ORAL ARGUMENT NOT YET SCHEDULED

No. 18-5214

In the

United States Court of Appeals

for the

District of Columbia Circuit

UNITED STATES OF AMERICA,
Plaintiff-Appellant,

v.

AT&T, INC.; DIRECTV GROUP HOLDINGS, LLC;
and TIME WARNER INC.,
Defendants-Appellees.

On appeal from a final judgment of the
U.S. District Court for the District of Columbia,
Hon. Richard J. Leon, No. 1:17-cv-2511

BRIEF *AMICI CURIAE* OF 37 ECONOMISTS, ANTITRUST SCHOLARS, AND FORMER GOVERNMENT ANTITRUST OFFICIALS IN SUPPORT OF APPELLEES AND SUPPORTING AFFIRMANCE

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CIRCUIT RULE 28 CERTIFICATE

Pursuant to Circuit Rule 28(a)(1), *amici curiae* certify as follows:

(A) *Parties and Amici*. All parties, intervenors, and *amici* who appeared before the district court and are appearing before this Court are listed in the proof brief for the appellees, except for those *amici curiae* who submit this brief.

(B) *Rulings Under Review*. References to the rulings at issue appear in the Proof Brief of Appellant United States of America.

(C) *Related Cases*. The case on review was not previously before this Court or any other court. Counsel is not aware of any related case pending before this Court or any court.

Dated: September 26, 2018 /s/ *Michael B. Kimberly*

CIRCUIT RULE 29 CERTIFICATE

Pursuant to Circuit Rule 29(d), *amici curiae* certify that the filing of this brief separate from other *amici* is necessary because (i) counsel worked diligently to coordinate a single brief among the 37 individuals signing the present brief; (ii) in light of the expedited briefing schedule, it was not practicable to coordinate further with other *amici*; (iii) *amici* are economists, antitrust scholars, and former government antitrust officials whose dispassionate views and scholarly expertise differ in important respects from the perspectives of other *amici* participating in the case; and (iv) this brief does not repeat factual or legal arguments made in the appellees' principal brief or (to our knowledge) any other *amicus* brief.

Dated: September 26, 2018 /s/ *Michael B. Kimberly*

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STATEMENT OF INTEREST

Amici curiae are 37 experienced economists, antitrust scholars, and former government antitrust officials who share a professional interest in seeing antitrust law develop in a manner that applies reliable economic principles and methods to the actual facts and data of specific cases. The identities and biographical statements of *amici* appear in the addendum to this brief.

We submit this brief to clarify important economic principles that support the way in which the district court resolved disputed factual issues and assessed the likely competitive effects of the transaction. We have not made an independent investigation of the evidence, nor have we performed case-specific analysis that would allow us to reach an independent conclusion about the likely competitive effects of the merger. Rather, we focus in this brief on well-accepted economic principles.[1]

PERTINENT STATUTES

All applicable statutes are contained in the addendum to the Proof Brief of Appellant United States of America.

SUMMARY OF ARGUMENT

The district court correctly applied economic analysis to assess the effect of this vertical merger on consumers. It found no credible evidence of an

[1] No counsel for a party authored this brief in whole or in part, and no person other than *amici* or their counsel made a monetary contribution to fund the preparation or submission of this brief. The parties have consented to the filing of this *amicus* brief.

anticompetitive effect. At the same time, the district court did find credible evidence that the merger would produce efficiencies. Consequently, the district court concluded that the government had not shown that the merger would likely diminish competition or harm consumers. Despite the arguments of the government and some *amici*, those findings should stand, as there is no indication that they were clearly erroneous.

The district court's findings do not rest on a misunderstanding of economic theory or its empirical application. To the contrary, they reflect a deep understanding of what facts are needed to apply economic theory reliably and a clear-minded appraisal of the failures of the government's evidence. The district court rejected the government's case against the merger not because of a lack of understanding of key economic principles, but because it decided that the weight of the industry testimony showed no significant anticompetitive effect but did show credible efficiencies, including those agreed to by the government, and because it decided that the government's case, including the testimony of its leading expert economic witness, Dr. Carl Shapiro, was ultimately unpersuasive.

According to the government, bargaining theory demonstrates that the merger would raise prices for rival multichannel video programming distributors (MVPDs) such as cable companies. In support of this claim, the government and Dr. Shapiro put forward a Nash bargaining model of price negotiations between Turner as content provider, on the one hand, and video programming distributors, on the other hand. Using this model, the government argued that the merger would raise resulting prices because the fallback position for Turner—the path that it would rationally consider taking if the negotiations fell through—would be less costly after the merger. That was so, the government asserted, because the resulting blackout of Turner programming would profitably divert some of the video programming distributor's subscribers to AT&T's DirecTV.

The district court found that, although Nash bargaining can be a useful approach to evaluating mergers in *some* cases, the empirical evidence *in this case* did not support the government's claims, even when viewed through the lens of Nash bargaining. In large part, the problems the district court identified rested on the inputs to Dr. Shapiro's model, not the model itself. The court found that Dr. Shapiro employed unreliable estimates of critical inputs, including his estimate of the number of subscribers who would depart from their video content distributors and switch to DirecTV if faced with a loss of Turner content and his use of outdated and inflated profit margins for AT&T. And, critically, the district court found that small changes in the values of these inputs caused the model's predictions to change dramatically. Indeed, modest changes to the inputs caused the predicted sign for competitive harm to *flip*, so that the government's predicted prices for the programming in question would fall after the merger rather than rise. Moreover, the district court decided, on the basis of industry testimony, that the long-term blackouts that Dr. Shapiro used as the fallback option in his Nash bargaining model are not credible threats. Given these findings, the district court was fully justified in holding that the government had failed to meet its burden to prove that the merger was likely to harm competition and consumers.

The government argues that the district court's reasoning is illogical, that it failed to understand the Nash bargaining model, that it weighed the industry testimony incorrectly, that it should have taken long blackouts into account as credible threats, and that the diversion rates driving Dr. Shapiro's model are sufficiently probative. An *amicus* brief has been filed by 27 distinguished scholars in support of these claims.

In fact, however, a review of the district court's reasoning confirms that the court did understand the Nash bargaining model, including the premise that the fallback option must be credible to be effective in influencing the negotiated outcome. It also confirms that the court found that the results of the government's model turn sensitively on the values of the inputs used to run the model and that, accordingly, the court understood that, with unreliable estimates of those inputs, the model cannot support a reliable inference of competitive harm. The court also found that the reliability of the government's model was further undercut by its inconsistency with testimony on how real-world industry bargaining works and on the actual, observed effects of past vertical integration in the industry.

Against this background, there is no basis from settled economic principles or practice to conclude that the district court's findings regarding the relevance and reliability of the government's proffered evidence were clearly erroneous. Given the facts and testimony presented in its opinion, the district court reasonably concluded that the government failed to meet its burden of proof.

ARGUMENT

A. Vertical mergers have inherent efficiencies that the district court properly considered when evaluating the merger's competitive effects.

Vertical integration is a decision by a firm about how to organize production, so that the firm might harness productive efficiencies from coordinating production within a single entity and reduce the transaction costs of trying, in the alternative, to achieve these efficiencies of vertical coordination through contract.[2] Unlike a horizontal merger, which combines firms that produce substitutes, a vertical merger combines firms that produce complements and thus generally inclines the merged firm to reduce prices, expand output, and increase investment. This is not to say that vertical mergers never raise competitive concerns. But it *is* to say that the efficiencies from vertical integration cannot be ignored if one is to predict a vertical merger's

[2] Judge Bork called vertical integration "indispensable to the realization of productive efficiencies." Robert H. Bork, *The Antitrust Paradox* 226 (1978).

likely competitive effect. *See, e.g.*, *Comcast Cable Commc'ns, LLC v. FCC*, 717 F.3d 982, 990 (D.C. Cir. 2013) (collecting cases).

In this case, it is significant that the district court held that its "ruling does *not* turn on the efficiencies offered by defendants in their affirmative case, but rather on its conclusion that the *government's* evidence, as 'undermined['] and 'discredit[ed]' by defendants' attacks, is insufficient to 'show[] a probability of substantially lessened competition,' and thus that the Government has 'failed to carry its ultimate burden of persuasion.'" *United States v. AT&T Inc.*, 310 F. Supp. 3d 161, 191 n.17 (D.D.C. 2018) (quoting *United States v. Baker Hughes Inc.*, 908 F.2d 981, 983, 990-991 (D.C. Cir. 1990)). Although this finding alone suffices to defeat the government's case, the district court further found that the merger "will achieve considerable efficiencies" that go "beyond those conceded by the Government." *Id.*

These factual findings rest on the district court's on-the-ground understanding of the entire record and justify reversal only if clearly erroneous. *See United States v. Am. Express Co.*, 838 F.3d 179, 193 (2d Cir. 2016) (following an antitrust bench trial, the district court's findings of fact reviewed "for clear error"), *aff'd sub nom. Ohio v. Am. Express Co.*, 138 S. Ct. 2274 (2018). As we describe below, the district court had a firm foundation in economic theory, in empirical research, and in the specific facts of this case for its conclusion that the government failed to carry its burden of proving a reasonable probability of substantial harm to competition.

B. The district court's analysis of competitive effects properly discounted the reliability of the government's bargaining model.

The government predicated its model of competitive effects on its interpretation of the Nash bargaining solution. In his 1950 article, *The Bargaining Problem*, John Nash proposed a solution to what he called the "bargaining situation"—an economic game in which two parties "have the opportunity to collaborate for mutual benefit in more than one way." John F. Nash, Jr., *The Bargaining Problem*, 18 Econometrica 155, 155 (1950). A solution to that game maximizes "the amount of satisfaction each [party] should expect to get from the situation." *Id.* According to Nash's model, an increase in the value of a party's position absent an agreement improves the party's bargaining position and therefore results in an improvement in that party's value of the bargain.[3]

According to the testimony of Dr. Shapiro, the theoretical definition of the no-agreement fallback for each negotiating party is the best option available to that party if no deal is reached; in other words, it is each party's best

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[3] Before deriving his solution, Nash made certain assumptions about the game's participants: that each bargaining party is "highly rational," "can accurately compare [its] desires for various things," is "equal [to the other] in bargaining skill," "has full knowledge of the tastes and preferences of the other," and "wishes to maximize the utility to [itself] of the ultimate bargain." *Id*. at 155, 159. Nash further assumed the independence of irrelevant alternatives—that is, if a bargainer faces a choice between *A* and *B* and prefers *A* to *B*, then that bargainer must also prefer *A* to *B* if faced with a choice between *A*, *B*, and *C*. *Id*. at 156.

alternative to a negotiated agreement. *See* Expert Report of Carl Shapiro (redacted) at 43. The district court recognized this when it noted that "Professor Shapiro's opinion incorporates the 'key' recognition that each side's bargaining leverage 'is based on what would happen if there were no deal.'" *United States v. AT&T Inc.,* 310 F. Supp. 3d at 223 n.35.

The government uses the Nash bargaining model to predict how the merger would alter market outcomes (such as prices charged for Turner content to cable operators or other content distributors) by predicting how the merger would alter the no-agreement fallback options for Turner and its counterparty in a negotiation over content pricing. Accordingly, the conclusions drawn under the Nash bargaining model about the impact of the merger can be influenced significantly by what are viewed as the no-agreement fallback options and their predicted values to the parties. For the model to be reliable, the predicted no-agreement fallback options must be credible; the parties must actually be willing to accept them as fallbacks, or else they will not influence the market outcomes predicted by the Nash bargaining model.[4] Likewise, the underlying predictions of the merger's effects on the

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4 This perspective was emphasized by Nash in his 1953 article, extending his 1950 article in a manner that "tells the players what threats they should use in negotiating." John Nash, *Two-Person Cooperative Games*, 21 Econometrica 128, 130 (1953). He summarized: "Supposing *A* and *B* to be rational beings, it is essential for the success of the threat that *A* be *compelled* to carry out his threat *T* if *B* fails to comply. Otherwise it will have little meaning." *Id*. Both the government and Dr. Shapiro relied heavily on

parties' valuations of their fallback options must also be reliable. If those predictions are inaccurate, then the model will not reflect the real-world incentives facing the parties during actual negotiations, and its results about the impacts of the merger on market outcomes will not be reliable.

1. Economic models that are highly sensitive to input assumptions are only as reliable as the assumptions themselves.

Sensitivity to changes in basic assumptions is a critical characteristic of many models, including economic models. If very slight changes in a key assumption radically change the model's predictions, one must question the validity of the model, at least when it is applied to situations in which the assumption is not strictly (rather than approximately) satisfied.

To be sure, Nash bargaining can be a useful theoretical modeling tool for gauging the economic effects of mergers. But it was entirely appropriate for the district court to question the empirical robustness of the results emerging from the government's bargaining model by testing the sensitivity of those results to modest changes in assumed input values.

Such testing is entirely routine in economic analysis. Indeed, it is expected for credible work. And it was particularly important in this case because the government predicted only very modest net harm, especially in

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the credibility of threats made during bargaining. *See* Shapiro Report (redacted) at 41 & n.169; Shapiro Rebuttal Report (redacted) at 42 & n.162. Dr. Shapiro cited Nash's 1950 article—but not Nash's 1953 article—as the basis for his bargaining model of competitive effects.

the context of a typical subscriber's monthly cable TV bill. Absent any demonstration that the estimate of harm remains positive in the face of reasonable modifications to the inputs and assumptions—that is, absent a demonstration that the result is robust and not input-sensitive—such a modest estimate cannot reliably and meaningfully support an inference of harm. Here, the government provided no such demonstration, yet it attempted to draw such an inference.

The effects of a given merger on the economic variables of interest depend on many case-specific inputs and parameters. The general framework of Nash bargaining cannot determine a merger's effects. To do that, it is necessary to examine the values of those inputs and parameters, the precision with which they can be determined, and the sensitivity of any predictions to changes in those inputs. The fact that the government's prediction of net harm was extremely sensitive to input values—which were based on assumptions that the district court found to be unsupported by or inconsistent with the evidence—appropriately calls into question the reliability and the probative value of the government's predictions.[5]

For example, the results of the government's model are highly sensitive

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[5] As the Federal Circuit explained in the context of measuring reasonable royalty damages, "[t]he Nash [bargaining] theorem arrives at a result that follows from a certain set of premises" but "itself asserts nothing" about the real-world reliability of those premises. *VirnetX, Inc. v. Cisco Sys., Inc.*, 767 F.3d 1308, 1332 (Fed. Cir. 2014) (analyzing Nash, *The Bargaining Problem*, *supra*).

to predictions about customer “departures” (the number of customers that would leave a rival content distributor in the face of a long-term Turner blackout) and “diversions” (the number of those departing customers that would switch to DirecTV). This is so because the government’s theory rests on the long-term blackout scenario as the no-agreement fallback for the Nash bargaining. The merger’s anticipated effect on the cost to Turner of a long-term blackout depends on predicted increases in profits from new subscribers who switch to DirecTV from the competing distributor because Turner’s content is blacked out on the competitor’s service.

The government (and its expert economic witnesses) did not directly measure the anticipated departures and diversions empirically. Although we offer no opinion on the details of how departures and diversions were estimated, we note that insofar as the district court determined that the government’s estimates were unreliable, it was correspondingly appropriate as a matter of sound economic analysis for the district court to conclude that any predicted price increases emerging from the model were also unreliable.

This concern is not about the theoretical underpinnings of Nash bargaining, but rather whether the inputs into the government’s version of the Nash bargaining model themselves were reliable and hence whether the predictions of the government’s model were reliable on that basis.

As another example, the parties agreed that the results of the government’s bargaining model were highly sensitive to estimates of AT&T’s profit margins on its video customers. Again, the merger's anticipated effect on Turner's bargaining outcome depends on the merger's impact on the cost of a long-term blackout to the post-merger firm. That impact, in turn, depends on the profit margin to DirecTV on the flow of new subscribers that results from the blackout. We offer no opinion on the government's particular profit-margin assumption. But inasmuch as the district court determined that the margin employed in the model was outdated and inflated, it was appropriate to identify this shortcoming as yet another reason to reject the model's conclusions.

According to the district court, the evidence supported estimated values for these and other inputs that would have yielded predictions from the government's model of net benefits resulting from the merger. Inasmuch as the district court concluded that those estimates of the input values were more credible than the government's estimates, it was once again appropriate for the district court to reject as unreliable the government's claims of net harm.

The debate in this case over each of the inputs also highlights the lack of any measure of statistical confidence for the government's estimate of harm. None of the inputs that the government used was known with certainty, meaning that there was inherent uncertainty in the government's estimate of harm. Yet, the government provided no measure of the degree of that uncertainty, such as a "standard error." It is conventional in economic practice to provide standard errors or other measures of the precision of one's estimates so that a reader can determine the strength of any inferences that can be drawn from the estimates.[6]

In this case in particular, an estimate of modest harm coupled with the failure to present any information about the estimate's degree of precision or robustness makes it impossible to draw any reliable inferences from the government's bargaining model. Indeed, because the inputs were multiplied together to reach a final price prediction in the government's model, the uncertainty surrounding the final estimate is even greater than the sum of the uncertainties associated with each of the inputs considered independently.

Given the evidence-based critiques and skepticism of the district court about key inputs into the government's model, and given evidence that the government's conclusions were sensitive to its choices of values for multiple inputs (as well as to its simplifying assumptions), it was appropriate for the district court to conclude that it could not draw meaningful inferences of competitive harm from the government's estimates of harm.

6 That is why reporting of standard errors or other measures of precision is a requirement for publication in the leading professional economic literature and why measures of statistical accuracy and econometric inference have been core subjects of leading economics Ph.D. education programs for at least 50 years.

2. The district court's skepticism of the government's bargaining model was appropriate in light of the facts.

All economic models are necessarily simplified abstractions, and Nash himself noted in his 1953 article that the assumptions required by his simplified model "are not generally perfectly fulfilled in actual situations." Nash, *Two-Person Cooperative Games*, *supra*, at 130. It is important to evaluate whether simplifications in a model in fact abstract away from important elements in a way that affects the accuracy of the model's predictions.

Bargaining is complex, and many factors can influence bargaining outcomes. The government is wrong to suggest that the district court should have accepted that the merger would substantially affect bargaining leverage and bargaining outcomes simply because a contested empirical implementation of a particular theoretical bargaining model says so.

Models that predict well in some circumstances can produce highly inaccurate predictions in other circumstances. It was appropriate for the district court to evaluate whether the particular version of the model that the government presented rested on assumptions that were appropriate to the particular circumstances of this merger. The district court was also right as a matter of sound economic reasoning to ask whether the price increases predicted by the government's model are consistent with industry facts and experience, including actual experience following prior vertical mergers. A model shown to be inconsistent with outcomes of previous events is much less likely to predict the outcomes of current events reliably. Insofar as the district court found that actual experience following prior vertical mergers contradicted the predictions of the government's model, it was appropriate for the district court to be skeptical about the predictions of the government's model on that basis.

Key features of the television-content-distribution industry present serious challenges for the application of a simple Nash bargaining model. Nash bargaining, as developed in the scholarly articles described above, addresses one-shot, bilateral negotiation, while actual bargaining between video content providers and distributors is repeated and multilateral. Although the economic literature has begun considering how to handle multilateral, dynamic negotiation settings, that literature is far from a settled consensus on the appropriate method in such cases or on whether certain simplifying approaches yield accurate predictions. This lack of consensus makes it all the more important for a factfinder to question the reliability of conclusions from a bargaining model that is a poor fit with the context to which it is applied.

Nash himself noted that, in his model, "we must suppose that the players have no prior commitments that might affect the game." Nash, *Two-Person Cooperative Games*, *supra*, at 130. But, as the district court recognized, negotiations in this industry occur in the shadow of several kinds of prior commitments, such as most-favored-nation clauses in other contracts, contractual commitments to arbitration, and regulatory requirements. The district court thus properly questioned whether abstraction away from such industry conditions within the model might cause the model to produce inaccurate predictions.

In particular, the district court was right to ask whether a permanent blackout—an extremely rare event—was the most appropriate alternative to an immediate negotiated agreement, rather than a delayed agreement following a temporary blackout or some other more credible outcome. The conclusions of the Nash bargaining model presented by the government would be significantly affected by this distinction, in terms of the associated assumed flows of diverted video customers and the losses of subscriber fees and advertising revenues that underlie the bargaining parties' valuations of the fallback scenarios.

The government's model assumes that a permanent blackout would be the relevant and credible fallback outcome of a failure of the bargaining parties to reach an agreement. But there is no theoretical reason why that must be so, and there is no theoretical basis to reject an evidence-based conclusion to the contrary. Determining the relevant no-agreement fallback must be informed by the specifics of the industry and the contractual and regulatory constraints present in the negotiation. The district court was correct to consider evidence to that effect.

Nor can a proper application of Nash bargaining in this context ignore the presence of regulation and Turner's prior commitment to binding arbitration. Both legal constraints change Turner's no-agreement fallback scenario, which, as discussed above, is a crucial element of both the government's argument and the Nash bargaining model. There may be disagreement about the precise economic effect of these legal constraints, but a reliable bargaining model cannot just ignore the effects of Turner's arbitration commitment and the FCC's program-access rules on the options open to each party, as the government's bargaining model did and the district court properly refused to do.

3. There is no inherent contradiction in the district court's treatment of the profit-maximizing decisions of multi-division firms.

The government asserts that the district court's opinion is inconsistent with the principle that corporations will seek to maximize corporate-wide profit. As the government sees it, the district court was wrong as a matter of law to conclude that, when negotiating with content distributors, vertically integrated content providers (like Turner) might focus on their own profits and not incorporate spillover effects on other divisions within the post-merger firm. This argument does not follow as a matter of economics.

In the pursuit of maximized profits, multi-division firms face a multitude of decisions about when to exercise centralized control and when to allow divisions to operate in a decentralized manner. Here, the district court relied on testimony of industry fact witnesses indicating that, in an integrated firm, the division that *produces* content does not consider in its contract negotiations the effects of its deals on the division that *distributes* content. In light of that testimony, it was not inconsistent with economic principles for the district court to conclude that these negotiations—which are highly complex even for a single division—are an example of profit-maximizing firms choosing to operate in a more decentralized manner. Indeed, given that the district court also concluded that any benefits to the integrated content distributor may be small and difficult to ascertain, it was consistent for the court to conclude that the overall corporation may not find it worth the complication and risks from asking its content division to negotiate more aggressively on account of a hoped-for diversion of new subscribers to its distribution division.

This line of reasoning does not contradict the district court's acceptance of the cost savings resulting from the elimination of "double marginalization," an economic principle that says that, once merged, DirecTV will no longer see the margin charged to it by Turner as a true economic cost, and thus will face lower economic costs and have an incentive to cut prices accordingly. As a matter of economic reasoning, there is no inherent contradiction in saying that a multi-division firm will reach different decisions about centralization versus decentralization on different topics. An integrated firm may well find a way to induce its internal divisions to work together to capitalize on the efficiencies of vertical integration (such as the elimination of double marginalization) while concluding that negotiations with outside entities are better handled in a decentralized way. That is especially so when (as here) the cross-divisional effects of those negotiations are modest and uncertain.

In short, the district court committed no clear error by concluding that the facts of this case supported such decisions and that the government had failed to meet its burden of persuasion to the contrary.

CONCLUSION

For the foregoing reasons, the judgment below should be affirmed.

September 26, 2018

Respectfully submitted,

/s/ *Michael B. Kimberly*

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CERTIFICATE OF COMPLIANCE

Pursuant to Federal Rule of Appellate Procedure 32(g(1)), undersigned counsel certifies that this brief:

(i) complies with the type-volume limitation of Rules 29(a)(5) and 32(a)(7)(B) because it contains 4,437 words, excluding the parts of the brief exempted by Rule 32(f) and Circuit Rule 32(e)(1); and

(ii) complies with the typeface requirements of Rule 32(a)(5) and the type style requirements of Rule 32(a)(6) because it has been prepared using Microsoft Office Word 2007 and is set in Century Schoolbook font in a size equivalent to 14 points or larger.

Dated: September 26, 2018 <u>/s/ *Michael B. Kimberly*</u>

CERTIFICATE OF SERVICE

I hereby certify that that all participants in this appeal are registered CM/ECF users and that service will be accomplished via the Court's CM/ECF system this day, September 26, 2018.

Dated: September 26, 2018 /s/ *Michael B. Kimberly*

ADDENDUM

IDENTITIES AND BIOGRAPHIES OF THE *AMICI CURIAE*

1. Thomas C. Arthur is the L. Q. C. Lamar Professor of Law at the Emory University School of Law, where he has been on the faculty since 1982. Previously, he practiced law for eleven years in the Washington, D.C. office of Kirkland & Ellis. Arthur teaches antitrust, civil procedure, and administrative law. His research has been published in the *Antitrust Law Journal*, *California Law Review*, *Emory Law Journal*, *Journal of Corporation Law, New York University Law Review*, *Tulane Law Review*, and elsewhere. Arthur holds a B.A. from Duke University and a J.D. from Yale Law School.

2. Elizabeth E. Bailey is Professor Emeritus of Business Economics and Public Policy at the Wharton School at the University of Pennsylvania. Her research focuses on industrial organization (particularly the theory of contestability), economic deregulation, and strategic management of economic regulation. She has written three books, including *Economic Theory of Regulatory Constraint* (D.C. Heath 1973). Her research has appeared in such journals as the *American Economic Review*, *Bell Journal of Economics, Brookings Papers on Economic Activity*, *Economic Journal*, *Journal of Economic Literature*, *Journal of Law and Economics*, *Journal of Political Economy*, *Journal of Public Economics*, and the *Yale Journal on Regulation*. From 1983 to 1991, she was Dean of the Graduate School of Industrial Administration at Carnegie Mellon University. Bailey previously was a

Commissioner on the Civil Aeronautics Board. From 1960 to 1977, she was at Bell Laboratories, where she began as a computer programmer and rose to head of the Economics Research Department. She has served as a director of CSX Corporation, Philip Morris, and TIAA-CREF, and she has been a trustee of the Brookings Institution since 1988. Bailey is a member of the National Bureau of Economic Research and was elected a Fellow of the American Academy of Arts and Sciences in 1997. She received a B.A. from Radcliffe College, an M.S. from the Stevens Institute of Technology, and a Ph.D. from Princeton University, where she was the first woman to receive a doctorate in economics.

3. **Jonathan Barnett** is Professor of Law at the University of Southern California, Gould School of Law, where he directs the Media, Entertainment and Technology Law Program. He specializes in intellectual property, antitrust, and corporate law. Barnett has published articles in the *Harvard Law Review*, *Yale Law Journal*, *Journal of Legal Studies*, *Review of Law & Economics*, and other scholarly journals. He previously practiced at Cleary Gottlieb in New York. A graduate of the University of Pennsylvania, Barnett received a MPhil from Cambridge University and a J.D. from Yale Law School.

4. **Donald J. Boudreaux** is Professor of Economics at George Mason University, where he has been a faculty member since 2001. He was formerly Associate Professor of Economics at Clemson University and Assistant

Professor of Economics at George Mason University. From 1997 to 2001, Boudreaux was president of the Foundation for Economic Education. His research concerns antitrust economics and the economics of international trade, and his articles have been published in *The Journal of Commerce*, the *Cato Journal*, and the *Supreme Court Economic Review*, among other publications. Boudreaux has lectured around the world on subjects including competition law and economics. He received his B.A. from Nicholls State University, his M.A. from New York University, his J.D. from the University of Virginia, and his Ph.D. in economics from Auburn University.

5. Henry N. Butler is Dean, George Mason University Foundation Professor of Law, and Executive Director of the Law & Economics Center at the Antonin Scalia Law School, George Mason University. For over 25 years, Butler has led judicial education programs that teach the basics of economics, finance, accounting, statistics, and scientific methods to over 3,000 sitting federal and state judges. From 2007 to 2010, he served as the first executive director of the Searle Center on Law, Regulation, and Economic Growth at Northwestern University School of Law. Butler has held prior appointments at The Brookings Institution, Chapman University, the University of Kansas, the University of Chicago, and Texas A&M University. He received an M.A. and a Ph.D. in economics from Virginia Polytechnic Institute and State University and a J.D. from the University of Miami School of Law. He holds a bachelor's degree in economics from the University of Richmond.

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