

A Retrospective Analysis of the AT&T/Time Warner Merger
by

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Abstract

The importance of merger retrospectives as a way to assess competition policy is well-recognized. Yet there have been few retrospectives – none that we are aware of for any recent merger – that examine the accuracy of the predictions made by economic models used in the antitrust investigation of the merger, despite the substantial lessons that can be learned from such studies. Moreover, there have been no such retrospectives of litigated cases that the government lost, likely because of the paucity of such cases.

In this article, we seek to fill these gaps by performing a retrospective of an important recent litigated merger in which the government lost and by focusing our attention on the accuracy of the predictions made by the economic model used by the government’s expert in the case. We focus on the 2018 AT&T / Time Warner merger, which was challenged by the U.S. Department of Justice (DOJ), litigated, and permitted to proceed by the court. To the extent data permit, we also discuss evidence related to the Comcast / NBCU merger, which involved the same theory of harm and was allowed to proceed with a remedy similar to the contractual commitment that AT&T / Time Warner unilaterally adopted to address the antitrust concerns.

The AT&T / Time Warner case is of particular interest for several reasons. First, it was the first vertical merger case litigated to conclusion by the DOJ in the last forty years, and, because it was litigated, the record contains specific detailed predictions that we can evaluate. Second, it used a vertical theory of raising rivals’ costs in a Nash bargaining framework. Such theories are becoming increasingly popular in antitrust debates. We evaluate the reasonableness of such theories together with the validity of the empirical predictions based on an economic model implementing such a theory.

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Our conclusion is that the evidence at the time of trial showed the theory of harm to be weak, and the specific empirical predictions made by the government’s expert to be wrong. Post-merger evidence confirms that conclusion, as does new evidence from the earlier Comcast / NBCU merger.

I. Introduction

The importance of merger retrospectives as a way to assess competition policy is well-recognized, and many merger retrospectives have been published.⁵ Yet there have been few retrospectives – none that we are aware of for any recent merger – that examine the accuracy of the predictions made by economic models used in the antitrust investigation of the merger, despite the substantial lessons that can be learned from such studies. Moreover, to date, published retrospectives have focused on mergers that were not litigated (such as cases that were cleared unconditionally or where the regulator accepted a remedy without litigating).⁶ There are not many litigated mergers where the merging parties prevailed, and we are not aware of published retrospectives of any recent instances, despite the fact that such studies could provide important lessons on what went wrong in the government’s case, or whether the government was actually right but the Court got it wrong.⁷

In this article, we seek to fill these gaps by performing a retrospective of an important recent litigated merger in which the government lost and by focusing our attention on the accuracy of the predictions made by the economic model used by the government’s expert in the case. We focus on the 2018 AT&T / Time Warner merger, which was challenged by the U.S.

⁵ See, e.g., Deborah Garza, Jonathan Yarowsky, Bobby Burchfield, W. Stephen Cannon, Dennis Carlton, Makan Delrahim, Jonathan Jacobson, Donald Kempf, Jr., Sanford Litvack, John Shenefield, Debra Valentine and John Warden, *Antitrust Modernization Commission Report and Recommendations*, April 2007, https://govinfo.library.unt.edu/amc/report_recommendation/amc_final_report.pdf, p. iii (“We also recommend increased retrospective study of the effects of decisions to challenge or not challenge specific transactions. Such empirical evidence, although difficult to gather, is critical to an informed and effective merger policy.”). See also Dennis Carlton, “Why We Need to Measure the Effect of Merger Policy and How to Do It,” *Competition Policy International*, Spring 2009.

⁶ See, e.g., John Kwoka, *Mergers, Merger Control, and Remedies: A Retrospective Analysis of U.S. Policy*, MIT Press, 2015, for summaries of a variety of such retrospectives.

⁷ Such retrospectives may also be helpful with respect to the ongoing debate about the optimal degree of antitrust intervention. See, e.g., Clifford Winston, “Back To The Good—or Were They the Bad—Old Days of Antitrust? A Review Essay of Jonathan B. Baker’s *The Antitrust Paradigm: Restoring a Competitive Economy*,” *Journal of Economic Literature*, Vol. LIX, March 2021.

Department of Justice (DOJ), litigated, and permitted to proceed by the court.⁸ To the extent data permit, we also discuss evidence related to the Comcast / NBCU merger, which involved the same theory of harm and was allowed to proceed with a remedy similar to the contractual commitment that AT&T / Time Warner unilaterally adopted to address the antitrust concerns.

The authors worked on behalf of AT&T in the AT&T / Time Warner matter and Prof. Carlton testified at trial. Dr. Israel also worked on behalf of Comcast in the Comcast / NBCU matter. We recognize the natural inclination to dismiss scholarly work from an expert witness in a matter as potentially biased but if others are to evaluate or provide in-depth scholarly research and commentary on antitrust matters, it is desirable to hear the views of expert witnesses that have devoted substantial time and effort to analyzing the matters and who have had access to the detailed and often confidential data. Prof. Shapiro, the government’s expert in the case, has published a scholarly article with his own perspective on the case.⁹ We urge the reader to look at the evidence presented and judge the works on their merits. When opposing experts disagree, as they did here, it is helpful to ask why. Is it the assumed facts? The model? Both? We explain in detail the areas of disagreement, the bases for each set of assumptions, and the most recent available evidence. Where possible we use data from public sources or readily available industry research, and we are happy to provide our underlying code for the econometric analyses that we present. As to the publicly available trial testimony based on confidential data, we stress that analyses in litigation are scrutinized to a degree unusual in scholarly work, and, as indicated in this article, much of the empirical work we cite herein from the trial was both reviewed by and not challenged by the government. Critically, both sets of empirical work that we discuss – the one based on public sources, which we update and present in more detail in this article, and the publicly available trial testimony based on confidential data – yield the same conclusion: a lack of support for the harm to competition alleged by the government with regard to the AT&T / Time Warner matter.

Notably, the AT&T / Time Warner case was the first vertical merger case litigated to conclusion by the DOJ in the last forty years,¹⁰ and, because it was litigated, the record contains specific detailed predictions that we can evaluate. By contrast, there is less information available about the Comcast / NBCU case.

⁸ As noted, Compass Lexecon worked on the mergers on behalf of AT&T / Time Warner and Comcast / NBCU. Prof. Carlton served as the main economic expert at the AT&T / Time Warner trial for AT&T. Henceforth, he will be referred to in the text as the AT&T expert. Prof. Carl Shapiro served as the government’s main economic expert at trial, henceforth referred to as the government expert.

⁹ Carl Shapiro, “Vertical Mergers and Input Foreclosure: Lessons from the *AT&T/Time Warner Case*,” *Review of Industrial Organization*, July 19, 2021, <https://doi.org/10.1007/s11151-021-09826-x>.

¹⁰ See, e.g., Marguerite Reardon and Mike Sorrentino, “Justice Department won’t appeal AT&T-Time Warner decision,” *cNet*, February 26, 2019, <https://www.cnet.com/news/justice-department-loses-appeal-to-bust-up-at-t-time-warner-merger/>.

The government model in both the AT&T / Time Warner and Comcast / NBCU cases consists of two main parts: an upstream bilateral Nash bargaining model, sometimes referred to as a “Bargaining Leverage Over Rivals” or “BLR” model, and a downstream merger simulation. The former part – the BLR model – is being used more frequently in antitrust analysis lately and has sparked controversy, making it particularly interesting to study.¹¹ Its logic also guides some of what was in the new (recently withdrawn by the FTC, but still in force at the DOJ) vertical merger guidelines, and the model was specifically cited by commenters during the guideline review process.¹² Thus, it is important to see how the BLR model performs in practice, both alone and as a part of a larger merger simulation exercise.

There has also been substantial interest in recent years in vertical mergers generally, and in video distribution specifically, as can be seen by the extensive comments filed in FTC and DOJ hearings on vertical mergers and in the recent (withdrawn by the FTC) vertical merger guidelines.¹³ The interest focuses heavily on a central question: Is there evidence of harm from these vertical mergers that would support claims that vertical mergers should be subject to more stringent scrutiny than they currently are, or do efficiencies from such mergers outweigh harms in most cases? Does the empirical evidence support theoretical claims of likely harm and increasing calls for more stringent antitrust scrutiny of vertical mergers?

Finally, this may be a particularly relevant time to examine AT&T / Time Warner as AT&T has vertically *dis*-integrated recently, spinning off DIRECTV and spinning off Time

¹¹ See, e.g., William Rogerson (2020), “Modelling and predicting the competitive effects of vertical mergers: The bargaining leverage over rivals effect,” 53 *Canadian Journal of Economics* 2; Brief *Amici Curiae* of 37 Economists, Antitrust Scholars, and Former Government Antitrust Officials in Support of appellees and Supporting Affirmance, September 26, 2018, <https://www.criterioneconomics.com/docs/att-economists-amicus-brief.pdf>; and Brief for 27 Antitrust Scholars as *Amici Curiae* in Support of Neither Party, August 13, 2018, https://joeharrington5201922.github.io/pdf/Amicus%20Brief_AT&T%20Time%20Warner.pdf.

¹² See, e.g., U.S. Department of Justice & The Federal Trade Commission, *Vertical Merger Guidelines*, June 30, 2020; William Rogerson, “Modelling and Predicting the Competitive Effects of Vertical Mergers: The Bargaining Leverage Over Rivals (BLR) Effect,” February 28, 2020, submitted as Comment on the U.S. Department of Justice and the Federal Trade Commission Draft Vertical Merger Guidelines, https://www.ftc.gov/system/files/attachments/798-draft-vertical-merger-guidelines/rogerson_verticalguidelines1_2.pdf.

¹³ See, e.g., the extensive comments, many focused on video, archived by the FTC and DOJ from the FTC’s 2018 hearing on vertical merger analysis, and the FTC and DOJ’s review period for the new vertical merger guidelines. <https://www.ftc.gov/news-events/events-calendar/ftc-hearing-5-competition-consumer-protection-21st-century>. <https://www.ftc.gov/policy/public-comments/draft-vertical-merger-guidelines>.

Warner to create a new media company by merging with Discovery.¹⁴ The fact that the previous integration did not work out as AT&T hoped represents a firm’s decision regarding what risks to take in the market, not an indication that the government’s alleged harms came to pass. Indeed, the fact of the disintegration is evidence that the alleged harms, such as supra-competitive pricing or other exercises of market power, did not occur. The reasoning is straightforward: If the mergers had created significant market power as the government alleged, this would have incentivized AT&T to retain ownership, making the subsequent spinoffs less likely.¹⁵

Throughout this retrospective, we compare and contrast the outcome of the AT&T / Time Warner merger with the Comcast / NBCU merger because of commonality in the theory of harm and in the approaches taken to address the alleged harm in the two cases. The FCC and DOJ applied a very similar vertical model in Comcast / NBCU as the DOJ applied in AT&T / Time Warner, and it appears that concerns about harm to competition were greater in Comcast / NBCU than in AT&T / Time Warner.¹⁶ However, the Comcast / NBCU merger was allowed to proceed with remedies under a government monitored consent decree. The government declined to offer the same remedies in AT&T / Time Warner, but the merging parties unilaterally instituted a similar remedy to the antitrust concerns, as a self-enforcing private contract between AT&T and current and future customers of Warner Media’s Turner networks. Thus, one cannot have a serious discussion about the two cases without discussing remedies. Indeed, the obvious question is whether the remedies were effective in either case, and, more generally, whether the mergers, with remedies, were harmful to competition and consumers. In this vein, we also examine the evidence as to whether private contracts with arbitration appear to be able to solve antitrust problems – by asking whether the unilateral commitment in AT&T / Time Warner functioned as well as the government-overseen consent decree in Comcast / NBCU – and whether such remedies should be characterized as “structural” or “behavioral” remedies.

We begin in Section II with a brief review of how vertical mergers differ from horizontal mergers and why they are gaining increased antitrust attention. We then describe in Section III the model applied by the government in Comcast / NBCU and AT&T / Time Warner and the

¹⁴ See, e.g., Eli Blumenthal, “DirecTV completes spinoff from AT&T, will turn AT&T TV into DirecTV Stream,” cnet, August 2, 2021, <https://www.cnet.com/tech/services-and-software/directv-completes-spinoff-from-at-t-will-turn-at-t-tv-into-directv-stream/>; Steve Kovach and Sam Meredith, “AT&T announces \$43 billion deal to merge WarnerMedia with Discovery,” CNBC, May 17, 2021, <https://www.cnbc.com/2021/05/17/att-to-combine-warnermedia-and-discovery-assets-to-create-a-new-standalone-company.html>.

While AT&T shareholders retain an ownership interest (at least initially) in DIRECTV and Warner Bros. Discovery, the companies are now separate entities and so it is no longer the case that the setting of content prices will be subject to the same economic incentives as alleged by the government’s theory of the case.

¹⁵ See, e.g., Thomas Hazlett, “Antitrust Activists Want to Go Full Throttle. Here’s a Lesson They Should Consider First.” *Barron’s*, July 29, 2021, <https://www.barrons.com/articles/antitrust-activists-want-to-go-full-throttle-heres-a-lesson-they-should-consider-first-51627509048>.

¹⁶ See, e.g., Expert Report of Dennis W. Carlton (Redacted), Section V.D.

specific predictions made in each case. For the AT&T / Time Warner case, we also describe how disputes over assumed parameter values in the model affected the price predictions – not just in magnitude but in the sign of the predicted effects – and how concerns over modeling assumptions affected its credibility. We then explain in Section IV what retrospective tests of the effects of the mergers, with remedies in place, are available. In Section V we examine the available evidence to evaluate which, if any, predictions in fact occurred and, more generally in Section VI, what can be learned from these recent cases about vertical mergers in video distribution, particularly those that include arbitration remedies. The evidence indicates that the forward-looking assumed parameter values used by the government in the AT&T / Time Warner case were incorrect, that the model would not have predicted harm had more realistic parameter values been used and that those more realistic parameter values were consistent with what the AT&T expert used. In any event, the evidence indicates that the harm predicted by the government’s expert in AT&T / Time Warner did not occur and that the decision of AT&T to spin off Time Warner provides confirmatory evidence of the invalidity of the government’s prediction of harm.

Our overall conclusions are that: (i) the government’s vertical theories of harm were not applicable in the AT&T case, (ii) it was a mistake to bring the case, and (iii) while AT&T might have been mistaken in believing the merger would be financially successful, it is not the job of the government to prevent firms from taking risky business decisions that do not harm competition.

II. Antitrust Approach to Vertical and Horizontal Mergers

Traditionally, antitrust enforcers and regulators have been less concerned about vertical mergers than about horizontal mergers. It is worth taking a moment to consider why. First, horizontal mergers, by definition, eliminate a competitor; for this reason, there is an inherent economic concern that these mergers may reduce competition. By contrast, in a vertical merger, every level of the vertical chain retains the same competitors as it had pre-merger, and there is no necessary increase in market concentration at any level of that chain. Second, and closely related, the set of assets that come under control of a single owner in a vertical merger are *complements*, not substitutes. This fundamentally changes the economic analysis – for example, the inherent pricing pressure created by the merger of complements is downward, not upward as in mergers of substitutes – and helps explain empirical findings showing that vertical mergers are generally beneficial to competition and consumers. That is, a horizontal merger has the potential to create a distortion (akin to imposition of a tax) in the product market, while in a vertical transaction the vertical merger has the potential to remove a distortion (akin to removing a tax) on an input, a benefit described in more detail below, as well as the potential to increase a distortion to downstream rivals, a potential harm we discuss below.

To be clear, both horizontal and vertical mergers can, in some circumstances, harm competition, but the concerns in the two types of cases are different. A key concern in a horizontal merger is that, post-merger, the two divisions of the combined firm (which were previously separate firms) will internalize the harm that more aggressive competition has on one the other, thereby softening competition and leading to higher prices. In a vertical merger, there

can be a concern that the vertically integrated firm will leverage market power that one division of the combined firm possesses to create or increase market power for the other division.

There has been increasing focus on this concern regarding vertical mergers in recent years, leading to the issuance of the recent vertical merger guidelines, which address the possibility of raising rivals’ costs, a specific version of such a leveraging theory. The basic elements of the benefits and harms from a vertical merger involving a raising rivals’ cost (RRC) theory of harm are sketched out below.¹⁷

Figure 1

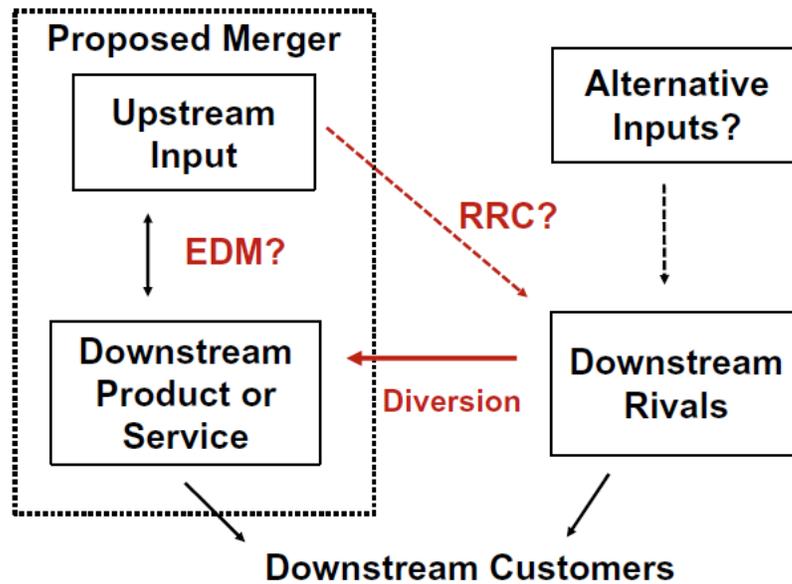


Fig. 1 Elements of raising rivals’ costs analysis

Source: Shapiro (2021), Figure 1.

As the figure makes clear, vertical integration can both: (i) produce benefits (e.g., elimination of double marginalization, or EDM, which is a specific illustration of the “Cournot complements” result that mergers of complements create downward pricing pressure) and (ii)

¹⁷ For a general discussion of potential vertical concerns, see Steven Salop and David Scheffman (1983), “Raising Rivals’ Costs: Recent Advances in the Theory of Industrial Structure,” 73 *American Economic Review*. For a more recent discussion about vertical mergers, see Dennis Carlton (2020), “Transaction costs and competition policy,” 73 *International Journal of Industrial Organization*. For an application of the theory using Nash bargaining to the AT&T / Time Warner case, see Carl Shapiro, “Vertical Mergers and Input Foreclosure: Lessons from the AT&T/Time Warner Case,” *Review of Industrial Organization*, July 19, 2021, <https://doi.org/10.1007/s11151-021-09826-x>. The figure shown here is from the Shapiro paper.

raise concerns about raising rivals' costs (which can create upward pricing pressure). The benefits to competition work through internalization of incentives. When two firms, each of which has some ability to set prices above marginal costs, offer complementary products – like video content and video distribution – lowering prices or making investments to improve one of the complementary products can benefit *both* firms, and consumers as well. For example, if one firm produces distinctive cars and the other customized engines, then as the engine becomes better, the overall car becomes better. Both the car manufacturer and the engine manufacturer make more sales. When they are separate, however, neither firm receives all of the benefits from lower prices or increased investments; instead, some of the benefits spill over to the other firm. A vertical merger brings the benefits to both firms under one roof, which increases the incentives to lower prices or make investments since the combined firm considers (“internalizes”) the full set of benefits when making investment decisions.

The possible harm to competition from a vertical merger is less obvious than the harm from a horizontal merger but it can occur in some settings. If the integrated firm raises the upstream input price to downstream rivals, the integrated firm will make less money from selling the input to them than pre-merger (since it was presumably setting the price pre-merger to maximize its profits from the sale on the input), but there is an offsetting benefit since the sales of the integrated firm's downstream product can increase because it now faces a weaker (higher cost) downstream competitor. That is, sales of the input by the upstream firm to a rival of the downstream firm create an externality that impacts the downstream firm. With vertical integration, the input provider internalizes this externality and that can create an incentive for the upstream firm to raise the input price to rival downstream firms resulting in upward pressure on downstream prices.

Given that there are (at least) two offsetting effects of a vertical merger, one needs to use some economic model to predict the net effect of the interactions of these two effects.¹⁸ That is what the recent literature tries to do with the use of various models that combine the incentive to gain efficiencies, which leads to downward pricing pressure, with the incentive to raise rivals' costs which leads to upward pricing pressure. (Indeed, this is what the government expert attempted to do.)

There has been substantial empirical work on the efficiency effects of vertical integration. For example, a widely cited 2007 survey of the economic literature by Professors Francine LaFontaine (former Director of the Federal Trade Commission's Bureau of Economics from 2014 to 2015) and Margaret Slade concludes:

¹⁸ There is a separate question about whether the effects are merger-specific. Merger-specificity is commonly discussed with respect to efficiencies. For example, if absent the merger the separate firms would achieve an efficiency through contract, the efficiency is not merger-specific. But exactly the same reasoning applies to the potential harms from the vertical merger. If absent the merger the harm would be achieved through contract, then the harm is not merger-specific. For this reason, in vertical cases (unlike horizontal ones where such contracts that harm competition are likely detectable and *per se* illegal), it is appropriate to question merger-specificity for both alleged harms and benefits.

[A]s to what the data reveal in relation to public policy, we did not have a particular conclusion in mind when we began to collect the evidence, and we have tried to be fair in presenting the empirical regularities. We are therefore somewhat surprised at what the weight of the evidence is telling us. It says that, under most circumstances, profit-maximizing vertical-integration decisions are efficient, not just from the firms' but also from the consumers' points of view. Although there are isolated studies that contradict this claim, the vast majority support it.¹⁹

A recent working paper by Marissa Beck and Fiona Scott Morton (2020) revisits and updates that survey, emphasizing that while efficiencies are present, concerns can also arise. The authors state that of seven older panel studies, two found evidence of harm from vertical integration and five found evidence of benefits. They state that, of 29 more recent studies, six found no effect, five found evidence of both harm and benefits, nine found only evidence of harm, and nine found only evidence of benefits.²⁰ The authors conclude that in “our view the economic literature demonstrates a variety of effects of vertical integration, including foreclosure and efficiencies, that justify examining vertical transactions on their merits rather than making general assumptions about their competitive effects.”²¹ However, in a recent article, Slade (2021) expresses a more positive view of the benefits from vertical integration.²² Moreover,

¹⁹ Francine Lafontaine and Margaret Slade (2007), “Vertical Integration and Firm Boundaries: The Evidence,” 45 *Journal of Economic Literature* 3, p. 680.

²⁰ Marissa Beck and Fiona Scott Morton, “Evaluating the Evidence on Vertical Mergers,” working paper, December 31, 2020.

One of the studies reviewed by Beck and Scott Morton (2020) is a retrospective of the DIRECTV and Fox vertical integration (see Baker *et al.* (2011), “The Year in Economics at the FCC, 2010–11: Protecting Competition Online,” 39 *Review of Industrial Organization*). This study claimed to find evidence of harm but no benefits as a result of the DIRECTV / Fox integration. However, as part of his analysis of the AT&T/Time Warner transaction, the AT&T expert analyzed the effects of vertical integration between DIRECTV and Fox and found no evidence of a price increase associated with vertical integration in this transaction. See Rebuttal Expert Report of Dennis W. Carlton (Redacted), ¶ 24. Baker *et al.* (2011) does not provide sufficient detail about the data and estimation methods used in their study that would allow reconciling these contradictory findings. In any event, the DIRECTV / Fox transaction predates very significant industry developments such as streaming and cord cutting and is therefore of limited relevance at present.

²¹ Marissa Beck and Fiona Scott Morton, “Evaluating the Evidence on Vertical Mergers,” working paper, December 31, 2020, abstract.

²² Margaret Slade (2021), “Vertical Mergers: A Survey of Ex Post Evidence and Ex Ante Evaluation Methods,” 58 *Review of Industrial Organization* 4.

many airline and railroad mergers have vertical elements, and there have been retrospectives in those industries with many (but not all) finding pro-competitive results.²³

Recent empirical work on this topic has been done by Luco and Marshall (2020) and Hosken and Taylor (2021). Luco and Marshall study vertical integration in the beverage industry and examine firms with multiple substitutable products, only some of which are distributed by vertically integrated firms. They find that prices for the vertically integrated products fall by around 1%, while prices for the non-vertically integrated products rise by around 1% as the vertically integrated firm seeks to steer sales to the vertically integrated products. Hosken and Taylor study gasoline retailing using a similar methodology and find that the “net effect of vertical separation on retail gasoline prices was essentially zero.”²⁴

A reasonable conclusion, in our view, is that vertical integration likely raises fewer competitive problems than horizontal ones – leading to the empirical finding of benefits or no harm in many cases – but that it is possible for vertical mergers to harm consumers, particularly when the vertical merger relaxes constraints that were previously preventing one of the merging firms from maximizing profits or permits leveraging of market power from one market into another. Although information from other studies on vertical integration provides useful background, each case should be analyzed on its own facts. For example, in AT&T / Time Warner, the government recognized certain benefits of vertical integration but also certain potential harms, and we agree with the government that their relative importance should be evaluated based on the facts of the case.

III. The Government’s Model in Comcast / NBCU and AT&T / Time Warner

In this section we explain the government’s model, discuss disputed assumptions underlying the theory and parameter values, and go over the various predictions based on different assumptions. In general, this is a complicated model, the predictions of which are sensitive to the assumptions. Given the complexity, it is important to assess whether the

²³ See, e.g., Clifford Winston, Vikram Maheshri and Scott M. Dennis, “Long-Run Effects of Mergers: The Case of U.S. Western Railroads,” *Journal of Law and Economics*, vol. 54, May 2011, concluding that despite antitrust concerns the studied railroad mergers had negligible effects on consumer welfare; and Dennis Carlton, Mark Israel, Ian MacSwain and Eugene Orlov, “Are Legacy Airline Mergers Pro- or Anti-Competitive? Evidence from Recent U.S. Airline Mergers,” *International Journal of Industrial Organization*, vol. 62, 2019, finding the recent legacy airline mergers were pro-competitive.

²⁴ Fernando Luco and Guillermo Marshall (2020), “The Competitive Impact of Vertical Integration by Multiproduct Firms,” 110 *American Economic Review*. Daniel Hosken and Christopher Taylor, “Vertical Disintegration: The Effect of Refiner Exit from Gasoline Retailing on Retail Gasoline Pricing,” October 8, 2021, forthcoming *Journal of Law and Economics*.

assumptions and resulting predictions can be empirically confirmed.²⁵ We discuss available retrospective evidence in the following sections.

A. Theory

We turn now to a summary of the government’s model in Comcast / NBCU and AT&T / Time Warner. The government’s model²⁶ in each case consists of two parts – an upstream bargaining model that determines the price of the input to rival distributors and a downstream merger simulation that determines the prices of the retail products given the outcome of the bargaining model.

For the bargaining model, the basic premise is that a content creator negotiates with each distributor over the price of the content, holding all other entities’ prices constant. That is, the model treats bargaining between the content creator and each distributor as a simultaneous game, which ignores any of the linkages between the outcome of one negotiation and all future negotiations, an assumption that is critical and also likely incorrect in this industry, as we discuss more below.²⁷ The parties split the joint profits from reaching a deal (the “gains from trade”) based on their relative bargaining strengths in a bargaining game first described by John Nash (a “Nash bargaining model”). The outcome of the negotiation depends importantly on the “threat points” – what happens to each party if they fail to reach an agreement. In the case of a television network and a video distributor such as a cable company, the model assumes that failure to reach an agreement means that the cable company does not broadcast the network – a “blackout.”²⁸

²⁵ We recognize that some believe that complicated models are too unreliable to be defensible in litigation and that whoever must rely upon them to meet their burden of proof will fail. As we discuss later, our view is that complicated models can provide valuable information, but likely work best when they have some track record of success in making predictions and are presented in conjunction with other evidence.

²⁶ See Expert Report of Carl Shapiro (Redacted), *United States of America v. AT&T Inc., et al.*, February 2, 2018, pp. 39-58. For a discussion of the model in the related Comcast / NBCU matter, see William Rogerson, “A Vertical Merger in the Video Programming and Distribution Industry: Comcast-NBCU,” in *The Antitrust Revolution, 6th Edition*, ed. by John Kwoka, Jr. and Lawrence White, Oxford University Press, 2014, pp. 534-575.

²⁷ That is, an important assumption of the model is that the content provider is unable to commit to content prices unilaterally and instead negotiates bilaterally with each distributor of content, not recognizing the impact that its negotiation has on the other negotiations and contracts that it is involved in, even if, as is not uncommon, there is a most favored nations clause that guarantees that the content price term in one negotiation will contractually alter the price in other contracts.

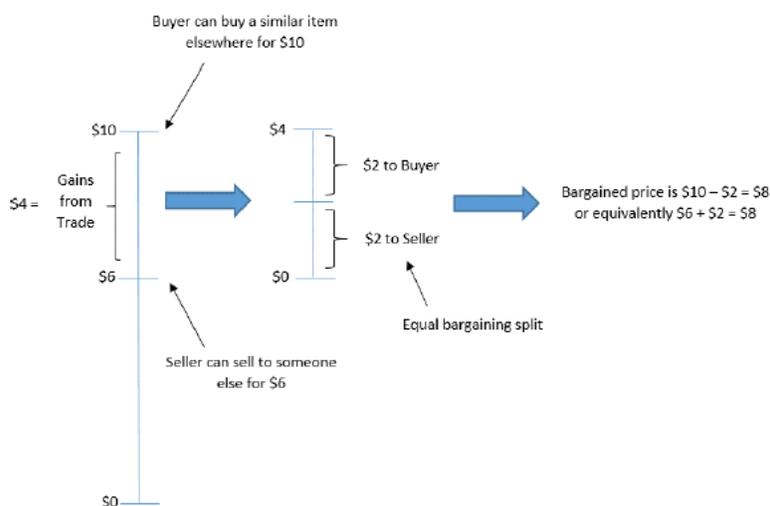
²⁸ To be clear, the model refers to a hypothetical permanent blackout as the relevant “threat point,” not a temporary one, although observation of temporary blackouts may be informative as to estimating some of the assumed values in the model. See, e.g., Shapiro Expert Report (Redacted), Appendix D: Long-Term Subscriber Loss, discussing how information from temporary blackouts can be used to calibrate the model.

In the cases at hand, the content at issue was the NBC Universal networks (both cable and broadcast), and the Turner (Time Warner) networks (cable only), and the distributors at issue were multichannel video programming distributors (MVPDs) such as cable companies and direct broadcast satellite (DBS) companies.²⁹

The government’s upstream bargaining model focuses on the change in pricing incentives that arise when a content provider merges vertically with one of the distributors of its content. According to the model, due to the merger, if the parties fail to reach an agreement, the content provider’s threat point improves from the pre-merger situation because the distributor, lacking the content, will lose some subscribers who will move to the vertically integrated content provider’s distribution arm. Thus, unlike in the pre-merger situation, the “pain” suffered by the content provider from not striking a deal with certain distributors is lower. Under the model, this improvement in the content provider’s threat point will, all else equal, result in the licensing distributor paying a higher price for the content. The government expert used the following figures to explain the model.³⁰ The boundaries in the figures are the “threat points” – the outcomes if no deal is reached.³¹

Figure 2

Figure 8. The Nash Bargaining Solution for Price



Source: Shapiro Expert Report (Redacted), February 2, 2018, Figure 8.

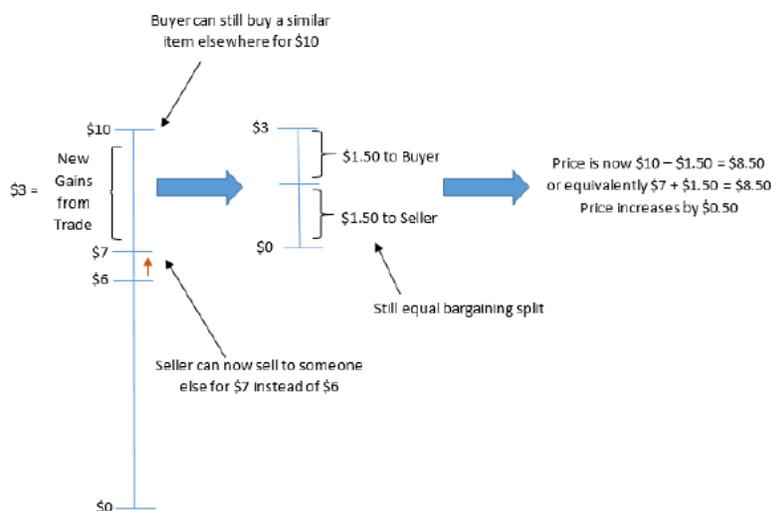
Figure 3

²⁹ The government did not apply its model to HBO, which is sold as a stand-alone product, and did not claim that there would be price increases or withholding of HBO.

³⁰ Shapiro Expert Report (Redacted), Figures 8 and 9.

³¹ For more detail on the model and its derivation, see the appendix.

Figure 9. An Increase in the Seller's Minimum Price Causes the Negotiated Price to Rise



Source: Shapiro Expert Report (Redacted), February 2, 2018, Figure 9.

The predicted content price increase in the government model is roughly the bargaining split times the incremental profit to the vertically integrated distributor if the rival distributor did not carry the content. Another way to think of this content price increase is that after integration the economic (opportunity) cost of selling to a downstream rival distributor now rises to reflect the fact that a sale to a downstream rival deprives the vertically integrated firm of its own downstream sales. As a result, the price the vertically integrated firm charges the downstream rival has upward pricing pressure. So, in the AT&T case, the concern was that AT&T would raise the price of, say, TNT to Comcast, to reflect the opportunity cost to DIRECTV (owned by AT&T) from licensing content to Comcast, which can take sales away from DIRECTV.

Hence, the key parameter values for determining the size of the predicted content price increase are the bargaining split (what fraction of the gains from trade the content provider gets, as determined by the relative bargaining strengths of the content provider and distributor), the departure rate (what fraction of subscribers the distributor will lose if it does not carry the content), the diversion rate (what fraction of the lost subscribers will go to the vertically integrated distributor), and the profit margins from a sale upstream and downstream at the vertically integrated distributor (which affect the potential gains and losses to the merged firm if a rival distributor does not carry the content).

As noted above, this Nash bargaining concept – and bilateral bargaining generally – assumes that the negotiations of each MVPD and content provider are unrelated (have no effect on one another) so that a Nash equilibrium assumption – holding all input and output prices other than those at issue in the specific negotiation fixed – can be made.³² Moreover, there is no

³² A general difficulty with these sorts of models is that estimating or simulating the parties' own reactions, and consumer/competitor reactions in turn, is hard to do and typically

concern about the effect of failing to reach agreement on subsequent negotiations with existing partners (because the negotiations are modeled as simultaneous). So, for example, if Comcast loses sports programming on TBS then there is no consideration given to the fact that Comcast might face future higher prices from sports channels that recognize Comcast does not have access to TBS. If this assumption is wrong, then the entire model can fall apart. For example, if, pre-merger, the content provider is managing to set terms such that overall industry profits are maximized (perhaps through application of MFNs linking the negotiations), then the theory of harm would not apply, as the fully vertically integrated outcome would be obtained pre-merger.

The second stage of the overall model consists of inserting the price changes for content predicted by the bargaining model into a merger simulation (generally using a logit demand system, although other demand systems could be used) and solving for equilibrium prices set by the various MVPDs.³³ Benefits from elimination of double marginalization are reflected at this stage. Because the model incorporates both the possibility of increased content costs of other MVPDs (potentially pushing retail prices upwards) and the possibility of lowered content costs of the vertically integrated MVPD (potentially pushing retail prices downwards), the direction of the merger's effect on average retail prices, and on consumer welfare, is ambiguous as a matter of economic theory, but rather depends on the specific modeling assumptions and parameter values. A key undisputed point is that, although the mechanism for harm is raising content prices to rivals, it is the overall retail pricing to consumers that matters, since one needs to take account of the the desirable effects of creating efficiencies from vertical integration alongside the harmful effects from raising costs to determine the merger's all in effect.

ignored. For example, recent work (*e.g.*, Gregory Crawford, Robin Lee, Michael Whinston and Ali Yurukoglu (2018), “The Welfare Effects of Vertical Integration in Multichannel Television Markets,” 86 *Econometrica* 3) assumes that *none* of the factors change, including the controversial assumption that the MVPD that loses content *does not change its own prices* in response. This assumes away across the board price cuts as well as targeted promotional efforts. This also is a critical assumption with respect to competitive effects. Does losing content hurt an MVPD's margins per subscriber, or number of subscribers? Only the latter creates an adverse vertical merger effect under the usual bargaining theory. However, MVPDs have an incentive to commit to taking the loss through margins (*e.g.*, to guarantee price cuts if content is lost) because that does not generate the diversion and recapture by the merged firm's downstream (MVPD) division. That is, this strategy removes or reduces the vertically integrated MVPDs' ability to use blackouts to drive departures to it and thus takes away or mitigates any leverage effect. This strategy is a realistic one. For example, YouTube TV recently announced that if it did not reach a deal with NBCU and hence stopped carrying the NBCU networks, YouTube TV would reduce the price of its service to consumers by \$10. The YouTube Team, “YouTube TV and NBC Programming Update,” YouTube Official Blog, October 2, 2021, <https://blog.youtube/news-and-events/youtube-tv-and-nbc-programming-update/>. Altering the allowed responses of the parties in the model can thus profoundly change the predicted competitive effects.

³³ Details on the government's merger simulation can be found in Shapiro Expert Report (Redacted), Appendix L.

The government’s implementation of the model in both the Comcast / NBCU and AT&T / Time Warner mergers treated the two stages (upstream bargaining and downstream competition) as independent. This assumption simplifies the implementation of the model, but it also ignores effects that may be important because the stages are not, in fact, independent. The input price and the elimination of double marginalization efficiencies affect the downstream prices, and thus the profit margins, which in turn should affect the equilibrium content prices, but do not in the government’s implementation of the model. Rogerson (2020) has stated that “[s]ince the equilibrium feedback effects can be complex it is difficult to say how the Department of Justice’s estimate of the consumer harm generated by the merger would have changed had it used the fully correct procedure.”³⁴ The end results of treating the two stages as independent are that: (i) any vertical merger will produce an increase in prices charged for content to rival MVPDs regardless of the magnitude of the benefits of the elimination of double marginalization, and (ii) the downstream prices used in the bargaining model differ from the downstream prices that emerge from the simulation model. Rogerson further notes that the literature indicates that specific model predictions (including the effects of treating the stages as independent) can be highly sensitive to “relatively arbitrary functional form assumptions of demand.”³⁵

During each of the recent cases, concerns, including those mentioned above, were raised about whether the government’s models accurately reflect the video content and distribution negotiations.³⁶ We return to those concerns and their implications for retrospective analyses after describing the predictions made by the various parties in each merger.

B. The Base Government Price Predictions in Comcast / NBCU and AT&T / Time Warner

³⁴ William Rogerson (2020), “Modelling and predicting the competitive effects of vertical mergers: The bargaining leverage over rivals effect,” *53 Canadian Journal of Economics* 2, p. 428.

³⁵ William Rogerson (2020), “Modelling and predicting the competitive effects of vertical mergers: The bargaining leverage over rivals effect,” *53 Canadian Journal of Economics* 2, p. 426 (“These papers collectively show that the net welfare impact of a vertical merger can be positive or negative and that the results hinge sensitively on the specific functional form assumption on demand. Thus, while they clearly support the conclusion that the EDM effect cannot simply be ignored and must be taken into account along with the RRC and/or BLR effects..., they also provide support for the concern that the results of simulations may depend on relatively arbitrary functional form assumptions for demand.”)

³⁶ For example, in addition to concerns already noted, prices are typically negotiated for years in advance, delaying any adverse pricing effects, and distributors may have most-favored-nation guarantees, such that negotiations are subject to additional restrictions and are not independent of one another, destroying the Nash assumption. See, e.g., Rebuttal Expert Report of Dennis W. Carlton (Redacted), *United States of America v. AT&T Inc., et al.*, February 26, 2018, pp. 28-31.

The government made specific predictions with regard to content and retail prices in both cases, but only those in AT&T / Time Warner are publicly available. However, Rogerson (2014) has attempted to estimate the upstream content price predictions (although not the retail price predictions) for the Comcast / NBCU case. Rogerson estimates that the government predictions for content price increases to the NBCU cable networks (the relevant comparable for the Time Warner cable networks) would be at least 9%, based on an assumed 5% departure rate, but Rogerson also notes the government likely assumed a substantially higher departure rate, perhaps closer to 25%.^{37,38} At the latter departure level, the predicted content price increases for the NBCU cable networks would be closer to 45%.

On the AT&T / Time Warner side, the government estimated that the prices per subscriber per month for the Turner networks would rise to rival MVPDs by an average of \$0.76, or 16.2%.³⁹ While the government predicted different retail price effects for each MVPD (and for different regions for a given MVPD), we focus on the overall average effects reported by the government. The government predicted that DIRECTV's average retail prices would *fall* by \$0.26, and that other MVPDs' prices would, on average, rise between \$0.22 and \$0.60, for an overall average retail price increase of about \$0.27 per sub per month.⁴⁰ The \$0.27 figure is roughly 0.19% of a typical MVPD subscriber bill of around \$140 per month.⁴¹ Thus, the prediction was that DIRECTV retail prices would be about 0.2% lower, but that overall average MVPD retail prices would be about 0.2% higher.⁴² (Again, it is overall final retail prices, not content prices, that one needs to look at to determine on net whether there is consumer harm.)

All of these predicted price changes are measured relative to the but-for world in which no merger occurs. Both content and retail prices had been trending higher prior to the merger. For example, the government expert reported that per subscriber content costs grew roughly 90% between 2009 and 2016, and retail video average revenue per user (ARPU) grew roughly 75% over the same period.⁴³ Thus, a predicted price decrease is relative to that trend of increases and

³⁷ William Rogerson, "A Vertical Merger in the Video Programming and Distribution Industry: Comcast-NBCU," in *The Antitrust Revolution*, 6th Edition, edited by John E. Kwoka, Jr. and Lawrence J. White, Oxford University Press, Oxford, 2014, 534-575, pp. 546-550, 555.

³⁸ None of Rogerson's estimates appear to factor in the remedies implemented in the Comcast/NBCU transaction.

³⁹ Shapiro Expert Report (Redacted), Figure 13.

⁴⁰ Shapiro Expert Report (Redacted), Figure 15. See also Figure 17 noting that in 20.6% of geographic zones, accounting for 2.3% of Turner subscribers, the predicted net effect on retail pricing would be zero or negative.

⁴¹ Rebuttal Expert Report of Dennis W. Carlton (Redacted), ¶ 5.

⁴² The government argued that while a 0.2% price increase may sound small, it would impact enough consumers to total roughly \$24 million per month in total. Shapiro Expert Report (Redacted), Figure 15.

⁴³ See, e.g., Shapiro Expert Report (Redacted), Figures 4 and 6.

does not imply an actual absolute reduction in the level of prices in the future – only a lower price level than would have occurred absent the merger. It is also worth noting that the government expert provided no statistical estimates of the standard errors of the predicted price increases and so one could not determine the statistical confidence that one should place on the government's predictions.

C. The Model's Assumptions and Predictions of Content and Retail Prices

As noted above, the key parameter value assumptions that feed into the bargaining model are the bargaining split, the departure rate, the diversion rate, and the profit margins on the upstream and downstream subsidiaries of the merged firm. There was dispute in both merger cases about those assumptions and hence about the price predictions made by the model.

In Comcast / NBCU, the details are not public, although Rogerson (2014) suggests alternative parameter value assumptions were suggested by the merging parties that would have produced lower, or no, predicted retail price increases.⁴⁴

In AT&T / Time Warner, the assumed parameter values for bargaining split, departure rate, diversion rate and profit margin were all intensely disputed.

With respect to profit margins, the government expert used AT&T (DIRECTV) margins from early 2016 and predicted those would remain constant going forward. In contrast, the AT&T expert observed that AT&T's margins had declined each year since 2012 and that third-party analysts predicted they would continue to decline. The most recent margins available at the time of the trial were from June 2017 and were lower by 39% than the early 2016 margins used by the government expert. Using the most recent margins available as of the trial and conservatively assuming that those would remain constant going forward reduced the estimated adverse net retail price effect from \$0.27 to \$0.05 (roughly 0.04% on a \$140 average monthly consumer bill).⁴⁵ The AT&T expert explained that his assumed parameter value was conservative (*i.e.*, favorable to the government) because given the existing trend, margins were likely to continue to decline.⁴⁶ A further decline in AT&T's distributor margins would reduce any predicted content or retail price increases in the government's model.

⁴⁴ Rogerson, William P. "A Vertical Merger in the Video Programming and Distribution Industry: Comcast-NBCU," in *The Antitrust Revolution*, 6th Edition, edited by John E. Kwoka, Jr. and Lawrence J. White, Oxford University Press, Oxford, 2014, 534-575, pp. 543-553.

⁴⁵ Rebuttal Expert Report of Dennis W. Carlton (Redacted), ¶¶ 45-46. The government expert inexplicably continued to rely upon the older numbers even after he became aware of the more recent ones.

⁴⁶ See, *e.g.*, Trial Testimony of Dennis W. Carlton, April 12, 2018, pp. 2448-2449.

With respect to the diversion rate, the government model assumed diversion proportional to then-current subscriber shares.⁴⁷ The government expert assumed that the “Outside Good” – cord cutting – would have a roughly 10% share, based on the same survey that he relied upon for the departure rate, which, as discussed below, the court found not to be credible. The AT&T expert explained that the government expert also assumed cord cutting would decline in importance whereas the AT&T expert’s opinion (credited by the District Court) was that cord cutters would likely grow in importance.”⁴⁸ The AT&T expert also pointed out the internal inconsistency in the government expert’s approach of using number of subscribers to MVPDs to estimate likelihood of diversion but not using number of cord-cutters to do the same.⁴⁹ Cord cutters accounted for roughly 20% of U.S. television households at that time, and that figure was rapidly growing. For example, the AT&T expert presented the figure reproduced below showing SNL Kagan’s (the source used by the government for MVPD subscriber numbers) prediction that by 2021 35.4% of television households would not be obtaining video service from a traditional MVPD, *i.e.*, would have cut the cord (see figure below).⁵⁰ Adjusting this assumed parameter value, by using a figure of 20% for cord cutting, then the predicted net effect on retail prices would be a *reduction* in average retail prices of \$0.17.⁵¹

⁴⁷ In Prof. Shapiro’s recent article, he criticizes as uninformative Prof. Carlton’s reference to Turner’s 6.4% share of viewership. Carl Shapiro, “Vertical Mergers and Input Foreclosure: Lessons from the *AT&T/Time Warner* Case,” *Review of Industrial Organization*, July 19, 2021, <https://doi.org/10.1007/s11151-021-09826-x>, p. 15. Shares can be a crude measure even in horizontal cases, and more so in vertical cases, but can still be of value in screening out frivolous cases. Nonetheless, the share was not part of the model assumptions nor of Prof. Carlton’s criticisms of the model.

⁴⁸ Trial Testimony of Dennis W. Carlton, April 12, 2018, p. 2448. Shapiro Expert Report (Redacted), n. 241. Rebuttal Expert Report of Dennis W. Carlton (Redacted), ¶ 69. Judge Leon, Memorandum Opinion, *United States of America v. AT&T Inc., et al.*, June 12, 2018, pp. 137-141. The court also noted that the survey firm had altered the actual survey results and without explanation reduced the reported cord cutting estimate by 40%, casting further doubt on its credibility.

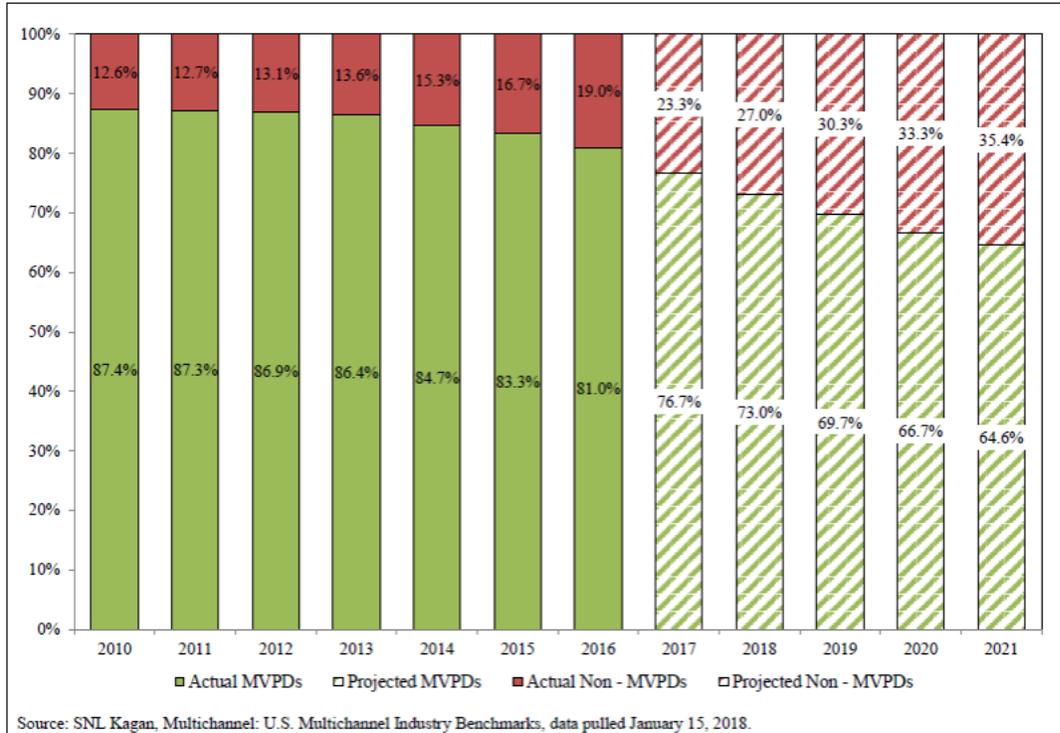
⁴⁹ Rebuttal Expert Report of Dennis W. Carlton (Redacted), ¶¶ 70.

⁵⁰ Expert Report of Dennis W. Carlton (Redacted), Figure 15.

⁵¹ Rebuttal Expert Report of Dennis W. Carlton (Redacted), ¶¶ 66-72.

Figure 4

Figure 15: Percentage of U.S. Television Households Obtaining Service from an MVPD



Source: Carlton Expert Report (Redacted), February 2, 2018, Figure 15.

With respect to the bargaining split, the government assumed a 50% split and claimed that split was supported by estimates of the various parties’ weighted average cost of capital, whose ratios the government took as a proxy for bargaining strength.⁵² The reliance on the relative costs of capital comes from a Rubinstein article cited by the government expert that showed how in a bilateral setting, using efficient contracts, the bargaining parameter could be related to the time discount rates (which are generally determined by the cost of capital) when offers are alternated.⁵³ In Rubinstein’s model, there never is disagreement in equilibrium. The AT&T expert did not put forward a specific alternative figure for bargaining weights but explained that the government’s figure was inconsistent with materials cited by the government, and that the government’s predictions of net consumer harm were not robust to changes in that assumed value for bargaining strength.⁵⁴

⁵² Shapiro Expert Report (Redacted), p. 42.

⁵³ Ariel Rubinstein (1982), “Perfect Equilibrium in a Bargaining Model,” 50 *Econometrica*, cited in Shapiro Expert Report (Redacted), p. 42.

⁵⁴ More specifically, the AT&T expert noted that the government expert relied upon a document that claimed MVPDs were paying more to Turner than the content was worth

With respect to the departure rate, the government expert assumed a departure rate of 9.4%,⁵⁵ based primarily on a survey by a consulting firm called Altman-Vilandrie for Charter, which he claimed was also consistent with an econometric analysis of the Viacom / Suddenlink blackout, which both experts agreed was a relevant benchmark.⁵⁶ On the survey, the merging parties presented testimony, credited by the court, that the survey was flawed. Furthermore, the departure figure for Turner (and no other networks) had been increased at the last minute by the consultant at the urging of Charter.⁵⁷ The government expert claimed in court that even using the original unchanged figure of 5% the government’s model would predict harm to consumers, but that was incorrect, and the expert retracted the statement on rebuttal.⁵⁸ In fact, had the original unchanged figure been used, the government’s model would predict retail price reductions, not increases.⁵⁹ On the Viacom / Suddenlink blackout, the AT&T expert pointed out that the government expert’s estimates were contradicted by Suddenlink’s own public statements to investors that the impact of the blackout on departures had been about 2.0-2.5%. Furthermore, the government expert’s econometric analysis had failed to account for the fact that the entire industry experienced a downturn in subscribership at that time. Accounting for that downturn reduced the government expert’s econometric estimate to 4.8%, an estimate more in line with Suddenlink’s own estimate and those of other industry analysts and participants.⁶⁰ Using a 5% departure rate, the government’s model predicted average net declines in retail prices of \$0.01.⁶¹

The AT&T expert also pointed out that MVPDs had long-term contracts in place such that Turner could not raise prices to them until the contracts next came up for renewal. That fact could be incorporated into the pricing predictions. If one used all the corrected numbers discussed above, and if one also took into account the price protections of existing contracts,

(i.e., MVPDs would actually be better off not carrying the Turner networks). That fact called into question the credibility of the document, but if true, the implication would be that Turner networks were receiving all or almost all of the gains from trade. If the government had assumed Turner received 71% or more of the gains from trade (holding other assumptions constant) the government’s model would predict net consumer benefits. Rebuttal Expert Report of Dennis W. Carlton (Redacted), Section VI.E.

⁵⁵ Shapiro Expert Report (Redacted), p. 128.

⁵⁶ Shapiro Expert Report (Redacted), Section 8.1.

⁵⁷ For more details, see Judge Leon, Memorandum Opinion, *United States of America v. AT&T Inc., et al.*, June 12, 2018, pp. 122-129.

⁵⁸ Judge Leon, Memorandum Opinion, *United States of America v. AT&T Inc., et al.*, June 12, 2018, pp. 128-129.

⁵⁹ Judge Leon, Memorandum Opinion, *United States of America v. AT&T Inc., et al.*, June 12, 2018, p. 129. Rebuttal Expert Report of Dennis W. Carlton (Redacted), ¶ 65

⁶⁰ Rebuttal Expert Report of Dennis W. Carlton (Redacted), ¶¶ 56-57. Judge Leon, Memorandum Opinion, *United States of America v. AT&T Inc., et al.*, June 12, 2018, pp. 129-131.

⁶¹ Rebuttal Expert Report of Dennis W. Carlton (Redacted), ¶ 65.

then the AT&T expert showed that the long-term impact of the merger on a roughly \$140 monthly retail bill would be about \$0.48 downwards, thus reversing the government’s prediction of an increase of \$0.27 per subscriber relative to trend.⁶² As noted above, this reduction would be relative to the ongoing trend of higher prices, meaning that the price increase would be less with the merger, not that absolute prices would be lower.

D. Relevance of Predictions in Light of Remedies and Industry Structure

In addition to the specific assumptions and results presented above, there is a more fundamental question about whether the model captures enough of the salient details of the industry and the transaction such that its predictions are relevant to post-merger outcomes regardless of the assumptions used. All models involve simplification, but ultimately the question is whether a model makes reasonably accurate predictions. If a model fails to account for core features of an industry, it would be surprising if it provided reliable predictions. In the AT&T / Time Warner case, the AT&T expert argued that the model’s predictions were irrelevant in light of the model’s failure to consider critical features of the transaction and marketplace.⁶³

First, and most strikingly, the model did not account for the merging parties’ contractual arbitration commitment in any way. In Comcast / NBCU, the government imposed a consent decree with a remedy to address the vertical concerns. The key element of the consent decree was an agreement to engage in binding arbitration where, if the distributor invoked arbitration, the content provider could not withhold the content during the proceeding. That is, the content provider could not unilaterally impose a blackout; instead, the distributor was guaranteed to be able to retain access to the programming at prices to be determined by the arbitrator pursuant to baseball-style final offer arbitration even if they rejected all proposed terms from the content provider. Although not made explicit, presumably the government believed that the predicted price increases from the model in Comcast / NBCU absent the remedy would not, in fact, occur given the remedy. In AT&T / Time Warner, the government refused to offer the same remedy. However, the parties made a unilateral binding contractual commitment to arbitration that also provided that the distributor could continue to air the content after demanding arbitration. Again, the distributor was guaranteed to be able to retain access to the programming even if they rejected all proposed terms from the content provider. The government expert’s model, using the theory of Nash bargaining, explicitly ignored the outside options created by this arbitration contractual commitment. That meant that even if one believed the government expert’s model, it was not a model of the merger actually being proposed.

⁶² Rebuttal Expert Report of Dennis W. Carlton (Redacted), ¶ 72.

⁶³ Prof. Shapiro claims in his recent article that Prof. Carlton criticized the model as theoretically unsound in spite of being an application of standard bargaining theory. Carl Shapiro, “Vertical Mergers and Input Foreclosure: Lessons from the *AT&T/Time Warner* Case,” *Review of Industrial Organization*, July 19, 2021, <https://doi.org/10.1007/s11151-021-09826-x>, p. 12. Prof. Carlton testified that the model was theoretically unsound for multiple reasons described in the text, the most important of which is that Prof. Shapiro ignored the arbitration commitment in his model.

Interestingly, the judge presiding over the AT&T / Time Warner trial also presided over the Comcast / NBCU consent decree and had been told for years by the government that the arbitration commitment was effective for Comcast / NBCU. Neither the government nor its expert ever provided a clear explanation as to why the arbitration commitment should be any less effective in AT&T / Time Warner than the government had been telling the judge it had been in Comcast / NBCU.⁶⁴ Furthermore, the government expert clearly stated that his model, and its predictions, did not account for the arbitration commitment.^{65, 66}

Second, the AT&T expert argued there were a range of other core features of the industry that had not been correctly modeled. For example, while Nash-in-Nash is a well-known bargaining model, it is not at all clear that it is applicable in the video industry. As noted by 37 antitrust scholars in an *amicus* filing, the “simple Nash bargaining model ... addresses one-shot, bilateral negotiation, while actual bargaining between video content providers and distributors is repeated and multilateral.”⁶⁷ More generally, critiques about the model fell primarily into four

⁶⁴ See, e.g., Carl Shapiro, “Vertical Mergers and Input Foreclosure: Lessons from the *AT&T/Time Warner Case*,” *Review of Industrial Organization*, July 19, 2021, <https://doi.org/10.1007/s11151-021-09826-x>, p. 32 (“Judge Leon himself had been supervising that consent decree since 2011. DOJ had repeatedly told Judge Leon that binding arbitration was an effective remedy in the Comcast/NBCU merger.”). See also Fiona Scott Morton, “Why Behavioral Remedies Won’t Work in the Case of AT&T-Time Warner,” *ProMarket*, January 16, 2018, <https://promarket.org/2018/01/16/behavioral-remedies-wont-work-case-att-time-warner/>. Prof. Morton’s discussion did not address the actual arbitration commitment made, nor did it consider the fact that such a commitment fundamentally changes the nature of the bargaining game itself.

⁶⁵ See, e.g., Carl Shapiro, “Vertical Mergers and Input Foreclosure: Lessons from the *AT&T/Time Warner Case*,” *Review of Industrial Organization*, July 19, 2021, <https://doi.org/10.1007/s11151-021-09826-x>, pp. 32-33 (“At trial, AT&T argued that Turner’s offer of binding arbitration would prevent Turner from increasing prices to rival MVPDs. ... My analysis addressed the merger between AT&T and Time Warner as originally proposed, not as it was modified in response to the DOJ complaint. ... The appeals court accurately observed that my quantification of harm to consumer[s] ‘failed to take into account Turner Broadcasting System’s post-litigation irrevocable offers of no-blackout arbitration agreements, which a government expert acknowledged would require a new model.’”).

⁶⁶ See also Trial Testimony of Michael Katz, April 16, 2018, pp. 2643-2757, for further discussion.

⁶⁷ Brief *Amici Curiae* of 37 Economists, Antitrust Scholars, and Former Government Antitrust Officials in Support of appellees and Supporting Affirmance, September 26, 2018, <https://www.criterioneconomics.com/docs/att-economists-amicus-brief.pdf>, p. 15; Rebuttal Expert Report of Dennis W. Carlton (Redacted), ¶ 35. A separate brief supported aspects of the government’s appeal with respect to the government’s model. Brief for 27 Antitrust Scholars as *Amici Curiae* in Support of Neither Party, August 13,

categories. First, that the simple Nash bargaining model assumes a one-shot game, but in this industry, for example, negotiations play out over time and reputation effects may matter. Second, that the simple Nash bargaining model assumes a bilateral negotiation uninfluenced by terms of other negotiations, but most-favored-nation (MFN) clauses are common in the industry, so that the outcome of one negotiation explicitly affects other negotiations, violating the Nash assumption. Third, the model assumes away a wide range of real-world responses, including, in particular, the ability of MVPDs to lower their retail prices in response to losing content in order to retain subscribers (whether through an overall price decrease or through targeted promotional efforts). Fourth, as Rogerson has noted – and the government expert concedes – the full model, including both bargaining and merger simulation, “essentially ignored equilibrium feedback effects [between the two parts of the model]... Since the equilibrium feedback effects can be complex it is difficult to say how the Department of Justice’s estimate of the consumer harm generated by the merger would have changed had it used the fully correct procedure.”⁶⁸ Given these limitations, it is notable that the government did not present any evidence that the model worked in the sense of being checked against any verifiable predictions.⁶⁹

Therefore, one possibility is that the government model as presented was flawed for any of a variety of reasons, and thus the predictions in the record are likely to be poor predictors of what transpired post-merger.⁷⁰ One fundamental test of whether the government was correct in bringing suit is whether Turner network prices did, in fact, increase because of the merger. (Again, even if there were such an increase, unless one looks at the effect on retail prices, one has not established competitive harm. But the mechanism for harm in the government’s model is

2018,
https://joe-harrington5201922.github.io/pdf/Amicus%20Brief_AT&T%20Time%20Warner.pdf.

⁶⁸ William Rogerson (2020), “Modelling and predicting the competitive effects of vertical mergers: The bargaining leverage over rivals effect,” 53 *Canadian Journal of Economics* 2, p. 428. See also Carl Shapiro, “Vertical Mergers and Input Foreclosure: Lessons from the AT&T/Time Warner Case,” *Review of Industrial Organization*, July 19, 2021, <https://doi.org/10.1007/s11151-021-09826-x>, p. 27. (“Rogerson (2020) correctly notes that the approach that I took ‘was not fully correct’ in the sense that I calculated RRC and EDM based on pre-merger prices rather than equilibrium prices.”)

⁶⁹ The government expert claimed that there was some “limited support” for his model’s predictions based on a redacted FCC analysis of DIRECTV and Fox conducted in 2010. However, the details of that analysis were not public and were not part of the discovery in AT&T / Time Warner, and the government expert did not do any analysis himself of that transaction. The AT&T expert did analyze that transaction and found no evidence of a price increase associated with vertical integration. Rebuttal Expert Report of Dennis W. Carlton (Redacted), ¶ 24.

⁷⁰ It is also worth noting that in the presence of efficiencies, a remedy need not be 100% effective in eliminating a concern in order for the merger to be on net beneficial. For example, if the remedy were only 50% effective, that would still result in the government model predicting the merger to be on net beneficial, reducing average retail MVPD prices. Rebuttal Expert Report of Dennis W. Carlton (Redacted), ¶ 41.

through increased content prices. Absent increased content prices, there can be no competitive harm in the model.)

IV. What Can a Retrospective Test?

A retrospective can test several claims. We can look back to see whether the government or the merging parties' assumed values on key parameters (*e.g.*, profit margins) were correct. We have the information to do this for some of the parameters from the AT&T case, but not for the Comcast case. We can check whether the government's predictions about price changes in content and final prices were correct. We can do this for both the Comcast / NBCU merger and the AT&T / Time Warner merger, though we have more evidence on the assumptions used for the AT&T / Time Warner merger. Finally, we can see whether any subsequent business developments provide information on the reasonableness of some of the claims made during trial.

The changes in content and retail prices are informative in several respects. If the observed content and retail prices align with the government's predictions, that would provide evidence in support of the model's ability to accurately predict the alleged adverse price effects. Conversely, if the observed content and retail prices do not align with those predicted by the government model, that would provide evidence that the model was not able to accurately predict price effects, perhaps due to its omission of the arbitration agreement or one of the other flaws discussed above.

The model can produce predictions of retail price increases or decreases depending on the assumed parameter values. If a prediction of a price change fails, that could be because of incorrect input assumptions or a problem with the model or both. We discuss in the next section whether the government's assumed parameter values were accurate in retrospect. However, regardless of the parameter values, the model by construction always predicts a content price increase (although the magnitude may be *de minimis*).⁷¹ If a content price decrease is observed, that could only be explained by the presence of theoretical deficiencies in the model.⁷²

⁷¹ As already explained, the government's model was implemented in two stages with the bargaining model that determines content prices being treated independently from the merger simulation model with no feedback effects modeled between the stages. Therefore, the model always predicts content price increases for a vertical merger. Note that in an equilibrium model with feedback between the two stages, this need not be the case if the elimination of double marginalization is sufficiently large.

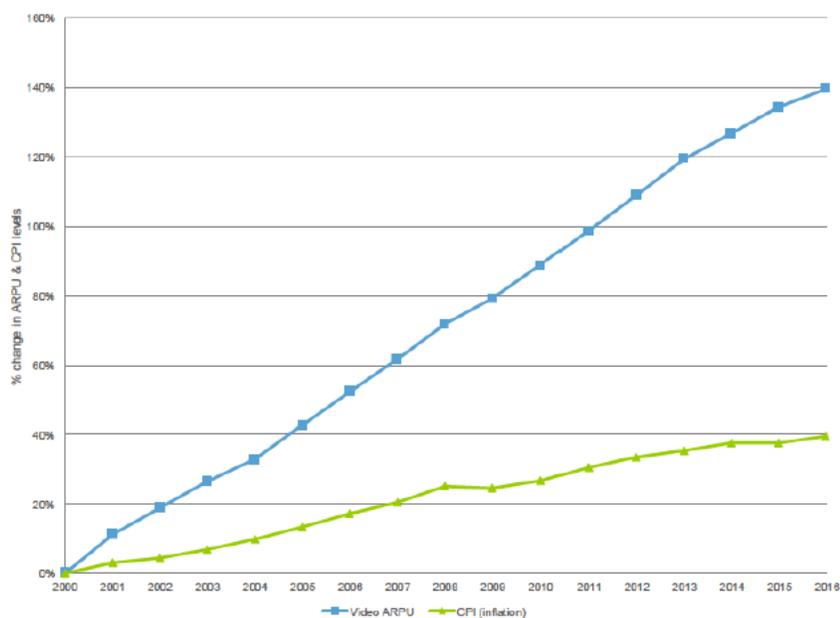
⁷² For example, the government expert's implementation of the model held bargaining strength constant pre- and post-merger. If bargaining strength changed where it was not predicted to do so, then a content price decrease could occur where an increase had been predicted. However, that is far from the only possible omission from the model that could explain a faulty prediction of a content price increase. For example, the failure to accurately predict a content price decrease might be because the model omits the arbitration clause and that clause matters.

There is also a separate question of whether it is even possible to detect some of the predicted price changes. Any pricing effects are most likely to be detectable with respect to content prices, not retail prices. For example, in the AT&T / Time Warner case, while content prices were predicted by the government expert to change by a reasonably large amount in percentage terms (20% or more), the net predicted effect on retail prices was tiny in percentage terms (0.19%). Given that retail MVPD ARPUs have been increasing by about 5% to 15% a year between 2000 and 2016 (see figure below from the government expert’s report),⁷³ it is not at all clear that even if a 0.19% change occurred relative to trend that it could be reliably detected.⁷⁴ Nonetheless, we consider the available evidence on retail prices below.

We now turn to a discussion of the retrospective evidence. We discuss each case separately.

Figure 5

Figure 6. Growth in Video ARPU vs. Growth of the Consumer Price Index: 2000–2016



Source: SNL Kagan, “Cable Industry Overview 2017,” available at <https://www.snl.com/web/client?auth=inherit#news/docviewer?id=40857390>.

Source: Shapiro Expert Report (Redacted), February 2, 2018, Figure 6.

⁷³ Shapiro Expert Report (Redacted), Figure 6.

⁷⁴ One issue the AT&T expert raised at trial is related to burden of proof. The government claim of net harm was not robust to a range of reasonable corrections to the estimated parameter values, as described above. Rebuttal Expert Report of Dennis W. Carlton (Redacted), ¶ 42.

V. Available Evidence on Post-Merger Outcomes

A. The Comcast / NBCU Experience

The government expectation in Comcast / NBCU was presumably that the arbitration remedy would work, and so neither content nor retail prices would rise as a result of the merger.⁷⁵ If that expectation was incorrect, and the theory of harm was correct, one might expect to see higher content and retail prices as a result of the merger. If we do not observe higher content and retail prices, it could be that the remedy was effective, the theory of harm was incorrect, or both. As we explain, the available evidence indicates that NBCU content prices were not elevated as a result of the merger so that either the government’s theory of harm in that case was wrong, or alternatively the theory was correct but the remedy was effective.⁷⁶

The first piece of evidence on NBCU content prices is simply the government’s own assertions as to the effectiveness of its remedy. While the consent decree was in effect, Judge Leon, who presided over the AT&T / Time Warner trial, also presided over the consent decree in Comcast / NBCU. DOJ had for years told Judge Leon that the consent decree with Comcast / NBCU, including the arbitration commitment, had been effective, and even the government expert has subsequently noted that the “DOJ never adequately explained why the arbitration remedy used in the Comcast/NBCU merger was unacceptable for the AT&T/Time Warner merger.”⁷⁷

The only published empirical retrospective on the Comcast / NBCU merger that the authors are aware of, Ford (2017), found “no systematic increase in the prices for Comcast’s networks following the merger. ... The evidence suggests either that there was no net positive effect on incentives to raise prices above competitive levels following the vertical merger, or else that the behavioral remedies placed on the Comcast-NBCU merger have been effective.”⁷⁸

⁷⁵ Again, relative to pre-existing trends and other non-merger related industry changes.

⁷⁶ Put another way, an observation of no harm is consistent with a flaw in the underlying model that predicted harm, and/or the presence of an effective remedy.

⁷⁷ Carl Shapiro, “Vertical Mergers and Input Foreclosure: Lessons from the *AT&T/Time Warner Case*,” *Review of Industrial Organization*, July 19, 2021, <https://doi.org/10.1007/s11151-021-09826-x>, pp. 32-33.

However, in his testimony at the ATT/ Time Warner trial, the government expert failed to address the relevance of the effectiveness of the Comcast-NBCU remedy on the evaluation of the proposed remedy in the ATT/Time Warner matter.

⁷⁸ George Ford, “A Retrospective Analysis of Vertical Mergers in Multichannel Video Programming Distribution Markets: The Comcast-NBCU Merger,” *Phoenix Center Policy Bulletin No. 43*, December 2017, p. 1.

In the AT&T / Time Warner trial, the AT&T expert reported results on the Comcast / NBCU price effects, based on a variety of econometric analyses using data from SNL Kagan (a standard industry source reporting estimates of average affiliate fees) as well as confidential data from DIRECTV, DISH and Charter produced during discovery.⁷⁹ The government identified DIRECTV and DISH as Comcast’s primary competitors, and hence the MVPDs most likely for Comcast to target with increased NBCU rates. The AT&T expert showed that there was no evidence of any statistically significant increases in NBCU rates related to vertical integration with Comcast using any of the available data sets. To the contrary, the point estimates obtained from difference-in-difference analyses (estimated over the 2010-2017 period, or 2010-2015 for Charter) as well as cross-sectional analyses (estimated from 2017 cross-sectional data, or 2015 for Charter) were typically negative – indicating lower prices due to the merger. And the only statistically significant results were negative.⁸⁰ In sum, the econometric evidence on NBCU’s content prices (affiliate fees) as of the time of the trial (2018), seven full years after NBCU’s vertical integration with Comcast, indicated that there was no statistically detectable increase in NBCU’s networks affiliate fees, and the government presented no econometric evidence or claims to the contrary.

Because third party data sources such as SNL Kagan use estimates that are sometimes revised, we use recent SNL Kagan data to re-estimate the SNL Kagan regressions related to the Comcast / NBCU case that were reported in the AT&T expert’s report in the AT&T / Time Warner litigation.⁸¹ Beginning with the difference-in-differences regressions, following the methodology presented by the merging parties and used by the FCC in Comcast/NBCU, we assume 20% of contracts roll-off each year, so that the full effect of the merger would be expected to have appeared by 2015.⁸² We implement the same difference-in-difference methodology presented by the AT&T expert (both unweighted and weighted by 2010 affiliate revenues), first for 2010-2015 (a period used by the AT&T expert when, as noted, all contracts should have rolled over), and second for 2010-2017 (a period also presented by the AT&T expert).⁸³ We also present cross-sectional analyses, that were also presented by the AT&T

⁷⁹ The SNL Kagan data are publicly available and copyrighted by S&P Global Market Intelligence and its affiliates, as applicable. (The provider does not guarantee the accuracy or adequacy of its content and shall not be held liable for any damages or losses in connection with any use of the content.)

⁸⁰ Expert Report of Dennis W. Carlton (Redacted), Section V.C and Appendix C; Trial Testimony of Dennis W. Carlton, April 12, 2018, pp. 2471-2475.

⁸¹ While the actual sales data from DISH, DIRECTV and Charter used in the trial will not have changed, it would not be surprising if there were some differences in the point estimates based on the SNL Kagan data. See, e.g., Georgi Ghozov, Nauman Ilias, Mark Israel and Allan Shampine, “Vertical Integration in Multichannel Television Markets: Revisiting Regional Sports Networks Using Updated Data,” *Criterion Journal of Innovation*, March 2019.

⁸² Expert Report of Dennis W. Carlton (Redacted), ¶ 191.

⁸³ Following the difference-in-difference specification used in the AT&T expert’s reports in the AT&T / Time Warner litigation, we regress the natural log of the affiliate fees of the

expert and in which the affiliate fees for the NBCU networks are compared to those of other top 50 networks, holding constant relevant factors such as programming expenses and ratings.⁸⁴ We apply the cross-sectional methodology to SNL Kagan data from 2015 (the year when contracts would have fully rolled over), and 2017 (also presented in the merging parties' work).

The results from the difference-in-difference regressions are presented in Table 1 and the estimates from the cross-sectional analyses are presented in Table 2 below. Given the log-log specification, the coefficients in both analyses may be interpreted as percentage effects on affiliate fees. Consistent with the findings presented at trial using actual company data, there are no statistically significant positive coefficients on vertical integration in any of the specifications.⁸⁵ Therefore, while some of the estimates are noisy, we conclude that it would be wrong to interpret the evidence, taken as a whole, as showing that there was competitive harm from the Comcast / NBCU merger and instead that it is proper to interpret the evidence as showing that there was no harm from the Comcast / NBCU merger - either the theory of harm in the Comcast / NBCU case was incorrect, or, as the government claimed, the remedy in Comcast worked.

top 50 basic cable networks on the natural log of programming fees (three-year moving average), Nielsen's prime-time ratings (three-year moving average), network and year fixed effects and an indicator variable for the vertically integrated NBCU networks. This variable takes a value of 0 in 2010, .2 in 2011, .4 in 2012, .6 in 2013, .8 in 2014 and 1 during 2015-2017 – an approach accounting for the staggered nature of contracts. See Rebuttal Expert Report of Dennis W. Carlton (Redacted), Section V.C and Appendix C.

⁸⁴ Following the cross-sectional specification used in the AT&T expert's report in the AT&T / Time Warner litigation, we regress the natural log of the affiliate fees of the top 50 basic cable networks on the natural log of programming fees (three-year moving average), Nielsen's day-time and prime-time ratings (three-year moving averages), the natural log of day-time and prime-time delivery, network age, network genre fixed effects and an indicator variable for the NBCU networks. See Rebuttal Expert Report of Dennis W. Carlton (Redacted), Section V.C and Appendix C.

⁸⁵ To the extent that the post-merger evidence indicates content prices went down, that would indicate that the model as implemented was incorrect, since, as explained in detail above, the model always predicts content price increases, all else equal.

Table 1: NBCU Vertical Integration Analysis with Kagan Data, Difference-in-Difference Regressions

	(1)	(2)	(3)	(4)
	2010-2015	2010-2015	2010-2017	2010-2017
NBCU Networks Vertically Integrated Indicator	-0.035314	-0.021429	0.030880	0.037505
	0.037552	0.053752	0.034192	0.040755
Log (Programming Investment)	0.220160*	0.147614	0.273007**	0.194825*
	0.104646	0.128398	0.082762	0.094669
Nielsen Prime Time Rating	-0.029238	-0.116934	0.001160	-0.045421
	0.090157	0.080581	0.066939	0.047775
Regression Weighting	YES	NO	YES	NO
Network Fixed Effects	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES
Observations	240	240	312	312
R-squared	0.999	0.994	0.998	0.993

Notes:

1. The NBCU Networks Vertically Integrated Indicator takes a value of 0 in 2010, .2 in 2011, .4 in 2012, .6 in 2013, .8 in 2014 and 1 during 2015-2017.
2. Clustered standard errors (clustered by owner); ** p-value<.05; * p-value<.1.
3. In the weighted specifications the regression weights are 2010 network revenues.

Table 2: NBCU Vertical Integration Analysis with Kagan Data, Cross-Sectional Regressions

	(1)	(2)	(3)	(4)
	2015	2015	2017	2017
NBCU Vertically Integrated Networks Indicator	-0.143069**	-0.109131**	-0.109912*	-0.099630
	0.039982	0.037672	0.058084	0.061002
Log (Programming Investment)	0.716526**	0.731904**	0.785865**	0.772942**
	0.181590	0.137935	0.216846	0.170922
Log (Prime-Time Delivery)	0.016006	-0.232082	0.175606	0.005953
	0.356335	0.354404	0.199836	0.215414
Log (Day-Time Delivery)	-0.248278	-0.084375	-0.460460	-0.421995*
	0.437618	0.428417	0.266932	0.201099
Nielsen Prime-Time Rating	0.290538	0.605586	-0.103659	0.356831
	0.518065	0.439390	0.537610	0.558099
Nielsen Day-Time Rating	0.709280	0.212704	1.258820	0.737601
	1.043590	0.932923	1.046729	1.060064
Network Age	0.000177	0.000672	0.000748	0.001104
	0.000637	0.000639	0.000822	0.000725
Regression Weighting	YES	NO	YES	NO
Genre Fixed Effects	YES	YES	YES	YES
Observations	46	46	46	46
R-squared	0.974101	0.878619	0.964620	0.879675

Notes:

1. Clustered standard errors (clustered by owner); ** p-value<.05; * p-value<.1.
2. In the weighted specifications network revenues are used as regression weights.

The Comcast / NBCU consent decree expired on September 1, 2018.⁸⁶ However, DOJ notified Comcast that it would continue to monitor Comcast even absent a formal consent decree structure, calling into question how much of a change in regulatory oversight actually occurred.⁸⁷ Nonetheless, we can look at publicly available data from SNL Kagan to see if there are any obvious discontinuities in NBCU rates since the consent decree has ended. As previously noted, given the existence of overlapping long-term contracts, any changes in average rates, such as those estimated by SNL Kagan, would be expected to appear gradually over the course of five years or so. Based on SNL Kagan data, average NBCU rates increased in 2018 but stayed relatively flat in 2019 and 2020. That timing is inconsistent with a hypothesis that rates increased substantially because of expiration of the consent decree given that most, if not all, of the 2018 rate increases reflected in the SNL Kagan estimates were set pursuant to contracts signed during the consent decree period.⁸⁸

Nonetheless, we have analyzed the end of the consent decree using the same econometric methods discussed above. That is, we conduct a difference-in-difference analysis of NBCU rates over the 2017-2020 period, as well as a cross-sectional analysis using the last year of actual data available, 2020. In the difference-in-difference analysis we again account for the staggered nature of contracts by assuming a 20% annual contract roll-off, reflected in the NBCU End of Consent Decree Indicator, which is turned on for the NBCU networks in the following fashion: 0 in 2017 (last full year before consent decree expiration), 0.05 in 2018 (20% of approximately one quarter of the year post consent decree), .25 in 2019 (first full year post consent decree) and .45 in 2020.

The results from this analysis are reported in Table 3 below. The cross-sectional regression results are reported in Table 4 below. Columns (1)-(2) / (5)-(6) include the Turner networks among the benchmark observations, whereas columns (3)-(4) / (7)-(8) exclude the Turner networks from the benchmark observations given that they underwent a change in vertical integration status during the period of study. Again, there are no positive statistically significant coefficients on the vertical integration variables for any of the specifications.

To summarize, the noise in the estimates prevents a fully conclusive statement, but on balance the totality of the evidence is more consistent with price reductions than it is with price increases. Therefore, we conclude that the evidence does not support an inference that the competitive harms that had induced the government to demand a consent decree materialized

⁸⁶ *Id.*

⁸⁷ Dawn Chmielewski, “DOJ Notifies Comcast It Will Continue To Keep An Eye On The Company – Report,” *Deadline*, August 30, 2018, <https://deadline.com/2018/08/doj-comcast-scrutiny-continue-post-consent-decree-nbcu-1202455013/>.

⁸⁸ Multi-year agreements typically specify prices by year, and those prices are typically rising over time, often in a non-linear fashion.

after the consent decree ended.⁸⁹ Since that theory of harm from a vertical merger was the same as that alleged in the AT&T case, we expect no harm would have emerged from the AT&T merger even in the absence of a contractual commitment that was modeled after the Comcast consent decree.

Table 3: NBCU End of Consent Decree Analysis with Kagan Data, Difference-in-Difference Regressions

	(1)	(2)	(3)	(4)
	2017-2020	2017-2020	2017-2020, excl. Turner Networks	2017-2020, excl. Turner Networks
NBCU End of Consent Decree Indicator	0.093042	-0.033794	0.109160	-0.027939
	0.058644	0.137805	0.059757	0.147585
Log (Programming Investment)	1.193218*	1.482844	1.026456	1.509077
	0.610260	1.046908	0.669169	1.139976
Log (Prime-Time Delivery)	-0.106137	-0.206644	-0.091341	-0.233192
	0.109942	0.211819	0.135461	0.260714
Regression Weighting	YES	NO	YES	NO
Network Fixed Effects	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES
Observations	164	164	144	144
R-squared	0.998795	0.994398	0.999033	0.993774

Notes:

1. The NBCU End of Consent Decree Indicator is specific to NBCU networks (0 for all other networks) and takes a value of 0 in 2017, 0.05 in 2018, .25 in 2019, .45 in 2020,
2. Clustered standard errors (clustered by owner); ** p-value<.05; * p-value<.1.
3. In the weighted specifications the regression weights are 2017 network revenues.

⁸⁹ Of course, it might be the case that the fear of DOJ scrutiny prevented any increases in content prices even after the consent decree expired.

Table 4: NBCU End of Consent Decree Analysis with Kagan Data, Cross-Sectional Regressions

	(5)	(6)	(7)	(8)
	2020	2020	2020, excl. Turner networks	2020, excl. Turner networks
NBCU Vertically Integrated Networks Indicator	-0.036998	-0.088648	0.006486	-0.065835
	0.043310	0.054992	0.084998	0.083778
Log (Programming Investment)	0.836172**	0.779982**	0.768968**	0.760731**
	0.223572	0.189628	0.286630	0.223012
Log (Prime-Time Delivery)	0.042665	-0.037462	0.062784	-0.077112
	0.215938	0.188376	0.239077	0.209270
Log (Day-Time Delivery)	-0.219251	-0.081261	-0.248370	-0.036044
	0.345395	0.233213	0.421304	0.247537
Nielsen Prime-Time Rating	0.026074	0.195788	0.275065	0.325422
	0.426795	0.258199	0.354637	0.327258
Nielsen Day-Time Rating	0.460217	-0.069193	0.192424	-0.280010
	0.970424	0.499004	0.890445	0.571453
Network Age	0.000661	0.000825	0.000422	0.000597
	0.000898	0.000753	0.000923	0.000795
Regression Weighting	YES	NO	YES	NO
Genre Fixed Effects	YES	YES	YES	YES
Observations	46	46	41	41
R-squared	0.958258	0.859249	0.963374	0.855032

Notes:

1. Clustered standard errors (clustered by owner); ** p-value<.05; * p-value<.1.
2. In the weighted specifications network revenues are used as regression weights.

B. The AT&T / Time Warner Experience Post-Merger

For our retrospective analysis of the AT&T / Time Warner merger, we begin by noting that AT&T has now spun off DIRECTV and is in the process of spinning off WarnerMedia. That indicates the government theory was incorrect since one would presumably not sell off assets that created market power and increased profits. Indeed, of all the retrospective evidence we are about to present, this evidence, based on actual business behavior subsequent to the merger, is likely the most powerful evidence that the government’s claims of harm to competition were wrong. The fact that AT&T has sold the assets off at a loss shows that AT&T’s hopes for financial success were wrong. Nevertheless, it is exactly the correct economic outcome for the government to allow mergers to go forward, absent competitive concerns, and let the parties enjoy the fruits of success or consequences of failure. Any attempt to defend the government case on the grounds that it would have saved AT&T from a business mistake is misguided: That is not the role of an antitrust authority.

We now turn to a discussion of parameter values, before discussing content prices and retail prices.

1. Evidence on Model Assumed Parameter Values

We now turn to a retrospective evaluation of the accuracy of the assumed parameter values used to estimate the model. To begin, we note that the assumed parameter values were intended to be forward-looking. In particular, there were long-term contracts in place at the time of the merger that would have prevented any predicted price increases, so the model’s price

predictions were only relevant years into the future and would depend upon the assumed parameter values in those future years.⁹⁰ Thus, it is highly relevant whether the parameter values assumed at the time of trial have, in fact, been born out over time.

For departure rates in the event of blackout, we are unaware of any new evidence one way or the other. There have been no blackouts of the Turner networks, temporary or otherwise, since the merger. That is not surprising given the guarantee of continued carriage in the arbitration commitment.

For margins, the financial data relied upon by the government and the parties in the trial are not publicly available. However, it is clear that DIRECTV's financial state has deteriorated, and AT&T has spun off DIRECTV.⁹¹ This means that the lower margins used by the AT&T expert were likely the more relevant ones to use in contrast to those used by the government's expert.

With respect to diversion, the government relied upon subscriber shares, and the data source used by the government and the merging parties – SNL Kagan – is publicly available, so we can see how matters have developed. The government expert assumed satellite MVPD shares would remain constant and that cord cutting would actually decline. The AT&T expert disputed those assumed parameter values but conservatively used only a higher estimate of cord cutting without assuming further increases in the future. We look first at MVPD shares ignoring cord-cutting, then look at how cord-cutting has developed.

First, ignoring cord-cutting, we ask if DIRECTV's share of MVPD subscribers has changed (since the diversion rate was assumed by the government to be proportional to DIRECTV's subscriber share).⁹² Contrary to the government expert's assumption that DIRECTV's share would remain constant, subscribership to satellite providers like DIRECTV

⁹⁰ See, e.g., Carl Shapiro, "Vertical Mergers and Input Foreclosure: Lessons from the AT&T/Time Warner Case," *Review of Industrial Organization*, July 19, 2021, <https://doi.org/10.1007/s11151-021-09826-x>, pp. 15-17 ("Turner would have the ability to set higher prices for these MVPDs only over time, as their contracts expired and were renegotiated. ... The Appeals Court likewise stated: 'Whatever errors the district court may have made in evaluating the inputs for Professor Shapiro's quantitative model, the model did not take into account long-term contracts, which would constrain Turner Broadcasting's ability to raise content prices for distributors.'"). Prof. Shapiro appears to recognize that ignoring contracts that protect from harms is problematic, especially so if the efficiencies (and consumer benefits) result immediately but the harms arise only in the future because of contractual protections.

⁹¹ See, e.g., Eli Blumenthal, "DirecTV completes spinoff from AT&T, will turn AT&T TV into DirecTV Stream," cnet, August 2, 2021, <https://www.cnet.com/tech/services-and-software/directv-completes-spinoff-from-at-t-will-turn-at-t-tv-into-directv-stream/>.

⁹² The government expert's merger simulation was implemented using shares for groups of zip codes below the Designated Market Area level. The national share was thus not a direct input but is illustrative of the unanticipated changes in the industry.

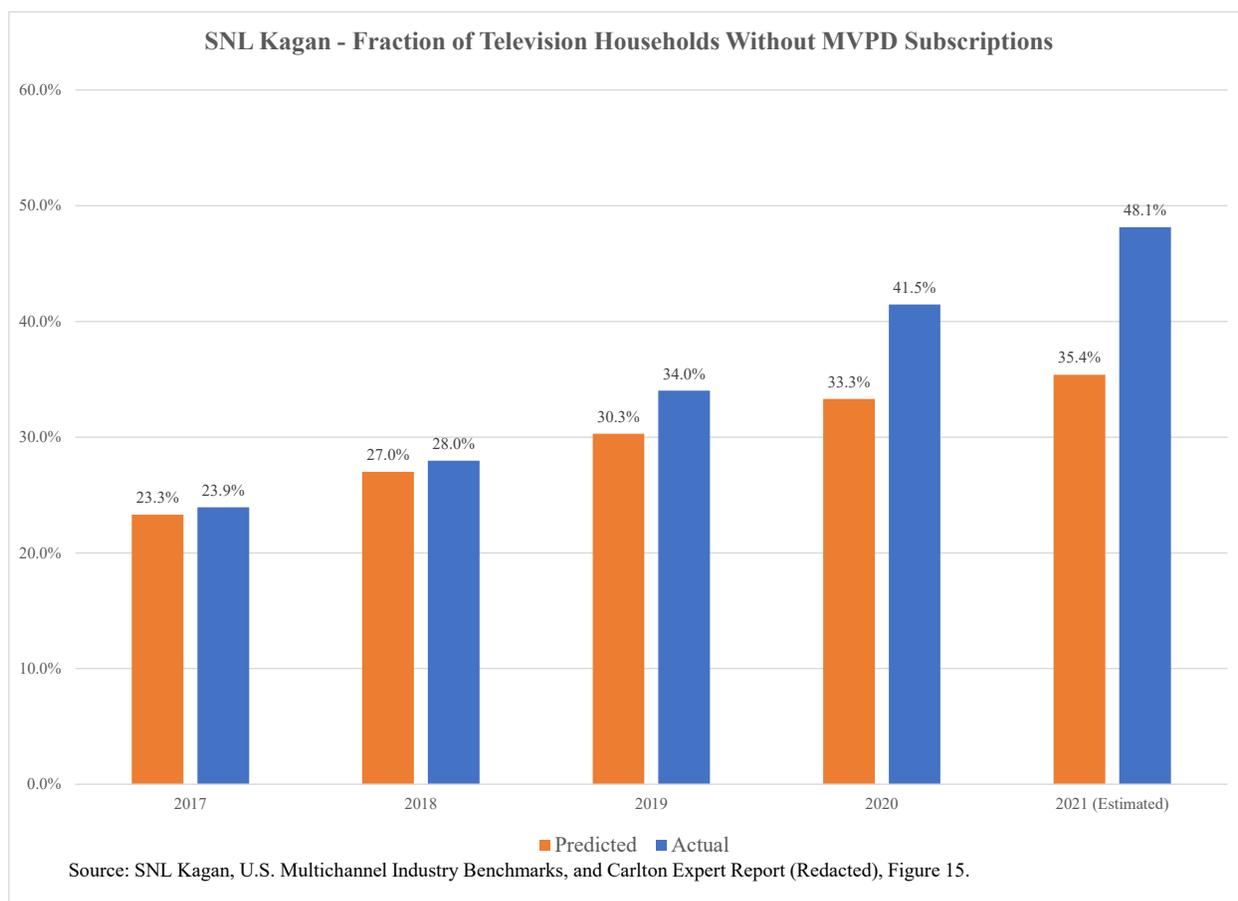
has declined faster than for cable providers, resulting in the MVPD shares of satellite providers like DIRECTV shrinking from roughly 34% in 2017 to roughly 27% in 2021.⁹³

Second, let us consider what has happened with cord-cutting. Contrary to the government expert's assumption that cord-cutting would decline in importance, but consistent with the AT&T expert's predictions, cord-cutting has exploded. The AT&T expert used an estimate of 20% for the fraction of television households that would not be MVPD subscribers going forward, based on the fraction for which that was true at the time, but noted that SNL Kagan predicted at the time that by 2021 35.4% of television households would not be MVPD subscribers. In fact, SNL Kagan now estimates that in 2021 48.1% of television households no longer subscribe to MVPDs. That is, roughly *half* of U.S. households have become cord-cutters. Put another way, roughly 38% of the MVPD subscribers that existed at the time of the merger have cut the cord.⁹⁴ And this is not simply due to the pandemic. The actual figures for cord-cutting have exceeded SNL Kagan's predictions in every year since the merger. (See below comparing the SNL Kagan predictions at the time of the trial with the actual amount of cord cutting.)

⁹³ SNL Kagan, U.S. Multichannel Industry Benchmarks.

⁹⁴ SNL Kagan, U.S. Multichannel Industry Benchmarks.

Figure 6



In summary, the AT&T expert’s key forward-looking parameter values to the model appear to have been more accurate than the government expert’s. Indeed, the AT&T expert indicated his assumed parameter values were conservative, and, in fact, that appears to have been the case. Using the more recent data for the key parameter values to run the model would produce estimates of even greater declines in retail prices (relative to trend) than were presented by the AT&T expert at trial.

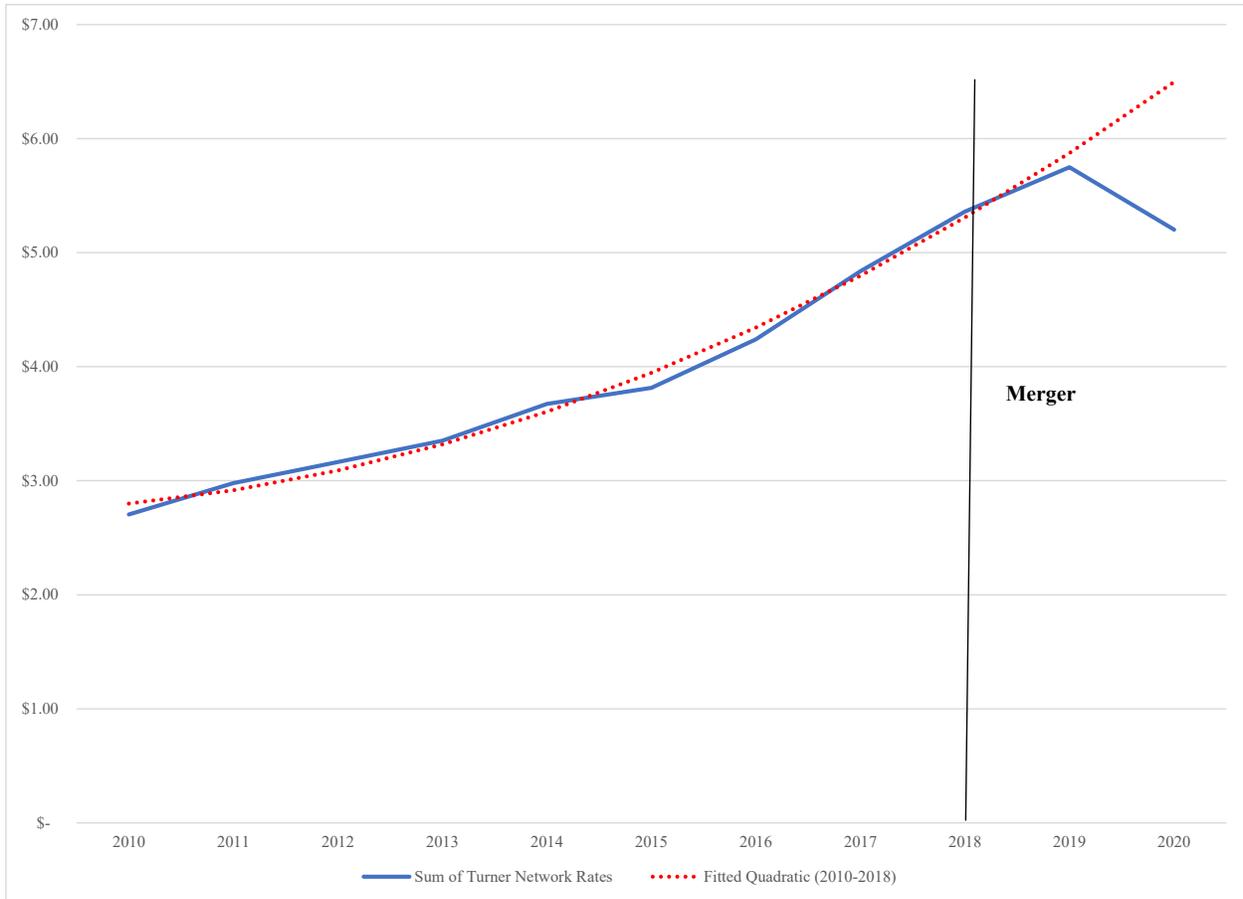
2. Evidence on Content Prices

As noted earlier, the model as implemented by the government expert always predicts a content price increase from the vertical merger (although it could be *de minimis*).⁹⁵ (Again, the mechanism of harm in the government’s model occurs through increased content prices. As explained earlier, to show a competitive harm on net, one must look at overall retail prices, not content prices.) However, while public data from SNL Kagan do suggest a change in trend post-merger, the change is *downwards*, not upwards. See the figure below, showing the sum of Turner network rates per SNL Kagan, by year. While the change in 2020 is readily apparent, a quadratic trend line based on 2010-2018 rates is fitted as a reference point. Notably, the

⁹⁵ The government did not apply its model to HBO, which is sold as a stand-alone product.

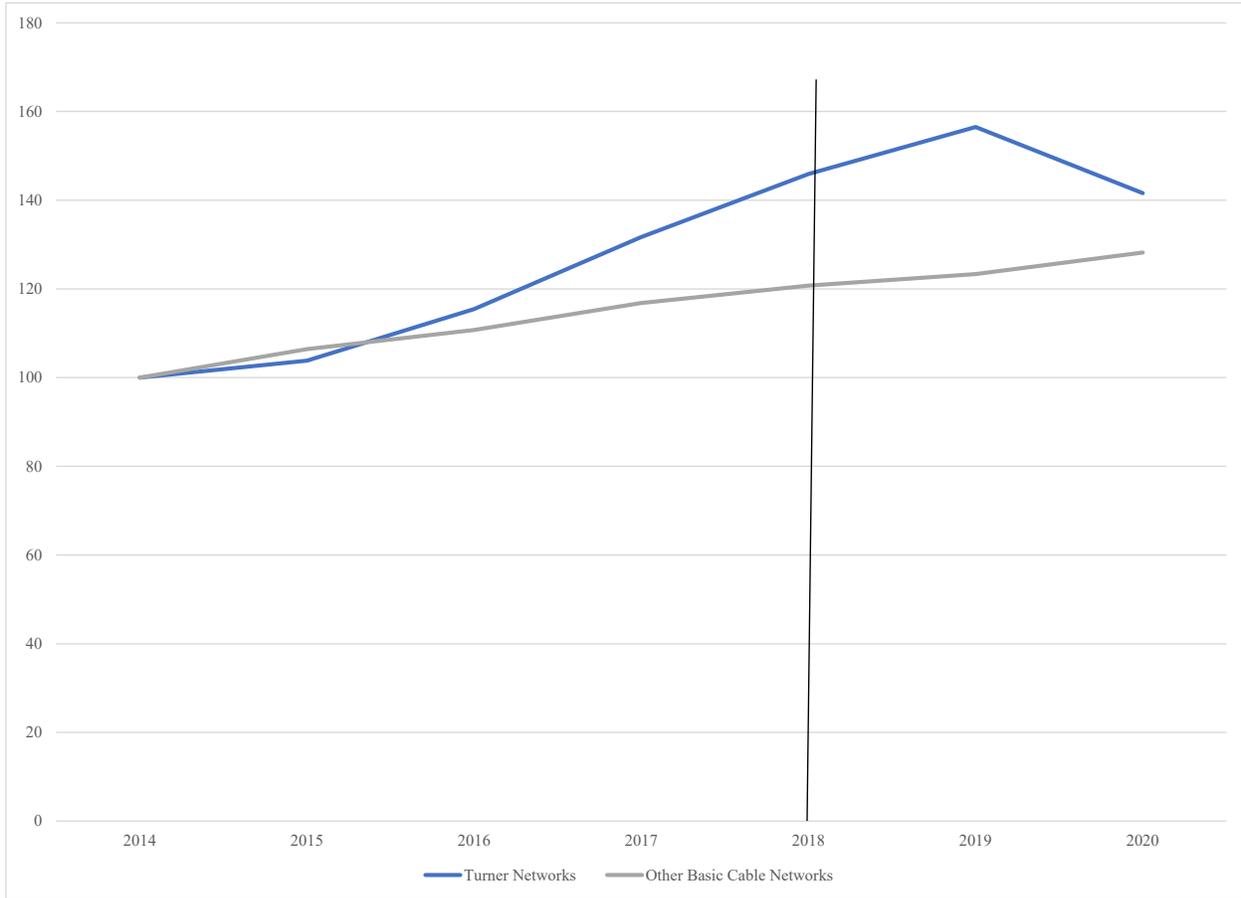
quadratic trend fits the pre-merger experience very well, with Turner prices falling below this trend only post-merger. Nor can this decline be explained by an industry-wide change. The next figure plots Turner network rates, indexed to 100 in 2014, against rates for other basic cable networks (excluding NBCU, given its change in integration and regulatory status, described above). There is no corresponding industry-wide decline: Turner rates declined against the industry in 2020, according to SNL Kagan.

Figure 7



Source: SNL Kagan data.

Figure 8



Source: SNL Kagan data.

This inconsistency between a price decrease in content prices and the model’s predictions of an increase is not a function of the model’s parameter values, since any of the discussed parameter values will produce a predicted content price increase from the vertical merger (given the separation of the upstream and downstream models, described above). The problem must lie with the theoretical deficiencies of the model itself. However, the inconsistency does not by itself indicate what that problem is. One likely candidate, however, is failure to account for the arbitration commitment, which could actually create downward pricing pressure on content prices.

3. Evidence on Retail Prices

Given that there are no content price increases relative to trend in the post-merger period, the model’s predictions about increased retail prices are irrelevant, as those predictions are premised on content prices increasing. That is, any retail price increases cannot be due to the government’s theory of harm because that theory was premised on content price increases driving retail price increases. Nonetheless, we examine retail prices next.

Some commenters have written that retail price increases at DIRECTV NOW (a virtual MVPD, different from DIRECTV’s flagship satellite service) and in wireless pricing shortly after the merger are evidence that the government’s predictions of harm were correct.⁹⁶ As noted above, however, even if the government’s theory of harm were correct, the government expert did *not* predict retail price increases at DIRECTV (either at the satellite service or the virtual MVPD DIRECTV NOW), *nor* did he predict retail price increases for AT&T’s wireless services. Indeed, the government’s theory of harm was entirely unrelated to wireless, and, with regard to video, the government expert predicted price *decreases* at DIRECTV itself (only prices for other MVPDs were predicted to increase slightly). Furthermore, as noted above, all parties agreed there were ongoing trends towards higher retail prices, and that any reductions in price would be relative to those trends. Hence seeing a continued trend in retail prices is uninformative about the government’s model’s validity.⁹⁷

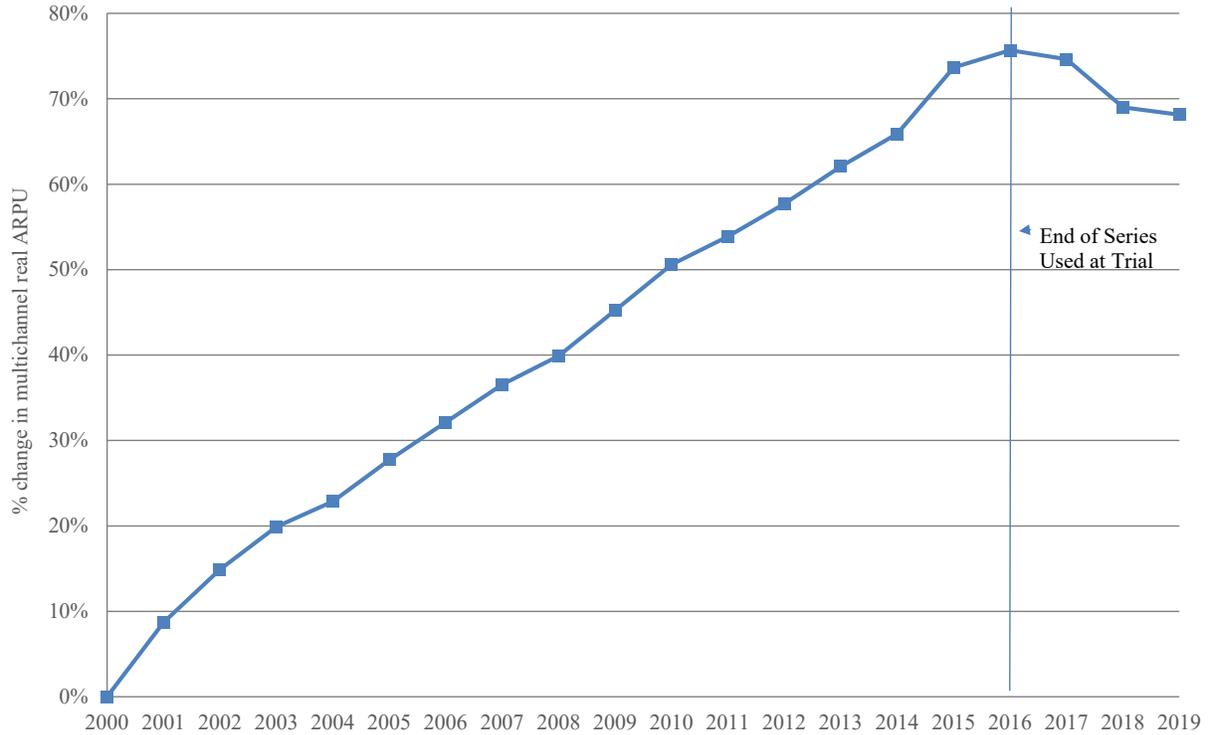
Contrary to the commenter’s claims, it is also not apparent that there has been any particular increase in retail prices relative to trend after the merger: In fact, the industry-wide ARPU series referenced by the government expert has actually *declined* since the merger. See the figure below for an updated version of the government expert’s figure on retail price trends over time.⁹⁸

⁹⁶ See, *e.g.*, Jacqueline Thomsen, “AT&T customers see price increases following Time Warner merger,” The Hill, July 3, 2018, <https://thehill.com/policy/technology/technology/395318-att-customers-see-price-increases-following-time-warner-merger>, and Jonathan Baker, introduction to John Kwoka, *Controlling Mergers and Market Power*, Competition Policy International, 2020, pp. 10-11. Other commenters have pointed to a multi-year blackout of HBO on DISH as evidence that the government theory of harm was correct. See, *e.g.*, Lina Khan (2020), “Book Review: The End of Antitrust History Revisited,” 133 *Harvard Law Review*, pp. 1673-1674. But in fact the government never claimed that HBO, or any of the Turner networks for that matter, would be withheld from any distributor as a result of the merger.

⁹⁷ Nor is it meaningful to pick out changes in particular products or bundles. The government predictions were made at an aggregate level, not the level of a particular product.

⁹⁸ The nominal series used by the government has been discontinued by SNL Kagan and replaced with a real (*i.e.*, deflated) series. This changes the levels for 2016 and earlier but not the overall trend referenced by the government expert.

Figure 9



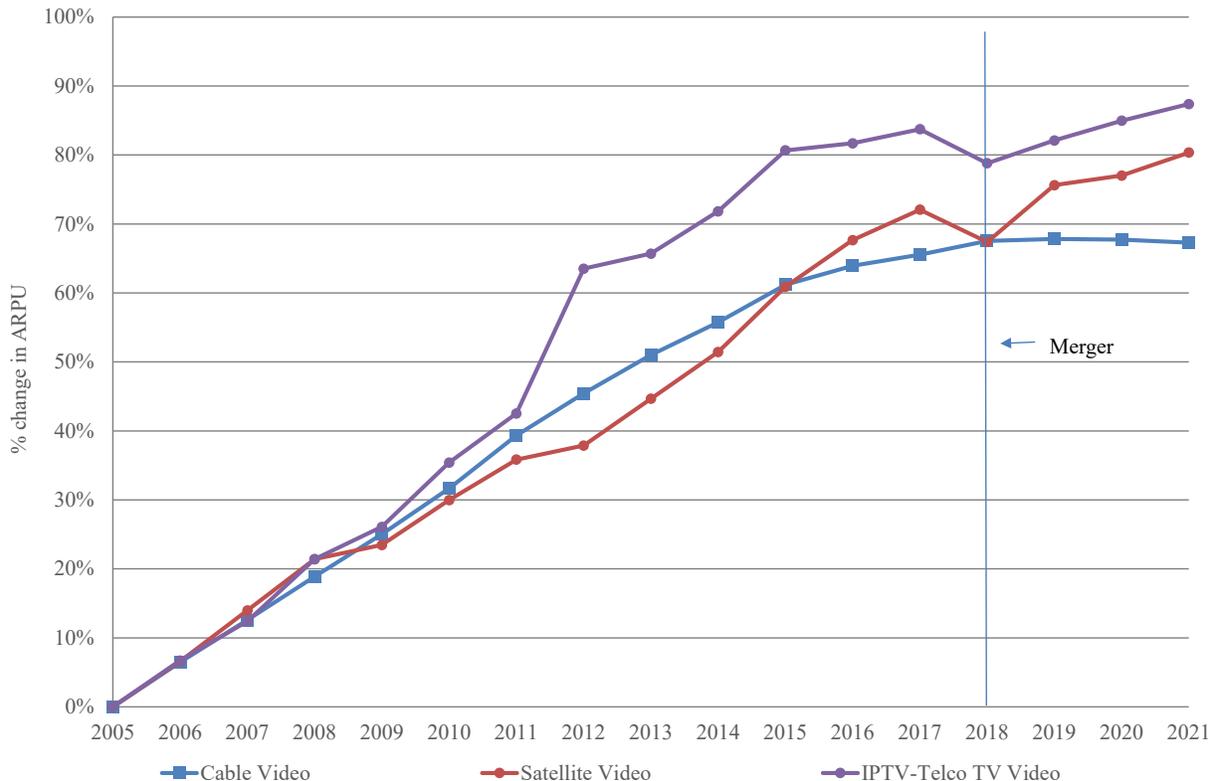
Note: Adjusted for inflation based on reported/estimated nominal figures and reported CPI, with a base year of 2000. Multichannel ARPU calculations include cable, DBS and telco platforms.

Source: SNL Kagan, "Inflation-adjusted multichannel bill rose 6x faster than real income 1999-2019," available at <https://platform.marketintelligence.spglobal.com/web/client/#news/article?id=57015366&KeyProductLinkType=6>.

As noted above, satellite’s share of MVPD subscribership has been declining, so it is informative to look at ARPU broken out between cable, satellite and telco (IPTV) providers. AT&T operates both telco and satellite video distributors. See the figure below.⁹⁹ Again, there is no obvious increase in ARPU relative to trend associated with the merger.

⁹⁹ The telco series begins in 2004, and the 2005 real ARPU is more than twice the 2004 real ARPU. The figure below begins in 2005 to make visual comparisons between satellite, cable and telco easier.

Figure 10



Source: SNL Kagan, "Global Forecast Table," available at <https://platform.marketintelligence.spglobal.com/web/client?auth=inherit#country/gmcForecastTable?ID=742&CableEntity=f780d481-ced4-458f-b8da-0d54036c8133>.

Finally, the magnitude of changes in retail price levels are out of line with the government’s theory of harm. For example, the article referenced earlier, criticizing the merger decision, discussed a \$5 increase in the price of DIRECTV NOW. Other virtual MVPDs have also had multi-dollar price increases in recent years.¹⁰⁰ Those changes appear due to general changes in the industry, such as vMVPDs beginning to look more like MVPDs in both content and price, and are not plausibly related to the government expert’s predicted changes in content prices of less than a dollar, changes that do not appear to in fact have happened.

4. Summary of Retrospective Evidence on AT&T / Time Warner

The retrospective evidence reveals that the government claims of anticompetitive harm from the merger were wrong. The business decision of AT&T to spin off Time Warner is powerful evidence that the government’s case was misguided. The government expert’s assumed parameter values for the model produced predicted retail price increases but those

¹⁰⁰ For example, Sling raised their prices by \$5 at the end of 2019. See Chris Welch, “Sling TV Gets More Expensive, Raises Cheapest Subscription Price to \$30,” *The Verge*, December 23, 2019, <https://www.theverge.com/2019/12/23/21035080/sling-tv-orange-blue-price-increase-subscription>.

assumed values were unrealistic. The AT&T expert’s alternative forward-looking assumed parameter values, which are closer to what has actually happened, produced predictions of decreases in retail prices (relative to trend and other industry changes). That fact indicates the government should not have brought the case in the first place. The failure to find evidence of content price increases post-merger shows that the government expert’s model was flawed since the model always predicts content price increases from the vertical merger, all else equal. In any case, the fact that content prices did not rise post-merger means that attempts to link the vertical integration to increased retail prices are inconsistent with the government’s theory of harm. Finally, the fact that the government claimed, and the evidence supports, that prices did not rise post-merger in the Comcast / Time Warner matter, a case involving similar issues and a remedy similar to the contractual arbitration remedy proposed by AT&T, is further confirmation that the government claims of anticompetitive harm from the AT&T / Time Warner merger were wrong.

VI. Lessons for Analysis of Vertical Mergers

In light of the discussion above, what general conclusions can we draw about vertical merger cases? First, the theory of vertical harm cannot and should not be dismissed out of hand as being inconsistent with economic theory. The theory itself is sound if applied in the right cases and supported with appropriate empirical evidence: The issue is whether it is empirically relevant to the industry under analysis. However, applying that theory to a particular industry can be tricky, and if done in a faulty way will produce incorrect results, as here.

Although we disagree with much of the government expert’s testimony and claims in his recent article on the AT&T / Time Warner merger, there are several points of apparent agreement.¹⁰¹ First, it is possible for vertical mergers to cause harm (even though, in our opinion, those circumstances are limited). Second, a vertically integrated firm will naturally seek to maximize its profits and that means it will internalize externalities (such as double marginalization) that would otherwise exist. Third, the presence of contracts can protect against short-term harms while allowing efficiencies to be attained. Fourth, a full equilibrium model with feedback between the downstream and upstream markets is the appropriate model. Finally, when there is a proposed remedy, that remedy should be accounted for in the economic analysis.

In general, it can be difficult to specify a model that accurately reflects the complex nature of real-world negotiations and industry facts, as is evident from the experience in AT&T / Time Warner. All models involve simplification, but a key lesson from this retrospective is that when using complex models, verification of the reliability of that model in making predictions is desirable, if that is possible. If it is not possible, then it may be difficult to have any confidence in a model’s predictions of harm.

Empirical evidence from prior transactions can be of great importance, especially if that evidence is in tension with a model’s predictions in the case under analysis. If a model predicts harm, as in the AT&T /Time Warner merger, but similar transactions, such as the Comcast /

¹⁰¹ Carl Shapiro, “Vertical Mergers and Input Foreclosure: Lessons from the *AT&T/Time Warner Case*,” *Review of Industrial Organization*, July 19, 2021, <https://doi.org/10.1007/s11151-021-09826-x>.

NBCU merger, have not produced harm, one should be highly skeptical of the model’s predictions. This is especially true when using complex structural models to make predictions of harm. The ability to provide reduced form studies of past similar transaction’s effects strikes us as an important complement to any attempted structural modeling, when such reduced form studies are feasible.¹⁰²

The fact that a remedy appears to have been effective both when implemented as a government consent decree and as a unilaterally imposed and self-enforcing contractual remedy is also of great interest. The government stated at the time of the AT&T / Time Warner merger that it did not wish to enter into a remedy that it would have to monitor on an ongoing basis. However, as discussed above, the unilaterally imposed arbitration commitment by AT&T was not a remedy to be administered by the government, but a contractual one that directly changed the bargaining process and is privately enforced just like any other private contract. The government was not required to monitor or enforce it. The merging parties made a legally binding commitment to distributors negotiating for content, and that contractual commitment is enforceable through the judiciary without any action by the government.

Although the government dismissed contractual commitments in the AT&T / Time Warner trial as a “behavioral remedy” that requires on-going monitoring and thus would be likely to be less effective than “structural remedies,” in our view that characterization is misleading. The arbitration mechanism operates by changing the incentives faced by the merging party in negotiations, relative to the incentives it would face absent the contractual commitment. As such, it could be properly considered to be a “structural remedy,” which, once imposed, requires only that firms operate in their own self-interest. In contrast, a “behavioral remedy” requires ongoing government monitoring because it typically requires firms to act in ways that are counter to their self-interest. This is not just a semantic debate about how to label the remedy: Regardless of what label one uses to describe it, a contractual commitment like the one in the AT&T / Time Warner case alters the incentives of the parties post-merger, can prevent harms claimed by the government, and is self-enforcing, requiring no government monitoring or regulation.¹⁰³

Some commenters have suggested that allowing merging parties to offer a unilateral contractual remedy will make it more difficult for the government to bring challenges.¹⁰⁴ However, that seems to be a socially beneficial outcome, not a concern. If the parties can offer

¹⁰² Of course, re-estimating the structural model for this past transaction and then examining whether its predictions turned out to be accurate would be desirable, but that might not be possible because of data requirements.

¹⁰³ See, e.g., Expert Report of Dennis W. Carlton (Redacted), ¶ 94. Of course, the contractual commitment can fail to achieve its goal, but just as with other contractual provisions, that will depend on the circumstances.

¹⁰⁴ See, e.g., Carl Shapiro, “Vertical Mergers and Input Foreclosure: Lessons from the AT&T/Time Warner Case,” *Review of Industrial Organization*, July 19, 2021, <https://doi.org/10.1007/s11151-021-09826-x>, pp. 33-34.

an effective remedy, such that the benefits can be obtained without risk of harm, then the merger should not be challenged.

As a final suggestion, there may be a lesson to be learned about the presentation of complex economic models such as the government’s model. In AT&T / Time Warner, AT&T took the unusual step of putting its expert witness on the stand right after the government’s expert witness. This back-to-back testimony allowed an unusual degree of ability to contrast the two testimonies without having the usual lengthy interlude between the testimony of the opposing economists. In some foreign jurisdictions and arbitrations, complex issues such as this are handled in expert witness “hot tubs” where experts can be questioned together or even question each other. Similar arrangements could be beneficial to the finders of fact in future litigation.

In sum, the retrospective analysis here indicates the government model was incorrect in predicting harm from the AT&T / Time Warner merger. That does not mean that all vertical cases are wrong, nor should it discourage analysis of vertical mergers. But it does mean marketplace and transaction details matter a great deal, and overconfidence in economic models that do not capture key theoretical or empirical details is dangerous and can lead to interference with business decisions that raise no competition concerns.

VII. Appendix¹⁰⁵

The government expert’s model is based on a Nash bargaining solution for content prices, which involves maximizing the product of the gains from trade for the two parties. More specifically, if n_1 and n_2 are the negotiated payoffs and t_1 and t_2 are the “threat points,” or the payoffs if no agreement is reached, then the Nash bargaining solution is the pair n_1, n_2 that satisfies:

$$\text{choose } p_1 \text{ to } \max(n_1 - t_1)(n_2 - t_2)$$

where n_1 and n_2 are functions of content price p_1 holding all other prices constant, and t_1 and t_2 are functions of all other prices.

The Nash bargaining solution with symmetric bargaining strength is an even split of the gains from trade, which is also used by the government expert in his implementation of the model. However, he does allow for unequal bargaining power when applying the model to the case. More specifically, when applied to the case of a content provider u and an MVPD distributor d , with bargaining strengths α and $(1-\alpha)$, respectively, then the following equality must hold:

$$(1 - \alpha)(\pi_u - \pi_u^{-i}) = \alpha(\pi_i - \pi_i^{-i})$$

where π_u is the content provider’s profits when it sells content to all distributors; π_u^{-i} is its profits selling content to all distributors except distributor i in this negotiation; π_i is the profit of

¹⁰⁵ Adapted from Expert Report of Carl Shapiro (Redacted), *United States of America v. AT&T Inc., et al.*, February 2, 2018, Appendix G: The Turner Bargaining Model.

the distributor i in the negotiation if it carries the content; and π_i^{-i} is its profit without the content.

As noted by the government's expert, this can be solved to yield the pre-merger content price w_i (expressed in per-subscriber per-month terms):

$$w_i = \alpha \left[(p_i - c_i) \frac{\Delta_i^{-i}}{D_i} + \frac{\delta_i D_i^{-i}}{D_i} \right] - (1 - \alpha) \left[a_u - c_u + \frac{\sum_{j \neq i} (w_j + a_u - c_u) \Delta_j^{-i}}{D_i} \right]$$

where the first square bracket multiplied by D_i (the number of subscribers at distributor i) is the distributor i 's gains from trade without transfers and the second square bracket multiplied by D_i is content creator u 's gains from trade without transfers.

The other terms are as follows. D_i^{-i} is the present discounted value of the number of subscribers if the content is permanently foregone. c_u is the content creator's direct cost (per-subscriber per-month), and c_i is the distributor's direct cost. a_u is the content creator's advertising revenue (also per-subscriber per-month). p_i is the distributor's price per subscriber. Δ_i^{-i} is the number of subscribers the distributor loses if it no longer carries the content. δ_i is the price response of the distributor when no longer carrying the content.

Post-merger, the only change is that there is an additional element to the content creator's gains from trade due to internalizing the effects of a permanent blackout on distributor i on the newly vertically integrated distributor d . The change in w can then be found simply by subtracting the two equations. Most of the terms fall out, as they are held constant, leaving only the new internalized element, multiplied by the bargaining share of the content creator. The predicted change in content price is then equal to

$$\Delta w_i \equiv w_i^* - w_i = (1 - \alpha)(p_d - c_d - w_d) \frac{|\Delta_d^{-i}|}{D_i}$$

where p_d , c_d and w_d are the vertically integrated distributor d 's price, direct cost, and content cost, and the final term is the gain in subscribers to the vertically integrated distributor d if distributor i does not carry the content. The final term can also be expressed as a departure rate times a diversion rate, or the constant annual subscriber loss rate such that it has the same present discounted value of firm i 's subscriber loss rate (\bar{L}) multiplied by the diversion rate γ_{id} (the fraction of lost subscribers from i that go to the vertically integrated distributor d). That yields:

$$\Delta w_i \equiv w_i^* - w_i = (1 - \alpha)(p_d - c_d - w_d) \bar{L} \gamma_{id}$$

These, then, are the four assumptions discussed earlier: the bargaining split, the margin of integrated distributor d , the departure rate, and the diversion rate.