameters, because none of the cases where the merging parties' consultancies delivered simulations were blocked.

5 The main drivers of price impact estimates

5.1 Descriptive findings

The summary statistics in Table 5 implicitly assumed that the main variables are independent of each other. To flush out some further details, we look at how the interaction of the above factors impact the average estimated price effect. Table 6 below shows the mean price change estimates for each combination of our three variables of interest. For example, the first two rows show the mean price-change estimate when using econometric demand models, if the simulation was done by the Commission, first for simulations in the telecoms industry (a 3.8pp price increase when considering the baseline models) and then for simulations in other industries (a 3.1pp price increase).

Table 6: Mean price changes for each combination of the key variables (merged entity+competitors+market)

			Baseline models (n=272)		Incl. sensitivity models (n=780)	
Model	Author	Industry	Mean price change	N	Mean price change	N
Econometric demand	European Commission	Telecoms	0.038	13	0.038	13
		Other industries	0.031	82	0.035	90
	Merging parties	Telecoms	0.060	11	0.060	11
		Other industries	0.007	4	0.007	4
Calibrated demand	European Commission	Telecoms	0.076	129	0.068	572
		Other industries	0.128	22	0.150	78
	Merging parties	Telecoms	0.000	2	0.000	2
		Other industries	0.032	9	0.031	10

Notes

** For which combined market share and increment information is available. Excludes market-level estimates for simulations where estimates for the merged entity or competitors are available. Excludes the DOJ's simulation in Oracle/PeopleSoft, and an unknown complainant's simulation in Thales/Finmeccanica*

Although, on average, simulations done by the Commission produce higher price change estimates (see Table 5 in the previous section), a further breakdown of the data shows that this is not true in telecoms for econometrically estimated simulations.[57]

Merger simulations in the telecoms industry predict higher post-merger price increases than those in other industries (see Table 5 in the previous section). Moreover, econometrically estimated merger simulations predict lower post-merger price increases than calibrated models. However, Table 6 above shows that this relationship depends on some of the other characteristics of the simulation. Firstly, price increases are larger in telecoms, but only for econometric models (for calibrated models, the

[57] Though this is based on a relatively small sample size, and driven by the random-coefficients econometric models put forward by the merging parties in *Hutchison 3G Italy/Wind JV*, where the models predicted large nominal price increases but which they argued would be offset by even larger increases in quality.

opposite is true). Next, price rises are lower for econometric models, but not for models put forward by the merging parties in telecoms.

To test whether these differences in the estimated price-impact of the merger remain when controlling for other merger characteristics, such as the combined market share of the merging parties, we turn to a regression analysis in the following section.

5.2 Regression analysis

The full results of our regression analysis are presented in Table 8 in the Appendix.[58] Here we only focus on our three main hypotheses introduced in Section 4. For this, in Table 7 we predict the marginal effects, using the regression parameters, of changes in the three main variables of interest. For example, the first row shows the difference between econometrically estimated simulations (three simulation models delivering 13 baseline price-change estimates) and calibrated models for simulations (six simulation models producing 129 baseline price-change estimates) done by the Commission in telecoms markets. This shows that econometrically estimated simulations deliver, on average, 2.5pp lower price increases using baseline models, and this difference is significant with a p-value of 0.011.[59]

Table 7: Difference in marginal effects from regressions with interaction terms (merged entity+competitors+market)

			Baseline				Incl. sensitivities			
Difference	Value other variables	No. models	Diff in margins	N	F	p	Diff in margins	N	F	p
Econometric minus calibrated	EC, Telecoms	3, 6	-0.025	13, 129	31.919	0.011	-0.031	13, 572	84.513	0.003
	EC, Other industries	3, 3	-0.117	82, 22	175.669	0.001	-0.123	90, 78	231.847	0.001
	Merging parties, Telecoms	1, 1	0.105	11, 2	289.276	0.000	0.107	11, 2	1104.593	0.000
	Merging parties, Other industries	2, 1	0.095	4, 9	53.909	0.005	0.068	4, 10	30.912	0.011
EC minus merging parties	Econometric, Telecoms	3, 1	-0.024	13, 11	89.447	0.003	-0.032	13, 11	91.545	0.002
	Econometric, Other industries	3, 2	-0.095	82, 4	85.804	0.003	-0.071	90, 4	44.311	0.007
	Calibrated, Telecoms	6, 1	0.106	129, 2	667.649	0.000	0.105	572, 2	887.206	0.000
	Calibrated, Other industries	3, 1	0.116	22, 9	132.736	0.001	0.120	78, 10	289.130	0.000
Telecoms minus other industries	Econometric, EC	3, 3	0.062	13, 82	142.246	0.001	0.067	13, 90	376.816	0.000
	Econometric, Merging parties	1, 2	-0.009	11, 4	0.480	0.538	0.028	11, 4	4.596	0.121
	Calibrated, EC	6, 3	-0.031	129, 22	8.343	0.063	-0.026	572, 78	8.653	0.060
	Calibrated, Merging parties	1, 1	-0.020	2, 9	235.009	0.001	-0.011	2, 10	15.246	0.030

Notes

** For which combined market share and increment information is available. Excludes market-level estimates for simulations where estimates for the merged entity or competitors are available. Excludes the DOJ's simulation in Oracle/PeopleSoft, and an unknown complainant's simulation in Thales/Finmeccanica*

5.2.1 Does it matter which method is used?

Table 7 shows that simulations using econometrically estimated demand parameters produce lower price-impact estimates even after controlling for differences in market concentration and other factors, but only for simulations done by the Commission, either in telecoms,[60] or in other industries. On the

[58] These results confirm some of the conventional wisdom of merger analysis: the price increase prediction is larger if the change in market concentration (post-merger combined share) is larger, and/or where the increment in market concentration is larger. Similarly intuitively, the price increase estimates are larger in simulations produced in Phase 2 or in blocked mergers in most of the specifications, and they are lower when synergies are factored into the model.

[59] The 'F' and 'p' columns indicate the F-statistic and p-value of the test of the differences in the marginal effects between the two values in the 'Difference' column.

[60] Supporting the specific point made by the merging firms in *Hutchison 3G UK/Telefónica UK*, that when the Commission produced both calibrated and econometric models side-by-side, the latter produced lower price increase estimates – see Section 4.1. Outside of our data set of merger simulations used in EU merger control, there is further anecdotal evidence to support this point, in that the CMA, in its review of the *Vodafone/Three JV* in the UK in 2024, used a merger simulation model based on econometrically estimated demand as its baseline, "*conservative*", model that predicted that consumers would be £216 million worse off every year post-merger. It then performed a number of sensitivity analyses where the main change to the baseline was that the demand

other hand, econometric models result in *higher* price-impact estimates if the simulation was performed by the merging parties.[61] One intuitive explanation could be that in calibrated models there are more assumptions about the underlying demand/supply parameters, and thus more leeway than where demand/supply parameters are estimated from data. This is discussed in more detail below.

5.2.2 Do the Commission's simulations always produce higher price increase predictions?

We find evidence to reject the hypothesis that the Commission *always* produces higher price-increase estimates (or, that the merging parties always produce lower price-increase estimates). When using simulations based on econometrically estimated demand parameters (in telecoms or other industries), the merging parties' price increase estimates actually seem to be higher than those of the Commission. This result holds even after controlling for differences in market concentration and the industry (see Table 7). Finally, the difference between the Commission's and the merging parties' predictions is lower in absolute terms when econometrically estimated simulations are used. We draw the following conclusions from this.

First, simulations relying on econometrically estimated demand parameters give more consistent post-merger price predictions. This could be because non-econometrically estimated simulations (typically calibrated models) rely on more arbitrary assumptions. This is something that CMA has also noted in *Vodafone/Three JV*: "*Compared to the detailed [econometric] estimation exercise … a calibration approach is more approximate and has a number of limitations. As such we place limited evidentiary weight on specific harm estimates and instead consider how the scale and direction of the harm estimates change under different assumptions*."[62]

To offer some qualitative support to this point, in *Oracle/PeopleSoft* the merging parties debated the degree to which both the Commission's and DOJ's relied on simplifying assumptions in their respective models, such as using market shares as a proxy for success rate in bids, not accounting for costs in the model because they were "*mostly sunk*", and assumption of participants having 'complete information' made their respective models unrealistic. This lead to a predicted price increase of 24.9% in the Commission's model (averaged across all baseline and sensitivity estimates).[63]

In *Outokumpu/Inoxum* (and also *INEOS/Solvay JV*, which used a similar simulation model) the Commission predicted a 10.6% post-merger price increase for the merged entity (averaged across all baseline and sensitivity estimates), but acknowledged that its model could not account for various features such as customer switching costs – in response, the merging firms put forward an adjusted model that predicted no price effect, but the Commission argued the assumptions needed to achieve this result were "*extreme*".

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parameters were calibrated instead – each of these sensitivities produced higher price rises, the largest of which predicted that consumers would be up to £900 million worse off each year. See CMA final report in *Vodafone/Three JV*, paras. 42-43 and Table D.10.

[61] Though these results are based on limited samples, i.e. equivalent to comparing five models. In telecoms, this is a comparison of the random coefficients econometric model used in *Hutchison 3G Italy/Wind JV* (where the merging parties acknowledged its model's high predicted price rises, but argued that overall consumer surplus would be higher due to quality improvements brought about by the merger) and the nested logit calibrated model used in *Hutchison 3G UK/Telefónica Ireland*, which produced "*negligible*" price increases. In other industries, our results are equivalent to a comparison of the econometric nested logit models in *Philip Morris/Papastratos* and *Kraft Foods/Cadbury* with the calibrated nested logit model in *DEMB/Mondelez*.

[62] CMA final report in *Vodafone/Three JV*, Appendix D, para. 108.

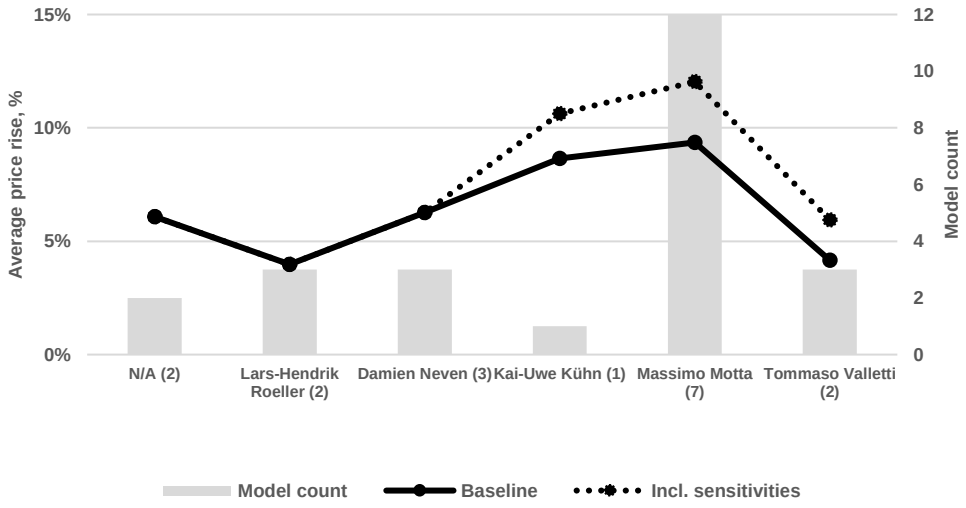
[63] As noted above, the DOJ's model is excluded from the regression data set.

Other assumptions in calibrated models can also lead to discrepancies in the price-increase estimates between the Commission and the merging parties. For example, it is well known from economic theory that the convexity of the demand curve impacts the level of pass-on, and thus the size of the price effect of the merger.[64] The Commission typically assumes linear demand in their calibrated simulations, which is associated with lower pass-on on than convex demand curves, and argues that this is a lower bound. However, it appears that when the Commission econometrically estimates demand parameters, it leads to a lower predicted post-merger price increase. Similarly, predicted post-merger price rises can vary greatly depending on elasticity assumptions in a calibrated model.[65]

5.2.2.1 The role of the Chief Economist in the predicted price change

Although we did not include this in our regression (given our sample size), on an aggregate level we looked at whether the average predicted price rises of the merged entity changed depending on the Chief Economist in charge – see Figure 4 below. There was a gradual increase in the average price rise predicted by merger simulations, followed a sharp decline under Tommaso Valletti's tenure, which might reflect that the two cases he oversaw – *Fortum/Uniper* and *T-Mobile NL/Tele2 NL* – were relatively less complex mergers, both being cleared without remedies (the former in Phase 1 and the latter in Phase 2).[66] When focusing on merging party simulations only (Figure 5 in Section 8.4 of the Appendix), we see an increase from the Damien Neven tenure to the Massimo Motta and Tommaso Valletti tenures, which is driven by the models put forward in *Hutchison 3G Italy/Wind JV* and *T-Mobile NL/Tele2 NL*, which predicted large price increases (factored into the analysis) but which were offset by even larger quality increases (not factored into the analysis).

Figure 4 – Average predicted price rise, by Chief Economist (all merger simulations)



5.2.3 Does it matter if the merger is in the telecoms industry?

We find evidence that simulations in the telecoms industry produce higher price-impact estimates even after controlling for differences in market concentration and other factors, although this is only

64 Panhans et al. (2023) look at the impact of a potentially mis-specified demand model can have on the merger simulation predictions.

65 Froeb et al (2003) and Walker (2005).

66 This pattern is largely the same when focusing just on merger simulations put forward by the Commission – see Figure 6 in Section 8.4 of the Appendix.

true for simulations using econometrically estimated demand parameters, done by the Commission (see Table 7). For econometric simulations put forward by the merging parties, or calibrated models put forward by the Commission (where the majority of observations are), the price-change predictions in telecoms and other industries are not statistically significantly different from each other. Finally, for calibrated models put forward by the merging parties, predicted price rises are actually *higher* in other industries than in telecoms.

6 Conclusions

In this paper we presented a detailed review of the merger simulations used in EU merger control. We analyse key areas of contention between the Commission and merging parties, including differences in the purpose of simulations, data selection, modelling approaches, and underlying assumptions, and then look at the main drivers of the price impact estimates produced by these simulations.

We do not find support for the argument that the Commission's simulations always present higher price-impact estimates than those of the merging parties. The choice of the simulation method plays an important role in this respect.

Both the Commission and merging firms may question whether the benefits of a fully-fledged merger simulation – with the increased data requirements and complexities that come with that – are worth it compared to simpler (and thus cheaper) price pressure indices which are easier to implement and require less data. This is particularly true from the perspective of the Commission which may be more resource constrained, if the simulation increases their exposure to a successful appeal by the merging parties, and if the merger simulation is at best only a marginal improvement on the predictions of simpler price-pressure methods.

We show that there is more consistency in the estimates of the Commission and the merging parties when they use econometrically estimated simulations. If the consistency of price predictions between the Commission and the merging parties can be considered a useful measure of simulation quality, in future work it would be useful to compare these simulation estimates with the predictions provided by price-pressure methods (such as GUPPI), which use more assumptions about structural parameters, and hence potentially giving way to more discrepancy between the Commission's and the merging parties' estimates.

This would be particularly important because it is has been argued that the merging parties use simulations to deliver results favourable to them. Whilst we do not find general evidence to support this claim, we also see no reason to think that this argument should not also apply for price-pressure methods. Given that these methods are more likely to rely on a wider range of assumptions, the same argument should actually favour fully-fledged merger simulations as a more consistent prediction method.

At the same time, there have also been significant changes over time in the types of mergers being attempted and the theories of harm being applied to these cases. This should provide an even stronger case for using simulations. For example, dynamic considerations have become more important in some of the recent large mergers. In *Activision/Blizzard*, the main concern was regarding the merger's impact on cloud gaming, a nascent segment of the gaming industry, and it is possibly difficult to see where a 'traditional' simulation could have represent useful economic evidence in this regard. Nevertheless, as was shown in *Hutchison 3G Italy/Wind JV* and *T-Mobile NL/Tele2 NL* in front of the Commission, and most recently *Vodafone/Three JV* in front of the CMA, the merging firms tend to submit more novel

simulation methods which aim to quantify efficiencies or quality improvements directly into the model. These types of merger simulation model should be encouraged.

Another example is platform mergers, or mergers involving two-sided markets, which have become increasingly relevant in recent years, particularly in the tech sector. A simulation in these settings could be especially useful, given the indirect network effects on each side of the market, the impact of a merger on which may be obscured when using simpler models. Despite there being relevant academic literature on how to incorporate this into a simulation[67], there have not been any cases of this type where such a simulation was deployed.

Merger reviews are carried out against relatively strict statutory deadlines, which might limit the possibility of the Commission or merging firms to produce complex economic evidence, as their reliable implementation may take time. The Commission (and also the CMA[68]) has indeed stated that time constraints have reduced its ability to produce reliable models.[69] This issue of timing could be mitigated if the merging firms were able to invest time early in a merger proceeding, for example in pre-notification, for developing a robust, reliable simulation model, which may also help the Commission with its own investigation. This would also have the added benefit that the underlying demand model could be used to help with the market definition stage, like in *Unilever/Sara Lee*. In any case, given that the length of Phase 1 and 2 reviews has not shortened over time, it is unlikely that this factor has caused the reduction in the use of simulations. Moreover, methods are being proposed to shorten the time needed for the estimation of structural parameters,[70] which could also help merger simulations to fit into the tight timeframe of merger procedures.

In general we wanted to highlight best practice, issues of simulations design and delivery that are least contentious between the Commission and merging parties. To provide further evidence in this regard, we hope to look at price-pressure methods in our future work.

7 References

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[67] See, for example, Filistrucchi et al (2012) and Cayseele & Vanormelingen (2019).

[68] Noted explicitly in its review of *Vodafone/Three JV*.

[69] For example, in *Unilever/Sara Lee*, the Commission argued that time was the main factor constraining it from introducing entry, repositioning or retailer buyer power into its model. Similarly, in the telecoms cases, the Commission seemingly moved away from relatively more sophisticated models based on econometrically estimated demand due to its increased complexity compared to calibrated demand models.

[70] Döpper et al. (2024).

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8 Appendix

8.1 Variants of summary statistic tables

Table 5ii below shows the summary statistics of the main variables from Table 5, but instead restricting the sample to the price rise estimates of the merged entity only. The results are qualitatively similar, with the exception of the difference between the average price rise of econometric vs. calibrated simulations, where the (negative) difference is not statistically significant.

Table 5ii: Summary statistics by the main variables (merged entity; baseline estimates)

Method	Statistic	Price change	Combined share	Increment	Synergies (0/1)	Phase 2 (0/1)	Blocked (0/1)
Econometric demand	mean	0.071	0.404	0.184	0.024	0.976	0.762
	sd	0.055	0.183	0.090	0.154	0.154	0.431
	N	42	42	42	42	42	42
Calibrated demand	mean	0.093	0.382	0.132	0.153	0.944	0.083
	sd	0.073	0.125	0.051	0.362	0.231	0.278
	N	72	72	72	72	72	72
t-test	t	1.641	-0.771	-3.968	2.191	-0.794	-10.212
	p	0.104	0.442	0.000	0.031	0.429	0.000
European Commission	mean	0.089	0.387	0.154	0.111	0.960	0.384
	sd	0.066	0.149	0.070	0.316	0.198	0.489
	N	99	99	99	99	99	99
Merging parties	mean	0.057	0.410	0.138	0.067	0.933	0.000
	sd	0.073	0.150	0.083	0.258	0.258	0.000
	N	15	15	15	15	15	15
t-test	t	-1.732	0.558	-0.761	-0.519	-0.459	-3.030
	p	0.086	0.578	0.448	0.605	0.647	0.003
Telecoms	mean	0.112	0.346	0.128	0.150	1.000	0.100
	sd	0.074	0.103	0.041	0.360	0.000	0.303
	N	60	60	60	60	60	60
Other industries	mean	0.054	0.438	0.177	0.056	0.907	0.593
	sd	0.043	0.175	0.089	0.231	0.293	0.496
	N	54	54	54	54	54	54
t-test	t	-5.067	3.453	3.837	-1.646	-2.453	6.472
	p	0.000	0.001	0.000	0.103	0.016	0.000
Total	mean	0.085	0.390	0.152	0.105	0.956	0.333
	sd	0.067	0.149	0.072	0.308	0.206	0.473
	N	114	114	114	114	114	114

Notes

** For which combined market share and increment information is available*

Table 5iii below shows the summary statistics of the main variables from Table 5, but instead including sensitivity estimates in addition to baseline estimates. Here, the (positive) difference between average price rises produced by the Commission vs. the merging parties is statistically significant, and the average price rise in telecoms is lower than in other industries.[71]

[71] A result which is driven by the Commission's simulation model in *Oracle/PeopleSoft*, where in the sensitivities it iterates over a 'quality' parameter, which has a large impact on the predicted price rises (as large as 49%).

Table 5iii: Summary statistics by the main variables (merged entity+competitors+market; incl. sensitivity estimates)

Method	Statistic	Price change	Combined share	Increment	Synergies (0/1)	Phase 2 (0/1)	Blocked (0/1)
Econometric demand	mean	0.037	0.426	0.167	0.008	0.966	0.542
	sd	0.047	0.171	0.088	0.092	0.182	0.500
	N	118	118	118	118	118	118
Calibrated demand	mean	0.077	0.412	0.124	0.092	0.994	0.308
	sd	0.073	0.103	0.043	0.289	0.078	0.462
	N	662	662	662	662	662	662
t-test	t	5.770	-1.244	-8.207	3.111	2.777	-5.008
	p	0.000	0.214	0.000	0.002	0.006	0.000
European Commission	mean	0.072	0.414	0.130	0.081	0.995	0.356
	sd	0.072	0.115	0.054	0.273	0.073	0.479
	N	753	753	753	753	753	753
Merging parties	mean	0.037	0.400	0.134	0.037	0.852	0.000
	sd	0.060	0.125	0.069	0.192	0.362	0.000
	N	27	27	27	27	27	27
t-test	t	-2.532	-0.640	0.365	-0.829	-7.484	-3.858
	p	0.012	0.523	0.715	0.407	0.000	0.000
Telecoms	mean	0.067	0.398	0.122	0.042	1.000	0.341
	sd	0.061	0.098	0.043	0.200	0.000	0.474
	N	598	598	598	598	598	598
Other industries	mean	0.083	0.467	0.159	0.203	0.956	0.352
	sd	0.097	0.150	0.075	0.404	0.206	0.479
	N	182	182	182	182	182	182
t-test	t	2.646	7.243	8.567	7.279	-5.237	0.261
	p	0.008	0.000	0.000	0.000	0.000	0.794
Total	mean	0.071	0.414	0.131	0.079	0.990	0.344
	sd	0.071	0.116	0.054	0.271	0.101	0.475
	N	780	780	780	780	780	780

Notes

** For which combined market share and increment information is available. Excludes market-level estimates for simulations where estimates for the merged entity or competitors are available. Excludes the DOJ's simulation in Oracle/PeopleSoft, and an unknown complainant's simulation in Thales/Finmeccanica*

Table 6ii below shows the differences in mean price rises across different dimensions of the data from Table 6, but instead restricting the sample to the price rise estimates of the merged entity only. The results are largely qualitatively similar, with the exception of predicted price rises being higher in telecoms for calibrated models put forward by the Commission.

Table 6ii: Mean price changes for each combination of the key variables (merged entity)

			Baseline models (n=114)		Incl. sensitivity models (n=270)	
Model	Author	Industry	Mean price change	N	Mean price change	N
Econometric demand	European Commission	Telecoms	0.102	4	0.102	4
		Other industries	0.059	34	0.059	34
	Merging parties	Telecoms	0.188	3	0.188	3
		Other industries	0.005	1	0.005	1
Calibrated demand	European Commission	Telecoms	0.113	51	0.124	165
		Other industries	0.062	10	0.100	52
	Merging parties	Telecoms	0.000	2	0.000	2
		Other industries	0.032	9	0.032	9

Notes

** For which combined market share and increment information is available*

8.2 Full regression results

The full regression results underlying the marginal effects presented in Table 7 are presented in Table 8 below. Because the different price estimates within a model are likely not independent, in our headline models we clustered standard errors by the simulations models (i.e. there could have been multiple models in a single case). Later we present results of our sensitivity analysis using clustering by cases and no clustering.

Table 8: Regression analysis results (merged entity+competitors+market)

	Baseline		Incl. sensitivities	
	Price change	Price change	Price change	Price change
Econometric demand (0/1)	-0.0370	0.0947***	-0.0621	0.0681**
	(0.0265)	(0.0129)	(0.0341)	(0.0123)
European Commission (0/1)	0.0101	0.116***	0.0118	0.120***
	(0.0260)	(0.0101)	(0.0506)	(0.00706)
Telecoms (0/1)	0.0428	-0.0198***	0.0178	-0.0107**
	(0.0231)	(0.00129)	(0.0238)	(0.00275)
Econometric demand x European Commission		-0.212***		-0.191***
		(0.0201)		(0.0163)
Econometric demand x Telecoms		0.0106		0.0385**
		(0.0135)		(0.0110)
European Commission x Telecoms		-0.0108		-0.0148
		(0.0111)		(0.00820)
Econometric demand x European Commission x Telecor		0.0817**		0.0536*
		(0.0217)		(0.0174)
Combined share	0.0536**	0.0720**	0.0488	0.0434
	(0.0153)	(0.0136)	(0.0216)	(0.0196)
Increment	0.122***	0.0729*	0.148***	0.140***
	(0.0190)	(0.0265)	(0.0217)	(0.0191)
Synergies (0/1)	0.0291	-0.00396	0.00882	-0.0134*
	(0.0223)	(0.0108)	(0.0159)	(0.00502)
Phase 2 (0/1)	0.0351	0.116***	0.0615	0.114***
	(0.0223)	(0.00969)	(0.0313)	(0.00786)
Blocked (0/1)	0.0208**	0.0289***	0.0217***	0.0295***
	(0.00626)	(0.00425)	(0.00348)	(0.00279)
Sensitivity model (0/1)			0.00219	-0.00306
			(0.00469)	(0.00177)
Competitor estimate (0/1)	-0.0600***	-0.0678***	-0.0746***	-0.0741***
	(0.00535)	(0.00778)	(0.00414)	(0.00386)
Market estimate (0/1)	0.0330*	0.00981	0.0635**	0.0588**
	(0.0124)	(0.00835)	(0.0149)	(0.0122)
Constant	-0.0158	-0.127***	-0.0166	-0.131***
	(0.0214)	(0.0117)	(0.0360)	(0.00873)
Observations	272	272	780	780
R-squared	0.411	0.509	0.409	0.469

Robust standard errors in parentheses (clustered by model)
*** p<0.01, ** p<0.05, * p<0.1

** For which combined market share and increment information is available. Excludes market-level estimates for simulations where estimates for the merged entity or competitors are available. Excludes the DOJ's simulation in Oracle/PeopleSoft, and an unknown complainant's simulation in Thales/Finmeccanica*

8.3 Regression sensitivities

Table 7ii shows the estimated marginal effects of the main regression model, but instead calculates the average price rise across merging firms weighted by each merging firm's pre-merger market share (rather than taking a simple average). Table 8ii shows the equivalent regression results. The results are qualitatively similar, with the exception that the negative difference between the predicted price rises of telecoms vs. other industries for calibrated models put forward by the Commission becomes statistically significant.

Table 7ii: Difference in marginal effects from regressions with interaction terms, weighted average price rise sensitivity (merged entity+competitors+market)

			Baseline				Incl. sensitivities			
Difference	Value other variables	No. models	Diff in margins	N	F	p	Diff in margins	N	F	p
Econometric minus calibrated	EC, Telecoms	3, 6	-0.025	13, 129	33.156	0.010	-0.031	13, 572	89.670	0.002
	EC, Other industries	3, 3	-0.114	82, 22	200.512	0.001	-0.125	90, 78	283.513	0.000
	Merging parties, Telecoms	1, 1	0.092	11, 2	235.532	0.001	0.092	11, 2	791.072	0.000
	Merging parties, Other industries	2, 1	0.089	4, 9	56.102	0.005	0.068	4, 10	33.160	0.010
EC minus merging parties	Econometric, Telecoms	3, 1	-0.021	13, 11	62.266	0.004	-0.029	13, 11	77.237	0.003
	Econometric, Other industries	3, 2	-0.093	82, 4	99.592	0.002	-0.074	90, 4	54.252	0.005
	Calibrated, Telecoms	6, 1	0.096	129, 2	629.491	0.000	0.094	572, 2	743.085	0.000
	Calibrated, Other industries	3, 1	0.111	22, 9	146.419	0.001	0.118	78, 10	331.596	0.000
Telecoms minus other industries	Econometric, EC	3, 3	0.056	13, 82	129.469	0.001	0.060	13, 90	330.331	0.000
	Econometric, Merging parties	1, 2	-0.016	11, 4	1.847	0.267	0.014	11, 4	1.364	0.327
	Calibrated, EC	6, 3	-0.034	129, 22	12.180	0.040	-0.034	572, 78	17.465	0.025
	Calibrated, Merging parties	1, 1	-0.019	2, 9	164.404	0.001	-0.010	2, 10	11.622	0.042

Notes

** For which combined market share and increment information is available. Excludes market-level estimates for simulations where estimates for the merged entity or competitors are available. Excludes the DOJ's simulation in Oracle/PeopleSoft, and an unknown complainant's simulation in Thales/Finmeccanica*

Table 8ii: Regression analysis results, weighted average price rise sensitivity (merged entity+competitors+market)

	Baseline		Incl. sensitivities	
	Price change	Price change	Price change	Price change
Econometric demand (0/1)	-0.0381	0.0888***	-0.0642	0.0680**
	(0.0247)	(0.0119)	(0.0333)	(0.0118)
European Commission (0/1)	0.00945	0.111***	0.0109	0.118***
	(0.0241)	(0.00913)	(0.0496)	(0.00651)
Telecoms (0/1)	0.0365	-0.0187***	0.00944	-0.00971**
	(0.0218)	(0.00146)	(0.0234)	(0.00285)
Econometric demand x European Commission		-0.203***		-0.193***
		(0.0181)		(0.0150)
Econometric demand x Telecoms		0.00273		0.0240
		(0.0120)		(0.0102)
European Commission x Telecoms		-0.0149		-0.0242*
		(0.0101)		(0.00766)
Econometric demand x European Commission x Telecoms		0.0865**		0.0699**
		(0.0196)		(0.0160)
Combined share	0.0341*	0.0519**	0.0297	0.0245
	(0.0131)	(0.0117)	(0.0203)	(0.0180)
Increment	0.168***	0.120**	0.191***	0.183***
	(0.0209)	(0.0265)	(0.0227)	(0.0185)
Synergies (0/1)	0.0308	-0.000463	0.00962	-0.0125*
	(0.0210)	(0.0102)	(0.0158)	(0.00471)
Phase 2 (0/1)	0.0342	0.112***	0.0606	0.115***
	(0.0215)	(0.00884)	(0.0313)	(0.00731)
Blocked (0/1)	0.0180*	0.0258***	0.0189***	0.0267***
	(0.00625)	(0.00393)	(0.00301)	(0.00261)
Sensitivity model (0/1)			0.00306	-0.00209
			(0.00430)	(0.00188)
Competitor estimate (0/1)	-0.0519***	-0.0592***	-0.0643***	-0.0637***
	(0.00681)	(0.00741)	(0.00457)	(0.00399)
Market estimate (0/1)	0.0382*	0.0160	0.0674**	0.0626**
	(0.0122)	(0.00833)	(0.0146)	(0.0118)
Constant	-0.0147	-0.122***	-0.0142	-0.130***
	(0.0199)	(0.0106)	(0.0363)	(0.00830)
Observations	272	272	780	780
R-squared	0.416	0.514	0.411	0.478

Robust standard errors in parentheses (clustered by model)

*** p<0.01, ** p<0.05, * p<0.1

** For which combined market share and increment information is available. Excludes market-level estimates for simulations where estimates for the merged entity or competitors are available. Excludes the DOJ's simulation in Oracle/PeopleSoft, and an unknown complainant's simulation in Thales/Finmeccanica*

Table 7iii shows the estimated marginal effects of the main regression model, but instead removes combined share and increment as regressors, in order to include the observations from the merging parties' model in *T-Mobile NL/Tele2 NL* in the sample (as well as other observations without combined share and increment). Table 8iii shows the equivalent regression results. The results are qualitatively similar, with the exception that the negative difference between the predicted price rises of telecoms vs. other industries for econometric models put forward by the merging parties and calibrated models put forward by the Commission become statistically significant.

Table 7iii: Difference in marginal effects from regressions with interaction terms, no combined share/increment sensitivity (merged entity+competitors+market)

			Baseline				Incl. sensitivities			
Difference	Value other variables	No. models	Diff in margins	N	F	p	Diff in margins	N	F	p
Econometric minus calibrated	EC, Telecoms	3, 6	-0.030	13, 139	114.930	0.002	-0.027	13, 636	78.931	0.003
	EC, Other industries	3, 3	-0.115	91, 22	223.674	0.001	-0.127	131, 78	164.832	0.001
	Merging parties, Telecoms	2, 1	0.106	12, 2	372.062	0.000	0.108	12, 2	260.802	0.001
	Merging parties, Other industries	2, 1	0.119	4, 21	163.759	0.001	0.102	4, 22	101.296	0.002
EC minus merging parties	Econometric, Telecoms	3, 2	-0.026	13, 12	43.144	0.007	-0.028	13, 12	41.980	0.007
	Econometric, Other industries	3, 2	-0.101	91, 4	127.105	0.001	-0.091	131, 4	98.995	0.002
	Calibrated, Telecoms	6, 1	0.110	139, 2	635.475	0.000	0.107	636, 2	721.005	0.000
	Calibrated, Other industries	3, 1	0.134	22, 21	307.976	0.000	0.138	78, 22	252.528	0.001
Telecoms minus other industries	Econometric, EC	3, 3	0.037	13, 91	107.490	0.002	0.050	13, 131	237.086	0.001
	Econometric, Merging parties	2, 2	-0.037	12, 4	15.177	0.030	-0.013	12, 4	1.448	0.315
	Calibrated, EC	6, 3	-0.048	139, 22	25.722	0.015	-0.050	636, 78	24.572	0.016
	Calibrated, Merging parties	1, 1	-0.024	2, 21	1576.876	0.000	-0.019	2, 22	153.660	0.001

Notes

** Excludes market-level estimates for simulations where estimates for the merged entity or competitors are available. Excludes the DOJ's simulation in Oracle/PeopleSoft, and an unknown complainant's simulation in Thales/Finmeccanica*

Table 8iii: Regression analysis results, no combined share/increment sensitivity (merged entity+competitors+market)

	Baseline		Incl. sensitivities	
	Price change	Price change	Price change	Price change
Econometric demand (0/1)	-0.0255	0.119***	-0.0578	0.102***
	(0.0258)	(0.00932)	(0.0380)	(0.0101)
European Commission (0/1)	0.0300	0.134***	0.0356	0.138***
	(0.0234)	(0.00763)	(0.0479)	(0.00866)
Telecoms (0/1)	0.0329	-0.0240***	0.00448	-0.0191***
	(0.0227)	(0.000605)	(0.0296)	(0.00154)
Econometric demand x European Commission		-0.235***		-0.229***
		(0.0164)		(0.0174)
Econometric demand x Telecoms		-0.0135		0.00637
		(0.00947)		(0.0103)
European Commission x Telecoms		-0.0244*		-0.0308*
		(0.00945)		(0.0104)
Econometric demand x European Commission x Telecoms		0.0992**		0.0935**
		(0.0176)		(0.0203)
Combined share				
Increment				
Synergies (0/1)	0.0330	-0.00976	0.0209	-0.0118*
	(0.0170)	(0.00487)	(0.0190)	(0.00392)
Phase 2 (0/1)	0.0335	0.133***	0.0481	0.132***
	(0.0222)	(0.00789)	(0.0397)	(0.00859)
Blocked (0/1)	0.0175**	0.0234***	0.0289***	0.0347***
	(0.00416)	(0.00258)	(0.00272)	(0.00230)
Sensitivity model (0/1)			-0.000415	-0.00401*
			(0.00455)	(0.00149)
Competitor estimate (0/1)	-0.0593***	-0.0671***	-0.0709***	-0.0707***
	(0.00405)	(0.00690)	(0.00349)	(0.00408)
Market estimate (0/1)	0.0147	-0.00376	0.0227	0.0241*
	(0.00829)	(0.00424)	(0.0108)	(0.00857)
Constant	0.00851	-0.109***	0.0188	-0.113***
	(0.0174)	(0.00763)	(0.0366)	(0.00866)
Observations	304	304	898	898
R-squared	0.345	0.459	0.343	0.427

Robust standard errors in parentheses (clustered by model)
*** p<0.01, ** p<0.05, * p<0.1

Table 7iv shows the estimated marginal effects of the main regression model, but reinstates the DOJ's model in *Oracle/PeopleSoft*, and an unknown complainant's model in *Thales/Finmeccanica* in the sample. Table 8iv shows the equivalent regression results. The results are qualitatively similar, with the exception that the negative difference between the predicted price rises of telecoms vs. other industries for calibrated models put forward by the Commission becomes statistically significant.

Table 7iv: Difference in marginal effects from regressions with interaction terms, adding DOJ and unknown complainant models sensitivity (merged entity+competitors+market)

			Baseline				Incl. sensitivities			
Difference	Value other variables	No. models	Diff in margins	N	F	p	Diff in margins	N	F	p
Econometric minus calibrated	EC, Telecoms	3, 6	-0.027	13, 129	30.443	0.003	-0.031	13, 572	71.888	0.000
	EC, Other industries	3, 5	-0.121	82, 25	90.079	0.000	-0.121	90, 81	357.927	0.000
	Merging parties, Telecoms	1, 1	0.104	11, 2	256.548	0.000	0.106	11, 2	928.692	0.000
	Merging parties, Other industries	2, 1	0.098	4, 9	38.673	0.002	0.068	4, 10	27.112	0.003
EC minus merging parties	Econometric, Telecoms	3, 1	-0.025	13, 11	65.791	0.000	-0.032	13, 11	75.294	0.000
	Econometric, Other industries	3, 2	-0.100	82, 4	56.106	0.001	-0.071	90, 4	41.700	0.001
	Calibrated, Telecoms	6, 1	0.105	129, 2	579.931	0.000	0.105	572, 2	618.378	0.000
	Calibrated, Other industries	5, 1	0.119	25, 9	94.020	0.000	0.119	81, 10	354.949	0.000
Telecoms minus other industries	Econometric, EC	3, 3	0.061	13, 82	135.313	0.000	0.066	13, 90	261.251	0.000
	Econometric, Merging parties	1, 2	-0.013	11, 4	0.710	0.438	0.028	11, 4	3.983	0.102
	Calibrated, EC	6, 5	-0.033	129, 25	7.117	0.044	-0.024	572, 81	9.854	0.026
	Calibrated, Merging parties	1, 1	-0.018	2, 9	94.049	0.000	-0.010	2, 10	15.563	0.011

Notes
** For which combined market share and increment information is available. Excludes market-level estimates for simulations where estimates for the merged entity or competitors are available*

Table 8iv: Regression analysis results, adding DOJ & unknown complainant models sensitivity (merged entity+competitors+market)

	Baseline		Incl. sensitivities	
	Price change	Price change	Price change	Price change
Econometric demand (0/1)	-0.0420	0.0979***	-0.0630	0.0680***
	(0.0249)	(0.0157)	(0.0314)	(0.0131)
European Commission (0/1)	0.00961	0.119***	0.0118	0.119***
	(0.0278)	(0.0123)	(0.0494)	(0.00631)
Telecoms (0/1)	0.0411	-0.0184***	0.0180	-0.0105**
	(0.0227)	(0.00190)	(0.0225)	(0.00265)
Econometric demand x European Commission		-0.219***		-0.190***
		(0.0252)		(0.0162)
Econometric demand x Telecoms		0.00567		0.0382**
		(0.0156)		(0.0121)
European Commission x Telecoms		-0.0141		-0.0140
		(0.0132)		(0.00759)
Econometric demand x European Commission x Telecoms		0.0883**		0.0525**
		(0.0264)		(0.0179)
Combined share	0.0454	0.0668**	0.0486	0.0430
	(0.0279)	(0.0186)	(0.0261)	(0.0236)
Increment	0.171	0.102*	0.161**	0.145***
	(0.0852)	(0.0459)	(0.0406)	(0.0266)
Synergies (0/1)	0.0240	-0.00677	0.00828	-0.0128**
	(0.0185)	(0.00880)	(0.0144)	(0.00499)
Phase 2 (0/1)	0.0376	0.119***	0.0614*	0.113***
	(0.0226)	(0.0122)	(0.0301)	(0.00706)
Blocked (0/1)	0.0201**	0.0284***	0.0215***	0.0293***
	(0.00657)	(0.00450)	(0.00324)	(0.00306)
Sensitivity model (0/1)			0.00197	-0.00263
			(0.00399)	(0.00297)
Competitor estimate (0/1)	-0.0593***	-0.0676***	-0.0745***	-0.0742***
	(0.00604)	(0.00766)	(0.00423)	(0.00382)
Market estimate (0/1)	0.0414	0.0126	0.0646**	0.0580***
	(0.0272)	(0.0129)	(0.0194)	(0.0132)
Constant	-0.0185	-0.133***	-0.0179	-0.131***
	(0.0239)	(0.0149)	(0.0360)	(0.00935)
Observations	275	275	783	783
R-squared	0.424	0.524	0.415	0.474

Robust standard errors in parentheses (clustered by model)
*** p<0.01, ** p<0.05, * p<0.1

Table 7v shows the estimated marginal effects of the main regression model, but does not cluster standard errors by model. Table 8v shows the equivalent regression results. Now, the negative

difference between econometric and calibrated models for models done by the Commission in telecoms is no longer statistically significant, the negative difference between the Commission and the merging parties for econometric models in telecoms is no longer statistically significant, the negative difference between telecoms and other industries for calibrated models done by the Commission is now statistically significant, and the negative difference between telecoms and other industries for calibrated models done by the merging parties is no longer statistically significant.

Table 7v: Difference in marginal effects from regressions with interaction terms, no clustered standard errors sensitivity (merged entity+competitors+market)

			Baseline				Incl. sensitivities			
Difference	Value other variables	No. models	Diff in margins	N	F	p	Diff in margins	N	F	p
Econometric minus calibrated	EC, Telecoms	3, 6	-0.025	13, 129	2.929	0.088	-0.031	13, 572	3.950	0.047
	EC, Other industries	3, 3	-0.117	82, 22	60.419	0.000	-0.123	90, 78	138.092	0.000
	Merging parties, Telecoms	1, 1	0.105	11, 2	8.461	0.004	0.107	11, 2	6.885	0.009
	Merging parties, Other industries	2, 1	0.095	4, 9	5.075	0.025	0.068	4, 10	2.577	0.109
EC minus merging parties	Econometric, Telecoms	3, 1	-0.024	13, 11	1.616	0.205	-0.032	13, 11	2.219	0.137
	Econometric, Other industries	3, 2	-0.095	82, 4	6.395	0.012	-0.071	90, 4	3.270	0.071
	Calibrated, Telecoms	6, 1	0.106	129, 2	10.013	0.002	0.105	572, 2	7.853	0.005
	Calibrated, Other industries	3, 1	0.116	22, 9	28.612	0.000	0.120	78, 10	41.689	0.000
Telecoms minus other industries	Econometric, EC	3, 3	0.062	13, 82	13.816	0.000	0.067	13, 90	16.625	0.000
	Econometric, Merging parties	1, 2	-0.009	11, 4	0.050	0.824	0.028	11, 4	0.427	0.513
	Calibrated, EC	6, 3	-0.031	129, 22	4.190	0.042	-0.026	572, 78	8.740	0.003
	Calibrated, Merging parties	1, 1	-0.020	2, 9	0.297	0.586	-0.011	2, 10	0.069	0.793

Notes

** For which combined market share and increment information is available. Excludes market-level estimates for simulations where estimates for the merged entity or competitors are available. Excludes the DOJ's simulation in Oracle/PeopleSoft, and an unknown complainant's simulation in Thales/Finmeccanica*

Table 8v: Regression analysis results, no clustered standard errors sensitivity (merged entity+competitors+market)

	Baseline		Incl. sensitivities	
	Price change	Price change	Price change	Price change
Econometric demand (0/1)	-0.0370***	0.0947**	-0.0621***	0.0681
	(0.00877)	(0.0420)	(0.00821)	(0.0424)
European Commission (0/1)	0.0101	0.116***	0.0118	0.120***
	(0.0115)	(0.0218)	(0.0118)	(0.0186)
Telecoms (0/1)	0.0428***	-0.0198	0.0178**	-0.0107
	(0.00989)	(0.0364)	(0.00738)	(0.0408)
Econometric demand x European Commission		-0.212***		-0.191***
		(0.0489)		(0.0452)
Econometric demand x Telecoms		0.0106		0.0385
		(0.0550)		(0.0588)
European Commission x Telecoms		-0.0108		-0.0148
		(0.0392)		(0.0415)
Econometric demand x European Commission x Telecoms		0.0817		0.0536
		(0.0616)		(0.0622)
Combined share	0.0536**	0.0720***	0.0488**	0.0434**
	(0.0268)	(0.0254)	(0.0198)	(0.0189)
Increment	0.122**	0.0729	0.148***	0.140***
	(0.0561)	(0.0531)	(0.0429)	(0.0411)
Synergies (0/1)	0.0291**	-0.00396	0.00882	-0.0134
	(0.0135)	(0.0133)	(0.00823)	(0.00821)
Phase 2 (0/1)	0.0351*	0.116***	0.0615***	0.114***
	(0.0196)	(0.0278)	(0.0209)	(0.0278)
Blocked (0/1)	0.0208**	0.0289***	0.0217***	0.0295***
	(0.00952)	(0.00940)	(0.00485)	(0.00473)
Sensitivity model (0/1)			0.00219	-0.00306
			(0.00503)	(0.00484)
Competitor estimate (0/1)	-0.0600***	-0.0678***	-0.0746***	-0.0741***
	(0.00711)	(0.00664)	(0.00469)	(0.00447)
Market estimate (0/1)	0.0330***	0.00981	0.0635***	0.0588***
	(0.0123)	(0.0122)	(0.00882)	(0.00849)
Constant	-0.0158	-0.127***	-0.0166	-0.131***
	(0.0215)	(0.0328)	(0.0227)	(0.0331)
Observations	272	272	780	780
R-squared	0.411	0.509	0.409	0.469

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 7vi shows the estimated marginal effects of the main regression model, but clusters the standard errors by case (rather than model). Table 8vi shows the equivalent regression results. Now, the negative difference between econometric and calibrated models for models done by the Commission in telecoms is no longer statistically significant, and the difference between econometric and calibrated models for models done by the merging parties in other industries is no longer statistically significant.

Table 7vi: Difference in marginal effects from regressions with interaction terms, standard errors clustered at case level sensitivity (merged entity+competitors+market)

			Baseline				Incl. sensitivities			
Difference	Value other variables	No. models	Diff in margins	N	F	p	Diff in margins	N	F	p
Econometric minus calibrated	EC, Telecoms	3, 6	-0.025	13, 129	1.656	0.219	-0.031	13, 572	2.491	0.137
	EC, Other industries	3, 3	-0.117	82, 22	11.935	0.004	-0.123	90, 78	11.881	0.004
	Merging parties, Telecoms	1, 1	0.105	11, 2	74.329	0.000	0.107	11, 2	69.152	0.000
	Merging parties, Other industries	2, 1	0.095	4, 9	2.803	0.116	0.068	4, 10	2.283	0.153
EC minus merging parties	Econometric, Telecoms	3, 1	-0.024	13, 11	6.678	0.022	-0.032	13, 11	4.645	0.049
	Econometric, Other industries	3, 2	-0.095	82, 4	4.604	0.050	-0.071	90, 4	2.439	0.141
	Calibrated, Telecoms	6, 1	0.106	129, 2	36.859	0.000	0.105	572, 2	37.858	0.000
	Calibrated, Other industries	3, 1	0.116	22, 9	7.879	0.014	0.120	78, 10	16.167	0.001
Telecoms minus other industries	Econometric, EC	3, 3	0.062	13, 82	7.488	0.016	0.067	13, 90	6.751	0.021
	Econometric, Merging parties	1, 2	-0.009	11, 4	0.029	0.867	0.028	11, 4	0.311	0.586
	Calibrated, EC	6, 3	-0.031	129, 22	0.610	0.448	-0.026	572, 78	0.530	0.479
	Calibrated, Merging parties	1, 1	-0.020	2, 9	69.750	0.000	-0.011	2, 10	2.053	0.174

Notes

** For which combined market share and increment information is available. Excludes market-level estimates for simulations where estimates for the merged entity or competitors are available. Excludes the DOJ's simulation in Oracle/PeopleSoft, and an unknown complainant's simulation in Thales/Finmeccanica*

Table 8vi: Regression analysis results, standard errors clustered at case level sensitivity (merged entity+competitors+market)

	Baseline		Incl. sensitivities	
	Price change	Price change	Price change	Price change
Econometric demand (0/1)	-0.0370	0.0947	-0.0621*	0.0681
	(0.0224)	(0.0566)	(0.0320)	(0.0451)
European Commission (0/1)	0.0101	0.116**	0.0118	0.120***
	(0.0277)	(0.0415)	(0.0469)	(0.0298)
Telecoms (0/1)	0.0428*	-0.0198***	0.0178	-0.0107
	(0.0218)	(0.00237)	(0.0267)	(0.00748)
Econometric demand x European Commission		-0.212**		-0.191**
		(0.0848)		(0.0707)
Econometric demand x Telecoms		0.0106		0.0385
		(0.0535)		(0.0466)
European Commission x Telecoms		-0.0108		-0.0148
		(0.0389)		(0.0331)
Econometric demand x European Commission x Telecoms		0.0817		0.0536
		(0.0843)		(0.0693)
Combined share	0.0536	0.0720	0.0488	0.0434
	(0.0541)	(0.0487)	(0.0724)	(0.0669)
Increment	0.122	0.0729	0.148	0.140
	(0.0863)	(0.0705)	(0.0948)	(0.0822)
Synergies (0/1)	0.0291	-0.00396	0.00882	-0.0134*
	(0.0247)	(0.0133)	(0.0114)	(0.00641)
Phase 2 (0/1)	0.0351*	0.116**	0.0615*	0.114***
	(0.0193)	(0.0394)	(0.0312)	(0.0317)
Blocked (0/1)	0.0208	0.0289*	0.0217*	0.0295**
	(0.0133)	(0.0160)	(0.0104)	(0.0109)
Sensitivity model (0/1)			0.00219	-0.00306
			(0.00874)	(0.00861)
Competitor estimate (0/1)	-0.0600***	-0.0678***	-0.0746***	-0.0741***
	(0.0166)	(0.0147)	(0.0142)	(0.0137)
Market estimate (0/1)	0.0330	0.00981	0.0635	0.0588
	(0.0370)	(0.0301)	(0.0478)	(0.0386)
Constant	-0.0158	-0.127**	-0.0166	-0.131***
	(0.0237)	(0.0453)	(0.0446)	(0.0354)
Observations	272	272	780	780
R-squared	0.411	0.509	0.409	0.469

Robust standard errors in parentheses (clustered by case)

*** p<0.01, ** p<0.05, * p<0.1

Table 7vii shows the estimated marginal effects of the main regression model, but adjusts some price increase predictions to be 'quality adjusted prices increases'. In three models, the merger simulation

predicted increases in price due to the merger, but also predicted that consumer surplus would also increase due to an increase in quality.[72] Table 8vii shows the equivalent regression results. The results are qualitatively the same, other than the difference between the Commission and the merging parties for econometric models in telecoms is no longer statistically significant in the baseline scenario, and the difference between telecoms and other industries for calibrated models done by the EC is now statistically significant.

Table 7vii: Difference in marginal effects from regressions with interaction terms, quality adjusted prices sensitivity (merged entity+competitors+market)

			Baseline				Incl. sensitivities			
Difference	Value other variables	No. models	Diff in margins	N	F	p	Diff in margins	N	F	p
Econometric minus calibrated	EC, Telecoms	3, 6	-0.026	13, 129	74.849	0.003	-0.030	13, 572	84.143	0.003
	EC, Other industries	3, 3	-0.119	82, 22	192.046	0.001	-0.126	90, 78	321.854	0.000
	Merging parties, Telecoms	1, 1	0.088	11, 2	249.185	0.001	0.087	11, 2	1002.550	0.000
	Merging parties, Other industries	2, 1	0.102	4, 9	44.327	0.007	0.067	4, 10	18.495	0.023
EC minus merging parties	Econometric, Telecoms	3, 1	-0.008	13, 11	6.970	0.078	-0.015	13, 11	18.029	0.024
	Econometric, Other industries	3, 2	-0.100	82, 4	65.189	0.004	-0.072	90, 4	27.051	0.014
	Calibrated, Telecoms	6, 1	0.107	129, 2	682.066	0.000	0.103	572, 2	776.998	0.000
	Calibrated, Other industries	3, 1	0.121	22, 9	119.186	0.002	0.122	78, 10	283.072	0.000
Telecoms minus other industries	Econometric, EC	3, 3	0.060	13, 82	215.085	0.001	0.067	13, 90	323.739	0.000
	Econometric, Merging parties	1, 2	-0.033	11, 4	7.331	0.073	0.010	11, 4	0.373	0.585
	Calibrated, EC	6, 3	-0.033	129, 22	13.128	0.036	-0.029	572, 78	11.606	0.042
	Calibrated, Merging parties	1, 1	-0.019	2, 9	234.116	0.001	-0.010	2, 10	12.165	0.040

Notes

** For which combined market share and increment information is available. Excludes market-level estimates for simulations where estimates for the merged entity or competitors are available. Excludes the DOJ's simulation in Oracle/PeopleSoft, and an unknown complainant's simulation in Thales/Finmeccanica*

[72] In *Oracle/PeopleSoft*, the Commission's model had two 'scenarios': pessimistic; and optimistic, where quality improvements and synergies due to the merger are assumed to take place. In practical terms for this sensitivity, we replace the (higher) predicted price rises in the optimistic scenario with the (lower) predicted price rises from the pessimistic scenario. In the merging parties' model in *Hutchison 3G Italy/Wind JV*, predicted price rises in the scenario where quality is assumed to increase due to the merger are set to zero, to reflect the model's predictions that consumer welfare would overall increase. The same is done for the merging parties' model in *T-Mobile NL/Tele2 NL*.

Table 8vii: Regression analysis results, quality adjusted prices sensitivity (merged entity+competitors+market)

	Baseline		Incl. sensitivities	
	Price change	Price change	Price change	Price change
Econometric demand (0/1)	-0.0406	0.102***	-0.0663	0.0674**
	(0.0209)	(0.0153)	(0.0301)	(0.0157)
European Commission (0/1)	0.0185	0.121***	0.0183	0.122***
	(0.0240)	(0.0110)	(0.0475)	(0.00724)
Telecoms (0/1)	0.0386	-0.0193***	0.0138	-0.00990**
	(0.0184)	(0.00126)	(0.0203)	(0.00284)
Econometric demand x European Commission		-0.221***		-0.194***
		(0.0232)		(0.0201)
Econometric demand x Telecoms		-0.0137		0.0198
		(0.0117)		(0.0141)
European Commission x Telecoms		-0.0137		-0.0190*
		(0.00868)		(0.00721)
Econometric demand x European Commission x Telecoms		0.106**		0.0761**
		(0.0208)		(0.0201)
Combined share	0.0566**	0.0745***	0.0459	0.0409
	(0.0136)	(0.0122)	(0.0217)	(0.0202)
Increment	0.123***	0.0769**	0.156***	0.148***
	(0.0143)	(0.0162)	(0.0203)	(0.0183)
Synergies (0/1)	0.00766	-0.0240	0.00695	-0.0147**
	(0.00672)	(0.0111)	(0.0115)	(0.00339)
Phase 2 (0/1)	0.0334	0.120***	0.0599	0.116***
	(0.0247)	(0.0108)	(0.0311)	(0.00846)
Blocked (0/1)	0.0185*	0.0261***	0.0219***	0.0296***
	(0.00627)	(0.00370)	(0.00374)	(0.00270)
Sensitivity model (0/1)			0.00365	-0.00140
			(0.00444)	(0.00232)
Competitor estimate (0/1)	-0.0598***	-0.0672***	-0.0735***	-0.0729***
	(0.00452)	(0.00550)	(0.00351)	(0.00261)
Market estimate (0/1)	0.0295*	0.00597	0.0681**	0.0633**
	(0.0123)	(0.00743)	(0.0162)	(0.0129)
Constant	-0.0180	-0.133***	-0.0192	-0.133***
	(0.0237)	(0.0108)	(0.0367)	(0.00804)
Observations	272	272	780	780
R-squared	0.406	0.498	0.398	0.450

Robust standard errors in parentheses (clustered by model)
*** p<0.01, ** p<0.05, * p<0.1

Table 7viii shows the estimated marginal effects of the main regression model, but does not combine price increase predictions for individual merging firms (for those models where the information is presented as such in the decisions) into a single price increase prediction for the merged entity. Table 8viii shows the equivalent regression results. The results are qualitatively the same, other than the negative difference between the econometric and calibrated models done by the Commission in telecoms is no longer significant in the baseline scenario, and the negative difference between the telecoms and other industries for calibrated models done by the Commission is now statistically significant.

Table 7viii: Difference in marginal effects from regressions with interaction terms, separate merging firms sensitivity (merged entity+competitors+market)

			Baseline				Incl. sensitivities			
Difference	Value other variables	No. models	Diff in margins	N	F	p	Diff in margins	N	F	p
Econometric minus calibrated	EC, Telecoms	3, 6	-0.010	17, 180	4.920	0.113	-0.015	17, 737	29.278	0.012
	EC, Other industries	3, 3	-0.127	82, 22	242.365	0.001	-0.136	90, 78	293.740	0.000
	Merging parties, Telecoms	1, 1	0.099	14, 2	305.813	0.000	0.061	14, 2	22.615	0.018
	Merging parties, Other industries	2, 1	0.080	4, 9	23.672	0.017	0.039	4, 10	5.294	0.105
EC minus merging parties	Econometric, Telecoms	3, 1	-0.032	17, 14	158.885	0.001	-0.036	17, 14	178.185	0.001
	Econometric, Other industries	3, 2	-0.092	82, 4	54.327	0.005	-0.063	90, 4	29.590	0.012
	Calibrated, Telecoms	6, 1	0.076	180, 2	107.732	0.002	0.040	737, 2	9.295	0.055
	Calibrated, Other industries	3, 1	0.115	22, 9	104.268	0.002	0.112	78, 10	227.620	0.001
Telecoms minus other industries	Econometric, EC	3, 3	0.058	17, 82	272.634	0.000	0.043	17, 90	64.604	0.004
	Econometric, Merging parties	1, 2	-0.002	14, 4	0.027	0.879	0.016	14, 4	2.632	0.203
	Calibrated, EC	6, 3	-0.059	180, 22	54.086	0.005	-0.078	737, 78	74.416	0.003
	Calibrated, Merging parties	1, 1	-0.020	2, 9	202.676	0.001	-0.005	2, 10	2.020	0.250

Notes

** For which combined market share and increment information is available. Excludes market-level estimates for simulations where estimates for the merging firms, merged entity or competitors are available. Excludes the DOJ's simulation in Oracle/PeopleSoft, and an unknown complainant's simulation in Thales/Finmeccanica*

Table 8viii: Regression analysis results, separate merging firms sensitivity (merged entity+competitors+market)

	Baseline		Incl. sensitivities	
	Pricerise	Pricerise	Pricerise	Pricerise
Econometric demand (0/1)	-0.0319	0.0805**	-0.0606	0.0387
	(0.0238)	(0.0165)	(0.0329)	(0.0168)
European Commission (0/1)	-0.00731	0.115***	-0.0107	0.112***
	(0.0265)	(0.0113)	(0.0523)	(0.00745)
Telecoms (0/1)	0.0271	-0.0202***	-0.0150	-0.00550
	(0.0151)	(0.00142)	(0.0237)	(0.00387)
Econometric demand x European Commission		-0.207***		-0.175***
		(0.0235)		(0.0176)
Econometric demand x Telecoms		0.0182		0.0219*
		(0.0123)		(0.00789)
European Commission x Telecoms		-0.0388**		-0.0727***
		(0.00795)		(0.0113)
Econometric demand x European Commission x Telecom		0.0986**		0.0993***
		(0.0201)		(0.0129)
Combined share	0.0965**	0.116***	0.101**	0.0978**
	(0.0213)	(0.0154)	(0.0226)	(0.0206)
Increment	0.0553	-0.000464	0.101**	0.0857**
	(0.0296)	(0.0277)	(0.0238)	(0.0159)
Synergies (0/1)	0.0147	-0.0102	0.00904	-0.0130
	(0.0169)	(0.00949)	(0.0149)	(0.00604)
Phase 2 (0/1)	0.0370	0.110***	0.0620	0.0982***
	(0.0197)	(0.0113)	(0.0304)	(0.00947)
Blocked (0/1)	0.0217**	0.0324***	0.0184***	0.0266***
	(0.00480)	(0.00403)	(0.00281)	(0.00308)
Sensitivity model (0/1)			0.00341	-0.00128
			(0.00435)	(0.00177)
Competitor estimate (0/1)	-0.0385	-0.0455***	-0.0281	-0.0131
	(0.0172)	(0.00482)	(0.0147)	(0.0128)
Market estimate (0/1)	0.0421	0.0168	0.0788**	0.0792**
	(0.0181)	(0.00952)	(0.0177)	(0.0167)
Merging firm estimate (0/1)	0.0392	0.0381**	0.0564**	0.0721**
	(0.0249)	(0.0103)	(0.0152)	(0.0125)
Constant	-0.0216	-0.131***	-0.0258	-0.134***
	(0.0229)	(0.0126)	(0.0334)	(0.00886)
Observations	330	330	952	952
R-squared	0.360	0.447	0.366	0.421

Robust standard errors in parentheses (clustered by model)

*** p<0.01, ** p<0.05, * p<0.1

** For which combined market share and increment information is available. Excludes market-level estimates for simulations where estimates for the merging firms, merged entity or competitors are available. Excludes the DOJ's simulation in Oracle/PeopleSoft, and an unknown complainant's simulation in Thales/Finmeccanica*

8.4 Other figures

Figure 5 – Average predicted price rise, by Chief Economist (merging party merger simulations)

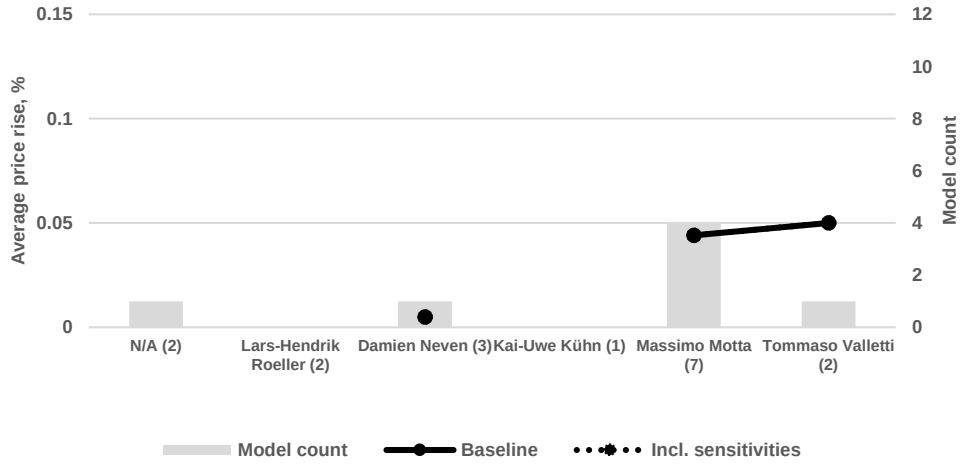

Figure 6 – Average predicted price rise, by Chief Economist (competition authority merger simulations)