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Federal Communications Commission
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February 27, 2008

VIA HAND DELIVERY

Ms. Marlene H. Dortch
Secretary
Federal Communications Commission
Office of the Secretary
236 Massachusetts Avenue, NE, Suite 110
Washington, D.C. 20002

Re: MB Docket No. 07-57
REDACTED – FOR PUBLIC INSPECTION

Dear Ms. Dortch:

The Consumer Coalition for Competition in Satellite Radio (“C3SR”), by its counsel, hereby submits, in the above-referenced proceeding, two redacted copies of the “Declaration of Alan T. Ingraham and Hal J. Singer” (the “Declaration”). C3SR, pursuant to the terms of the Second Protective Order,¹ is separately filing one unredacted copy with the Secretary’s Office, and two unredacted copies with Jamila Bess Johnson of the Media Bureau. A redacted copy is also being filed in the public record for this proceeding via ECFS.

C3SR shall make the unredacted version of the Declaration available for inspection at the offices of Williams Mullen, 1666 K Street NW, Suite 1200, Washington, D.C. 20006. Individuals that have executed the appropriate Acknowledgment of Confidentiality should contact Benjamin D. Arden at 202.293.8135 to coordinate access.

Please contact the undersigned with any questions.

Respectfully submitted,

Julian L. Shepard
Counsel to C3SR

Enclosures

No. of Copies rec'd 041
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¹ *Applications of Sirius Satellite Radio Inc. and XM Satellite Radio Holdings Inc. for Approval to Transfer Control*, Protective Order, DA 07-4666 (rel. Nov. 16, 2007).

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Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

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FEB 27 2008
Federal Communications Commission
Office of the Secretary

In the Matter of)
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XM Satellite Radio Holdings Inc.,)
Transferor)
)
)
and)
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Sirius Satellite Radio Inc.,)
Transferee)
)
)
Consolidated Application for Authority to)
Transfer Control of XM Radio Inc. and Sirius)
Satellite Radio Inc.)

MB Dkt. No. 07-57

DECLARATION OF ALLAN T. INGRAHAM AND HAL J. SINGER

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Qualifications of Hal J. Singer

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INTRODUCTION

1. We have been asked by the Consumer Coalition for Competition in Satellite Radio ("C3SR") to analyze the econometric regression contained in CRA's supplemental report.¹ CRA's regression model purports to show "an inverse relationship between satellite radio penetration and the number of terrestrial radio signals; that is, satellite radio penetration is lower where there are more AM and FM signals, all else held equal."² The main specification they use to show this involves a model where satellite penetration is the dependent variable and the independent variable of interest, terrestrial radio signals, is specified in terms of a fifth-order polynomial. CRA then claims that the relationship they observe constitutes direct evidence that satellite radio and terrestrial radio are demand-side substitutes. In this declaration we (1) contend that CRA's analysis, even if econometrically valid, does not address the issue of demand-side substitution and (2) show that CRA's econometric model is fundamentally flawed.

2. CRA's regression model, even if it were properly specified, does not inform the issue of demand substitution when defining markets according to the *Merger Guidelines*—that is, CRA's analysis does not demonstrate how satellite radio subscribers shift their demand

1. Further Economics Analysis of the Sirius-XM Merger, Nov. 9, 2007, Appendix A.

2. Further Analysis of Econometric Evidence that Satellite and Terrestrial Radio are Demand Substitutes, Jan. 11, 2008, ¶2 [hereinafter *CRA's Further Analysis*].

between satellite radio and terrestrial radio in response to a relative change in prices of those services.³ Neither the price of terrestrial radio nor the price of SDARS varies across the observations in CRA's cross-sectional database. Hence, to the extent that CRA's regression model measures some elasticity of demand, it is not the elasticity with respect to a change in relative prices. In this declaration, we identify technical problems with the econometric analysis under the generous (but incorrect) assumption that the elasticity measured by CRA's model could inform the Commission's market definition analysis in this proceeding.

QUALIFICATIONS OF ALLAN T. INGRAHAM

3. I am President of Criterion Auctions, which is a division of Criterion Economics, L.L.C. I am an expert on econometrics and game theory. My research has applied this expertise to merger analysis, the detection of bid-rigging, corporate finance and investment, and public finance.

4. I earned my B.A. *magna cum laude* with Honors in Economics from Colby College, and my M.A. and Ph.D. in Economics from University of Maryland, College Park.

5. In 2006 I performed econometric analysis on behalf of Intelsat and PanAmSat relating to their merger review before the U.S. Department of Justice. For the U.S. Department of

3. Department of Justice and Federal Trade Commission, Horizontal Merger Guidelines, revised Apr. 8, 1997, § 1.11 ("In considering the likely reaction of buyers to a price increase, the Agency will take into account all relevant evidence, including, but not limited to, the following: (1) evidence that buyers have shifted or have considered shifting purchases between products in response to relative changes in price or other competitive variables; (2) evidence that sellers base business decisions on the prospect of buyer substitution between products in response to relative changes in price or other competitive variables; (3) the influence of downstream competition faced by buyers in their output markets; and (4) the timing and costs of switching products."). Applied here, evidence that satellite radio subscribers shifted to terrestrial radio in response to relative changes in the price of satellite radio to terrestrial radio would suggest that satellite radio is too narrow a product market. In my opinion, CRA has failed to provide *any* evidence of this nature.

Justice I have assisted in the statistical analysis of the competitive effects of mergers in the industry for medical devices and in the industry for electricity generation in New England.

6. I have provided statistical and econometric analysis for numerous corporate and government clients. In October 2006, I submitted written testimony before the U.S. Postal Rate Commission on behalf of the Newspaper Association of America. Also in 2006, I provided expert testimony in the matter of securities litigation involving Apollo Group, Inc. on behalf of Lead Plaintiff. In 2005, I submitted testimony on behalf of Coventry First in the matter of Coventry First v. 21st Services. Between July 2003 and February 2005, I served as a data and statistical expert to the U.S. Attorney's Office in its discrimination case against the New York City Department of Parks and Recreation.

7. Since 2003, I have provided expertise on economic and statistical issues to the National Basketball Association (NBA). Between 2002 and 2004, I was part of an expert team that examined the market for timber in British Columbia. Using state-of-the-art statistical techniques, I developed a system through which the British Columbian Ministry of Forests could use auction results to price timber held under long-term tenure. I have also performed economic and statistical analysis on behalf of General Motors, Verizon Communications, Verizon Wireless, SBC, Qwest, Brown & Williamson Tobacco Company, and RJ Reynolds Tobacco Company.

8. I have published articles in scholarly journals, including *Contributions to Economic Analysis & Policy*, *Canadian Journal of Law and Technology*, *Telecommunications Policy*, *Topics in Economic Analysis & Policy*, *Virginia Tax Review*, and *Yale Journal on Regulation*. A list of my published articles is included in Appendix 3.

QUALIFICATIONS OF HAL J. SINGER

9. I am President of Criterion Economics. My areas of economic expertise are antitrust, industrial organization, and regulation. I have applied my expertise to several regulated industries, including insurance, health care, telecommunications, and video programming.

10. I am the co-author of the book *Broadband in Europe: How Brussels Can Wire the Information Society* (Kluwer/Springer Press 2005). I also have published a book chapter in *Access Pricing: Theory, Practice and Empirical Evidence* (Justus Haucap and Ralf Dewenter eds., Elsevier Press 2005) and in *Handbook of Research in Trans-Atlantic Antitrust* (Philip Marsden, ed., Edward Elgar Publishing 2006).

11. I have published scholarly articles in several economics and legal journals, including *American Economic Review Papers and Proceedings*, *Berkeley Technology Law Review*, *Canadian Journal of Law and Technology*, *Federal Communications Law Journal*, *Harvard Journal of Law and Technology*, *Hastings Law Journal*, *Journal of Business and Finance*, *Journal of Competition Law and Economics*, *Journal of Financial Transformation*, *Journal of Industrial Economics*, *Journal of Insurance Regulation*, *Journal of Network Industries*, *Journal of Regulatory Economics*, *Journal of Telecommunications and High Tech Law*, *Review of Network Economics*, *Telecommunications Policy Journal*, *Topics in Economics Analysis and Policy*, and *Yale Journal on Regulation*.

12. In regulatory proceedings, I have presented economic testimony in several forums, including the U.S. Federal Communications Commission, the U.S. Federal Trade Commission, the Antitrust Division of the U.S. Department of Justice, the U.S. National Highway Traffic and Safety Administration, the House of Commons of Canada, the Canadian

Radio-television and Telecommunications Commission, and the U.S. Congressional Budget Office.

13. I have also served as a testifying expert in several litigation matters. For example, I served as the damages expert on behalf of a class of hospitals in an antitrust litigation involving safety containers for syringes. On behalf of PacifiCare, a health maintenance organization, I submitted a damages report that estimated the harm associated with delayed entry by a generic pharmaceutical manufacturer in *In Re Tricor Indirect Purchaser Antitrust Litigation*. My other experience as a testifying expert in litigation is summarized in my CV.

14. In addition to litigation, I have written expert testimony in regulatory proceedings and commissioned white papers for several firms and trade associations, including 1-800 CONTACTS, Advanced Medical Technology Association, Allegheny Communications, AT&T, Bell Canada, BellSouth, Broadband Roundtable, Cellular Telephone Industry Association (CTIA), Coventry First, General Motors, Harvest Partners, Internet Innovation Alliance, Medical Device Manufacturers Association, Mid-Atlantic Sports Network (Baltimore Orioles), National Association of Broadcasters, Qwest, SBC, TELUS, Verizon, and Walt Disney.

15. Before joining Criterion, I worked at LECG, an economic consulting firm based in Emeryville, California. In addition, I have worked as an economist for the Securities and Exchange Commission and the Army Corps of Engineers, and I have taught microeconomics and international trade at the undergraduate level.

16. I earned M.A. and Ph.D. degrees in economics from the Johns Hopkins University and a B.S. *magna cum laude* in economics from Tulane University.

I. CRA'S ECONOMETRIC ANALYSIS SUFFERS FROM SEVERAL ERRORS

17. Even if one were to ignore the basic inadequacy of CRA's data, their econometric analysis also suffers from several errors. The problems with the CRA regression analysis can be grouped into two basic categories: (1) the misspecification of the regression analysis and (2) the nonsensical granularity of their data.

A. CRA's Regression Model Is Misspecified

18. CRA's regression framework involves regressing satellite radio penetration on the number of terrestrial radio signals. Because satellite radio penetration is a measure of the *demand* for satellite radio, and because the number of terrestrial radio stations is a measure of the *supply* of terrestrial radio, CRA's regression analysis amounts to a regression of the demand for satellite radio on the supply of terrestrial radio. The supply of terrestrial radio, however, is highly correlated with population. Specifically, there have been, historically, more terrestrial radio stations in areas that are more populated. Thus, CRA's regression specification coaxes a negative relationship between satellite usage and terrestrial radio signals through a data sleight of hand. CRA's dependent variable contains population in the denominator, and that variable is regressed on terrestrial radio signals. Because of the strong correlation between population and terrestrial radio signals, CRA's specification amounts to a regression of the inverse of population on terrestrial radio signals. It is therefore unsurprising that CRA's regression finds a negative relationship between satellite radio penetration and terrestrial radio. As we show below, however, when one properly corrects for the relationship between population and terrestrial radio, the relationship between satellite radio and terrestrial radio either disappears or becomes *positive*.

B. The Use of Cross-Sectional Data Greatly Limits CRA’s Findings

19. As was stated above, CRA’s regression is primarily picking up the relationship between population and the number of terrestrial radio signals in a particular area. That effect is heightened because CRA’s data amounts to a single snapshot in time. Specifically, had CRA been able to show that a *change in terrestrial radio signals within geographic locations* results in a *change in satellite radio penetration*, its analysis would deserve more attention. This, however, is not the case. CRA’s regressions instead show that the number of terrestrial radio stations varies negatively with the inverse of population (that is, that it varies positively with population). Consequently, the conclusions that CRA draws from its econometric analysis are inappropriate given its regression specification combined with the limitations of its dataset.

C. CRA Uses an Inappropriate Level of Granularity for the Relevant Geographic Market

20. CRA’s regression analysis assumes that five-digit zip code level geographic designations are the appropriate unit of observation. Even at an instinctual level, such a unit of observation seems dubious as many people travel across zip codes while listening to the radio. The credibility of CRA’s approach is further eroded by the fact that Arbitron, a leading international and media marketing research firm, defines markets in much larger terms. Indeed, the average Arbitron market in the regression analysis shown in Appendix A of this report is approximately 28 times the area of the average five-digit zip code area used in the CRA analysis.⁴

4. The mapping of zip codes to census data is made possible by the Census Bureau’s ZIP Code Tabulation Areas. See <http://www.census.gov/geo/ZCTA/zcta.html> (“Zip Code Tabulation Areas (ZCTAs) are a new statistical entity developed by the U.S. Census Bureau for tabulating summary statistics from the Census 2000. This new entity was developed to overcome the difficulties in precisely defining the land area covered by each ZIP code.”)

21. CRA's use of such a granular unit of observation also creates technical problems as far as the data are concerned. CRA's satellite penetration data produces some nonsensical results when aggregated up to the five-digit zip code level. For instance, one observation in their data indicates a satellite penetration of 2500 percent, which CRA resets to 100 percent. CRA is forced to recode 72 observations in their data set to 100 percent because satellite radio subscriptions exceed the total population. Although 72 observations represent a small proportion of the overall five-digit zip code sample, this figure suggests the presence of measurement bias in CRA's data. Because CRA's dependent variable is measured in terms of percentages, a one-person mismeasurement in the number of satellite radio subscribers could have a much larger effect as the granularity of the data increases.

D. A More Appropriate Specification Would Regress Satellite Radio Usage on Terrestrial Radio Usage

22. To remedy the theoretical and practical flaws of CRA's approach, one could define a more appropriate regression specification. First, a more appropriate specification would regress satellite radio *usage* on terrestrial radio *usage*, controlling for any additional explanatory factors. Such a specification would reduce the confounding effects of regressing demand on supply. Second, to understand buyer substitution, the regression should make use of panel data, which indicates the responses of a given body of consumers over time to changes in the competitive landscape.⁵

23. In a letter submitted to the FCC, CRA states that it explored the effect of including population and various transformations of population as explanatory variables in its

5. It bears emphasis that without any metric gauging the effect of a change in relative prices, as required by the *Merger Guidelines*, even this more appropriate specification would provide no evidence as to the cross-price elasticity of demand.

penetration model.⁶ CRA explains that adding population or transformation of population to the right side of its regression has little effect on the relationship between satellite radio penetration and the number of terrestrial radio signals. They then conclude that their regression specification is not biased by the inclusion or exclusion of population.⁷

24. CRA failed to explain, however, that its population adjustment included the population variable on both the right-hand and left-hand side of the equation, which results in simultaneity bias. Simply put, CRA tests for the effect of population on satellite radio usage by estimating a biased regression model. Therefore, CRA's test is inappropriate. As we show below, when one properly adjusts for population in CRA's specification, the relationship between population and satellite radio usage is either insignificant or is *positive*.

II. CRA'S RESULT IS NOT ROBUST TO SMALL CHANGES IN ITS SPECIFICATION

25. Given the extensive problems with the CRA data, any conclusions drawn from this source should be treated with extreme skepticism. In this section, we demonstrate that after correcting for the specification problems as much as possible with the given data, the relationship between satellite radio penetration and the number of terrestrial radio signals either disappears or becomes *positive*.

26. We implement two minor changes to improve the regression specification. First, we remove population from the denominator of the dependent variable and include population and population density as an explanatory variable on the right-hand side of the regression. Removing population from the denominator of the dependent variable has the additional benefit of eliminating the endogeneity created by having population on both sides of a regression

6. *CRA's Further Analysis, supra*, at 8.

7. *Id.*

equation. Second, we aggregate the data so that the basic unit of observation is an appropriately large geographic unit. In one series of regressions, we aggregate the data into their appropriate Arbitron market. The advantage of this approach is that it employs the standard delineation of radio geographic markets. However, not all locations in the United States are assigned to an Arbitron market. Thus, as a robustness check, we also perform the same statistical analysis where each observation in the data is aggregated to an area delineated by the first three digits of a given zip code (“three-digit zip code level”). The analysis using the Arbitron market definitions is contained in Appendix 1; the three-digit zip code level analysis is contained in Appendix 2.

27. Each appendix contains three separate regression analyses. The first regression in each set involves a specification where we regress the number of satellite radio subscribers in a given geographic market on a fifth-degree polynomial rendering of the number of terrestrial radio signals as well as additional demographic factors. The second regression in each set employs this specification except that the demographic factors that originally were expressed in terms of percentages are instead expressed in absolute levels. The third and final regression in each set employs the same specification as the second regression except that the terrestrial radio signals variables are interacted with population. The purpose of the third set of regressions is to illustrate the effect of multiplying CRA’s basic specification by population. The results consistently belie CRA’s claim that there is a definitive negative relationship between satellite radio usage and the number of terrestrial radio signals.

28. For the first Arbitron regression in Appendix 1, although each individual coefficient on the terrestrial radio signals variables fails to reach statistical significance, a Wald

Test⁸ reveals that they are jointly significant.⁹ That is, although no one terrestrial signal variable is significant on its own, they are statistically significant when considered together. Thus, to examine the validity of CRA’s purported “substitution effect” it is necessary to look at the marginal effect of the number of terrestrial signals in a geographic area on satellite usage. Taking the first derivative of the polynomial reveals that in Arbitron markets with ■ to ■ terrestrial radio signals an increase in the number of terrestrial radio signals actually *increases* the number of satellite radio subscribers *ceteris paribus*. The range over which this positive effect occurs includes ■ percent of the observations in the data set. For the other two regressions in Appendix 1, the coefficients on the terrestrial radio signals variables fail to reach significance both individually and jointly, indicating no relationship between satellite usage and the number of terrestrial signals in an area.¹⁰ Thus, the Arbitron level regressions indicate that the results reported by CRA are not robust to alternative specifications, when one *correctly* controls for population in the regression.

29. The ZCTA3 level results are quite similar. For the first two regression analyses in Appendix 2, Wald Tests reveal that the coefficients on the terrestrial signals variables are jointly significant at the five percent level. However, for the first regression over the range of ■ to ■ signals the relationship between satellite usage and number of terrestrial radio signals is positive. For the second regression, the relationship is positive from ■ to ■ signals. These ranges respectively represent ■ and ■ percent of the sample, demonstrating that CRA’s purported

8. See William H. Greene, *ECONOMETRIC ANALYSIS FIFTH EDITION* 486 (Prentice Hall 2003). (A Wald Test is a procedure that tests the significance of a set of right-hand side variables).

9. The p-value for the test that the regression parameters on the terrestrial signal variables are *simultaneously* zero is less than ■, which indicates statistical significance at ■ percent.

10. For the first regression in Appendix 1, the p-value for the F-test of joint significance is ■. For the second regression equation the p-value is ■.

“substitution effect” is non-existent throughout large parts of the sample. Finally, a Wald Test on the third ZCTA3 level regression also reveals that the coefficients on the terrestrial signals variables are jointly significant.¹¹ Again, the marginal relationship between satellite subscribers and terrestrial radio stations is positive for the majority of the sample.¹²

III. ADDITIONAL FLAWS IN CRA’S ANALYSIS

30. In its recent *ex-parte* filing, “Further Analysis of Econometric Evidence that Satellite and Terrestrial Radio Are Demand Substitutes,” CRA makes many claims that are both conceptually and practically flawed. In this section, we address the most salient of these claims so that they are not misconstrued as evidence in support of the proposition that satellite radio and terrestrial radio are demand substitutes.

31. Perhaps the most important issue to address is CRA’s claim that the number of terrestrial radio stations in a geographic area is a demand-side metric as opposed to a supply-side metric. In fact, CRA goes so far as to describe our construal of the terrestrial stations variable as representative of supply as “a most peculiar interpretation” of their results.¹³ We contend that rather than being a peculiar interpretation that this is the standard interpretation as far as economic theory is concerned. Indeed, the supply curve is defined as the quantity supplied of a good offered at all relevant price points.¹⁴ On the other hand, the number of terrestrial radio signals is a poor proxy for the quality of radio offerings. The quality of terrestrial radio is clearly

11. The p-value for this test is less than ■■■, indicating the parameters on the terrestrial signals variables are jointly significant at the ■ percent level.

12. The marginal effect is found to be positive over the range of ■ to ■ signals, which represents ■ percent of the sample.

13. *CRA’s Further Analysis, supra*, at 4.

14. GEORGE J. STIGLER, *THE THEORY OF PRICE* FOURTH EDITION 107 (Macmillan 1987) (“We can construct market supply curves for productive services by the same procedure that is used to construct market demand curves: by adding together the quantities of a productive service that each person will supply at given prices of that service.”).

a function of programming and reach. Because CRA has provided no evidence that number of signals in an area provides any information concerning these factors, its relevance as a proxy for quality is highly questionable.

32. Another issue that warrants attention is CRA's claim that our alternative specifications are fundamentally flawed. They state:

Judging from the reported results, however, their specification of these relationships is fundamentally flawed. Their specification implausibly assumes that the increase in the absolute number of SR subscribers resulting from a given change in the number of TR signals (*e.g.*, from 20 to 21) is the same in every area regardless of the population of the area. For example, one result predicts that, all else equal, adding one TR station increases the number of subscribers to satellite radio by about 534 in every ZCTA3 area, regardless of whether the total population of that ZCTA3 is 60,000 or 600,000 or 1,600,000.¹⁵

Expressing our result in this way is extremely misleading. If one were to attempt to estimate the total number of satellite radio subscribers in a ZCTA or Arbitron market from our regression results they would not merely use the number of terrestrial radio stations. To arrive at a correct estimate of the number of satellite subscribers in a ZCTA based on our framework it would be necessary to account for population and all of the other variables in our model. It is in this way that our initial regression results account for cross-sectional variation in population. What our initial regression analysis assumed was that the effect of population and the number of terrestrial signals on satellite radio subscribers in a unit of observation varied independently of one another. This hypothesis is quite plausible as CRA has never provided a reason that a radio signal represents a different "level of quality" in a populous region relative to a non-populous region. Nevertheless, the question is in essence an empirical one, and the third regression in each appendix directly addresses the hypothesis that there is an interaction effect between the number

15. *CRA's Further Analysis, supra*, at ¶15.

of terrestrial signals in an area and the population. As discussed previously, the inverse relationship reported by CRA disappears under this specification as well.

33. Another point that requires clarification is CRA's claim that aggregating signals over a larger geographic area causes us to lose minute variations in the number of terrestrial signals. As we discussed above, the number of terrestrial radio signals in a geographic area is a dubious metric of radio quality. However, even if we accept for the moment CRA's assumption—that the number of terrestrial radio signals is a proxy for quality—it makes sense to focus on signals that cover large amounts of area as these signals are the “high-quality” signals. CRA's overly granular analysis gives excessive weight to low-powered radio stations that cater to a very small body of listeners, which are the low-quality signals. Therefore, the logic behind CRA's claim is flawed.

34. CRA's argument against aggregation, however, serves to highlight further the fundamental problem in its analysis. Recall that CRA's primary empirical result is driven by the positive correlation between population and the number of terrestrial radio signals in a given geographic location. CRA's results are therefore strengthened by over-emphasizing populated areas with a number of terrestrial signals. It is therefore ironic that CRA has attempted to strengthen its “quality” argument by stressing observations in which the marginal station is likely of low quality relative to the entire population of stations.

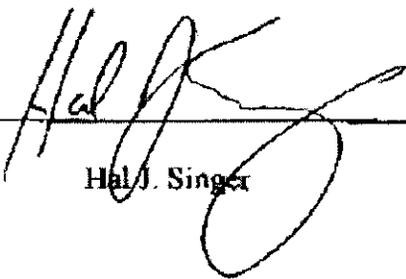
CONCLUSION

35. The closest that CRA comes to providing any evidence of buyer substitution in this proceeding is its regression analysis. Unfortunately, the specification errors of the CRA regression analysis are so severe that any inferences drawn from the analysis must be ignored. When these econometric flaws are considered along with the fact that even if CRA's regression

model were perfectly specified, the estimated parameters would not inform the relevant demand elasticity called for by the *Merger Guidelines*, the analysis fails to inform the issue of product market definition.

* * *

We declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct.



Hal J. Singer



Allan T. Ingraham

Executed on February 27, 2008.

APPENDIX 3: CURRICULUM VITAE OF ALLAN T. INGRAHAM

ALLAN T. INGRAHAM

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WORK HISTORY

President, Criterion Auctions, L.L.C., Feb. 2001 to Present
Research Assistant, University of Maryland, Sep. 1998 to Feb. 2001
Teacher's Assistant, University of Maryland, Sept. 1996 to May 1999
Industry Economist, U.S. Food and Drug Administration, June 1997 to Aug. 1999

EDUCATION

Ph.D. Economics, University of Maryland at College Park, December 2001
Thesis: *Bidder-Auctioneer Cheating in Sealed Bid Auctions*
Fields of Study: Game Theory, Public Finance, and Econometrics.
M.A. Economics, University of Maryland at College Park, May 1998
B.A. *magna cum laude*, Honors in Economics, Colby College, May 1996
Thesis: *The Effects of Non Need-Blind Admissions on Academic Quality at a Selective College*

PUBLICATIONS

The Adverse Economic Effects of Spectrum Set-Asides, CANADIAN JOURNAL OF LAW & TECHNOLOGY, *forthcoming* (with Robert Crandall).
The Effects of Incumbent Bidding in Set-Aside Auctions: An Analysis of Prices in the Closed and Open Segments of FCC Auction 35, TELECOMMUNICATIONS POLICY, *forthcoming* (with Peter Cramton and Hal Singer).
A Fair Posting Process for Japanese Professionals Entering Major League Baseball 24 ENTERTAINMENT AND SPORTS LAWYER (2007).
A Test for Collusion between a Bidder and an Auctioneer in Sealed-Bid Auctions 4 CONTRIBUTIONS TO ECON. ANAL. & POL. (2005).

Do States Tax Wireless Services Inefficiently? Evidence on the Price Elasticity of Demand 23 VIRGINIA TAX R. (with J. Gregory Sidak, 2004).

Do Unbundling Policies Discourage CLEC Facilities-Based Investment?, Topics in Economic Analysis & Policy Section, 4 TOPICS IN ECON. ANAL & POL. (with Robert W. Crandall and Hal J. Singer, 2004).

Mandatory Unbundling, UNE-P, and the Cost of Equity: Does TELRIC Pricing Increase Risk for Incumbent Local Exchange Carriers? 20 YALE J. ON REG. 389 (with J. Gregory Sidak, 2003).

WORKING PAPERS

Inter-City Competition for Retail Trade: Can Tax Increment Financing Generate Incremental Tax Receipts?, July 2005 (with Hal J. Singer and Thomas G. Thibodeau).

A Methodology for Evaluating Production in Football: An Armchair Quarterback's Rating System, June 2005.

Equilibrium Bidding in the Presence of Bidder-Auctioneer Cheating, Dec. 2001.

EXPERT TESTIMONY AND COMMISSIONED RESEARCH

Rebuttal Report of Allan T. Ingraham on behalf of Lead Plaintiff, In Apollo Group, Inc. Securities Litigation (D. Arizona. Dec. 2006) (Lead Case No. CV 01-2147-PHX-JAT)

Expert Report of Allan T. Ingraham on behalf of Lead Plaintiff, In Apollo Group, Inc. Securities Litigation (D. Arizona. Oct. 2006) (Lead Case No. CV 01-2147-PHX-JAT)

Rebuttal Testimony of Allan T. Ingraham on Behalf of the Newspaper Association of America, Before the Postal Rate Commission, Washington, DC (Docket No. R2006-1).

Direct Testimony of Allan T. Ingraham on Behalf of the Newspaper Association of America, Before the Postal Rate Commission, Washington, DC (Docket No. R2006-1).

Expert Declaration of Allan T. Ingraham on behalf of Coventry First, In Coventry First LLC v. 21st Services (D. Penn. Dec. 2005) (Civil Action No. 04-05293-PBT).

The Relevance of Recent United Kingdom Telecommunications Policy to the Policy Choices in Canada, (prepared for Telus, July 2007), Co-authored with Robert Crandall.

The Economic Effects of Spectrum Set-Asides (prepared for Telus, May 2007), Co-authored with Robert Crandall.

Productivity and Value of Players in the NBA between the 1999-2000 and 2005-2006 Seasons (prepared for the Commissioner's Office of the National Basketball Association April 2006), co-authored with Peter Cramton and Jeff West.

Analysis of NHTSA's August 2005 Notice of Proposed Rulemaking to Revise the CAFE Standards for Light Trucks (prepared for General Motors Corp. Nov. 2005), co-authored with Robert W. Crandall and Hal J. Singer.

Changes in the Level of Equality in Player Salary Between the 1996-1997 and 2005-2006 NBA Seasons (prepared for the Commissioner's Office of the National Basketball Association Oct 2005), co-authored with Peter Cramton and Jeff West.

How Do Consumers and the Auto Industry Respond to Changes in Exhaust Emission and Fuel Economy Standards? A Critique of Burke, Abeles, and Chen (prepared for General Motors Corp. Sept. 21, 2004), co-authored with Robert W. Crandall and Hal J. Singer.

Inter-City Competition for Retail Trade in North Texas: Can a TIF Generate Incremental Tax Receipts for the City of Dallas? (prepared for Harvest Partners July 16, 2004), co-authored with Thomas G. Thibodeau and Hal J. Singer.

An Analysis of Auction Volume and Market Competition for the Coastal Forest Regions in British Columbia (prepared for the British Columbia Ministry of Forests Sept. 2002), co-authored with Susan Athey and Peter Cramton.

Setting the Upset Price in British Columbia Timber Auctions (prepared for the British Columbia Ministry of Forests Sept. 2002), co-authored with Susan Athey and Peter Cramton.

Auctioning Timber to Maximize Revenues (prepared for the British Columbia Ministry of Forests June 2002), co-authored with Susan Athey and Peter Cramton.

Auction Based Timber Pricing and Complementary Market Reforms (prepared for the British Columbia Ministry of Forests March 2002), co-authored with Susan Athey and Peter Cramton.

The Effect of Auction Structure on the Winning Bidder and License Price (prepared for ArrayComm March 2001).

MARKET DESIGN AND STRATEGIC CONSULTING IN AUCTION MARKET

Advice to NII Holdings and Nextel Mexico in preparation for the 1.9 GHz and 1.7/2.1 GHz spectrum auctions in Mexico, December 2007 to present.

Advice to T-Mobile UK in preparation for the UK 3G Spectrum Auctions, January 2007 to Present.

Advice to NII Holdings and Nextel Brazil in preparation for the 1.9 GHz Auction in Brazil, August 2007 to December, 2007.

Administration of DONG auction for Natural Gas, February 2007 to March 2007.

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Advice to T-Mobile USA in preparation for the FCC's Advanced Wireless Services Auction, April 2006 to September 2006.

Provided simulation tools to ISO New England in connection with the Market for Forward Reserves, 2005-2006.

Design and Implementation of the Telecommunications Authority of Trinidad & Tobago Spectrum Auction, March 2005 to June 2005.

Provided strategic advice, bid-tracking software, and on-site support to Nextel Mexico in connection with Mexico's 800 MHz auctions and PCS auction, 2004-2005.

Provided bid-tracking tools and on-site support for the mock auction landing slots at LaGuardia airport, February to March 2005.

Provided review of auction rules, strategic advice, bid-tracking software, auction simulator, and market analysis tools to PSEG before and during New Jersey's BGS auctions, 2001-2005.

Provided strategic advice and bid-tracking software to Poundradio during Ofcom's 3.4 GHz Spectrum Auction, June 2003.

Provided strategic advice and comments on auction rules to ArrayComm in preparation for FCC Auction #46, 2001-2002.

Provided strategic advice and bid-tracking software to Space Data Spectrum Holdings, LLC during the FCC's PCS Narrowband Auction, 2001.

Provided bid-tracking software for Cellcom during Israel's PCS auction, 2001.

Provided strategic advice, on-site support, and bid-tracking software to Access Spectrum during the 700 MHz Guard Band Auction Re-Auction—FCC Auction 38, 2001.

Provided bid-tracking software to Burst Wireless during FCC Auction #35, 2001

Provided mock auction simulator, bid-tracking tool, and strategic advice to FirtMark in preparation for Ofcom's WLL Auction, 2000.

Provided strategic advice, on-site support, and bid-tracking software to Access Spectrum during the 700 MHz Guard Band Auction—FCC Auction #33, 2000.

Provided bid-tracking software and auction simulation tools to One2One during the UK 3G Wireless Auction, 2000.

Provided strategic advice, bid-tracking software, and auction website support to Stream Intelligent Networks during Industry Canada's 24-38 GHz Auction, 1999.

REFEREED JOURNALS

BE Journals in Economics Analysis and Policy, Journal of Quantitative Analysis in Sports, Journal of Regulatory Economics, Journal of Competition Law & Economics.

HONORS AND AWARDS

Distinguished Teacher's Assistant, University of Maryland, 1999-2000.

Economics Department Teaching Award, University of Maryland, Fall 1997.

Phi Beta Kappa Society, elected May 1996.

Colby College Faculty Award in Economics, April 1996.

APPENDIX 4: CURRICULUM VITAE OF HAL J. SINGER

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EDUCATION

THE JOHNS HOPKINS UNIVERSITY, Ph.D., 1999; M.A. (Economics), 1996.

TULANE UNIVERSITY, B.S. *magna cum laude* (Economics), 1994. Dean's Honor Scholar (full academic scholarship). Senior Scholar Prize in Economics, 1994.

CURRENT EMPLOYMENT

CRITERION ECONOMICS, L.L.C., Washington, D.C.: President, 2004-present. Senior Vice President, 1999-2004.

EMPLOYMENT HISTORY

LECG, INC., WASHINGTON, D.C.: Senior Economist, 1998-99.

U.S. SECURITIES AND EXCHANGE COMMISSION, OFFICE OF ECONOMIC ANALYSIS, WASHINGTON, D.C.: Staff Economist, 1997-98.

THE JOHNS HOPKINS UNIVERSITY, ECONOMICS DEPARTMENT, BALTIMORE: Teaching Assistant, 1996-98.

AUTHORED BOOKS AND BOOK CHAPTERS

An Antitrust Analysis of the World Trade Organization's Decision in the U.S.-Mexico Arbitration on Telecommunications Services, co-authored with J. Gregory Sidak, in *HANDBOOK OF TRANS-ATLANTIC ANTITRUST* (Philip Marsden, ed. Edward Elgar 2006).

BROADBAND IN EUROPE: HOW BRUSSELS CAN WIRE THE INFORMATION SOCIETY, co-authored with Dan Maldoom, Richard Marsden, and J. Gregory Sidak (Kluwer/Springer Press 2005).

Are Vertically Integrated DSL Providers Squeezing Unaffiliated ISPs (and Should We Care)?, co-authored with Robert W. Crandall, in *ACCESS PRICING: THEORY, PRACTICE AND EMPIRICAL EVIDENCE* (Justus Haucap and Ralf Dewenter eds., Elsevier Press 2005).

JOURNAL ARTICLES

1. *Assessing Bias in Patent Infringement Cases: A Review of International Trade Commission Decisions*, 21 HARVARD JOURNAL OF LAW AND TECHNOLOGY (forthcoming 2008), co-authored with Robert W. Hahn.
2. *The Effect of Incumbent Bidding in Set-Aside Auctions: An Analysis of Prices in the Closed and Open Segments of FCC Auction 35*, ___ TELECOMMUNICATIONS POLICY JOURNAL (forthcoming 2008), co-authored with Peter Cramton and Allan Ingraham.
3. *A Real-Option Approach to Analyzing the ACLI's Excise Tax Proposal on Life Settlement Transactions*, ___ JOURNAL OF FINANCIAL TRANSFORMATION (forthcoming 2008), co-authored with Joseph R. Mason.
4. *The Economics of Wireless Net Neutrality*, 3 JOURNAL OF COMPETITION LAW AND ECONOMICS 399 (2007), co-authored with Robert W. Hahn and Robert E. Litan.
5. *Vertical Foreclosure in Video Programming Markets: Implication for Cable Operators*, 3 REVIEW OF NETWORK ECONOMICS 348 (2007), co-authored with J. Gregory Sidak.
6. *The Unintended Consequences of Net Neutrality*, 5 JOURNAL ON TELECOMMUNICATIONS AND HIGH TECH LAW 533 (2007), co-authored with Robert E. Litan.
7. *Does Video Delivered Over a Telephone Network Require a Cable Franchise?*, 59 FEDERAL COMMUNICATIONS LAW JOURNAL 251 (2007), co-authored with Robert W. Crandall and J. Gregory Sidak.
8. *The Competitive Effects of a Cable Television Operator's Refusal to Carry DSL Advertising*, 2 JOURNAL OF COMPETITION LAW AND ECONOMICS 301 (2006).
9. *Überregulation without Economics: The World Trade Organization's Decision in the U.S.-Mexico Arbitration on Telecommunications Services*, 57 FEDERAL COMMUNICATIONS LAW JOURNAL 1 (2004), co-authored with J. Gregory Sidak.
10. *The Secondary Market for Life Insurance Policies: Uncovering Life Insurance's "Hidden" Value*, 6 MARQUETTE ELDER'S ADVISOR 95 (2004), co-authored with Neil A. Doherty and Brian A. O'Dea.
11. *Do Unbundling Policies Discourage CLEC Facilities-Based Investment?*, 4 TOPICS IN ECONOMIC ANALYSIS AND POLICY (2004), co-authored with Robert W. Crandall and Allan T. Ingraham.
12. *Foreign Investment Restrictions as Industrial Policy*, 3 CANADIAN JOURNAL OF LAW AND TECHNOLOGY 19 (2004), co-authored with Robert W. Crandall.
13. *Regulating the Secondary Market for Life Insurance Policies*, 21 JOURNAL OF INSURANCE REGULATION 63 (2003), co-authored with Neil A. Doherty.
14. *Interim Pricing of Local Loop Unbundling in Ireland: Epilogue*, 4 JOURNAL OF NETWORK INDUSTRIES 119 (2003), co-authored with J. Gregory Sidak.
15. *The Benefits of a Secondary Market for Life Insurance*, 38 REAL PROPERTY, PROBATE AND TRUST JOURNAL 449 (2003), co-authored with Neil A. Doherty.
16. *The Empirical Case Against Asymmetric Regulation of Broadband Internet Access*, 17 BERKELEY TECHNOLOGY LAW JOURNAL 954 (2002), co-authored with Robert W. Crandall and J. Gregory Sidak.
17. *How Can Regulators Set Nonarbitrary Interim Rates? The Case of Local Loop Unbundling in Ireland*, 3 JOURNAL OF NETWORK INDUSTRIES 273 (2002), co-authored with J. Gregory Sidak.

18. *Vertical Foreclosure in Broadband Access*, 49 JOURNAL OF INDUSTRIAL ECONOMICS (2001) 299, co-authored with Daniel L. Rubinfeld.
19. *Open Access to Broadband Networks: A Case Study of the AOL/Time Warner Merger*, 16 BERKELEY TECHNOLOGY LAW JOURNAL 640 (2001), co-authored with Daniel L. Rubinfeld.
20. *Cable Modems and DSL: Broadband Internet Access for Residential Customers*, 91 AMERICAN ECONOMICS ASSOCIATION PAPERS AND PROCEEDINGS 302 (2001), co-authored with Jerry A. Hausman and J. Gregory Sidak.
21. *Residential Demand for Broadband Telecommunications and Consumer Access to Unaffiliated Internet Content Providers*, 18 YALE JOURNAL ON REGULATION 1 (2001), co-authored with Jerry A. Hausman and J. Gregory Sidak.
22. *Determining the Source of Inter-License Synergies in Two-Way Paging Networks*, 18 JOURNAL OF REGULATORY ECONOMICS 59 (2000).
23. *A General Framework for Competitive Analysis in the Wireless Industry*, 50 HASTINGS LAW REVIEW 1639 (2000), co-authored with J. Gregory Sidak and David Teece.
24. *Capital Raising in Offshore Markets*, 23 JOURNAL OF BUSINESS AND FINANCE 1181 (1999), co-authored with Ian Gray and Reena Aggarwal.

EXPERT TESTIMONY

1. Reply Declaration of Hal J. Singer on behalf of Direct Purchasers in *Natchitoches Parish Hosp. Serv. Dist. v. Tyco Int'l, Ltd. et al.* (D. Mass. 2005) (Feb. 15, 2008).
2. Affidavit of Hal J. Singer on behalf of the Ralph O. Stalsberg Irrevocable Trust in *Ralph O. Stalsberg, an Individual, Lonnie R. Stalsberg, as Trustee for the Ralph O. Stalsberg Irrevocable Trust I Dtd. 9/28/2004 v. New York Life Insurance Company, New York Life Insurance and Annuity Corporation*, Case No. 2:07-Cv-29-Bj (D. Utah 2007) (Feb. 8, 2008).
3. Expert Report of Hal J. Singer on behalf of Direct Purchasers in *Natchitoches Parish Hosp. Serv. Dist. v. Tyco Int'l, Ltd. et al.* (D. Mass. 2005) (Dec. 18, 2007).
4. Reply Declaration of Hal J. Singer on behalf of PacifiCare Health System, Inc., *In Re Tricor Indirect Purchaser Antitrust Litigation*, C.A. No. 05-360 (KAJ) (D. Del 2006) (Oct. 8, 2007).
5. Reply Declaration of Hal J. Singer on behalf of Direct Purchasers in *Natchitoches Parish Hosp. Serv. Dist. v. Tyco Int'l, Ltd. et al.* (D. Mass. 2005) (Feb. 9, 2007).
6. Declaration of Hal J. Singer on behalf of Direct Purchasers in *Natchitoches Parish Hosp. Serv. Dist. v. Tyco Int'l, Ltd. et al.* (D. Mass. 2005) (Dec. 15, 2006).
7. Declaration of Hal J. Singer on behalf of PacifiCare Health System, Inc., *In Re Tricor Indirect Purchaser Antitrust Litigation*, C.A. No. 05-360 (KAJ) (D. Del 2006) (Dec. 15, 2006).
8. Reply Declaration of J. Gregory Sidak and Hal J. Singer on behalf of Mid-Atlantic Sports Network, *In the Matter of Comcast Corp., Time Warner Cable, Inc. and Adelphia Communications Corp., Applications for Consent to the Assignment and/or Transfer of Control of Licenses*, MB Dkt. No. 05-192 (Nov. 15, 2005).
9. Declaration of J. Gregory Sidak and Hal J. Singer on behalf of the Power Mobility Coalition, *In the Power Mobility Coalition v. Michael O. Leavitt, Secretary, U.S. Department of Health and Human Services, and Mark B. McClellan, Administrator, Centers for Medicare and Medicaid* (D.D.C. 2005) (Oct. 13, 2005).

10. Comments of Robert W. Crandall and Hal J. Singer on behalf of TELUS Communications Inc., In the Matter of Telecommunications Policy Review, Canadian Radio-television and Telecommunications Commission (Aug. 15, 2005).
11. Declaration of J. Gregory Sidak and Hal J. Singer on behalf of Mid-Atlantic Sports Network, In the Matter of Comcast Corp., Time Warner Cable, Inc. and Adelphia Communications Corp., Applications for Consent to the Assignment and/or Transfer of Control of Licenses, MB Dkt. No. 05-192 (July 22, 2005).
12. Reply Declaration of Robert W. Crandall and Hal J. Singer on behalf of Verizon Communications Inc. and MCI, Inc., In the Matter of Verizon Communications Inc. and MCI, Inc. Applications for Approval of Transfer of Control, WC Dkt. No. 05-75 (May 23, 2005).
13. Declaration of Robert W. Crandall and Hal J. Singer on behalf of Verizon Communications Inc. and MCI, Inc., In the Matter of Verizon Communications Inc. and MCI, Inc. Applications for Approval of Transfer of Control, WC Dkt. No. 05-75 (Mar. 10, 2005).
14. The Competitive Impacts of Restraints in the Contact Lens Industry: Reply to OSI's Comments (prepared for 1-800 CONTACTS for submission to the Federal Trade Commission Policy Division), co-authored with Einer Elhauge and Andrew N. Kleit (Dec. 20, 2004).
15. Reply Declaration of Robert W. Crandall and Hal J. Singer on behalf of SBC Communications Inc., In the Matter of EarthLink Inc. v. SBC Communications, Inc., No. EB-04-MD-006 (Dec. 10, 2004).
16. Economic Analysis of the Proposed Merger of OSI and CooperVision (prepared for 1-800 CONTACTS for submission to the Federal Trade Commission Merger Division), co-authored with Einer Elhauge and Andy Kleit (Dec. 13, 2004).
17. Declaration of Robert W. Crandall and Hal J. Singer on behalf of Verizon Communications Inc., In the Matter of Unbundled Network Access Elements, Review of the Section 251 Unbundling Obligations of Incumbent Local Exchange Carriers, WC Dkt. No. 04-313, CC Dkt. No. 01-338 (Oct. 18, 2004).
18. Declaration of Robert W. Crandall and Hal J. Singer on behalf of SBC Communications Inc., In the Matter of EarthLink Inc. v. SBC Communications, Inc., No. EB-04-MD-006 (June 15, 2004).
19. Rebuttal Report of Hal J. Singer on behalf of the Assiniboine and Sioux Tribes of the Fort Peck Indian Reservation, In Burlington Northern and Santa Fe Railway Company v. Assiniboine and Sioux Tribes of the Fort Peck Indian Reservation (D. Mont. 2004) (No. CV-01-34-BLG).
20. Declaration of Hal J. Singer on behalf of the Assiniboine and Sioux Tribes of the Fort Peck Indian Reservation, In Burlington Northern and Santa Fe Railway Company v. Assiniboine and Sioux Tribes of the Fort Peck Indian Reservation (D. Mont. 2003) (No. CV-01-34-BLG).
21. Declaration of Hal J. Singer on behalf of Tomas H. Miguens, In Q International Courier v. Tomas H. Miguens (S.D.N.Y. 2003) (No. 02 Civ. 5278-JSM).
22. Declaration of Robert W. Crandall and Hal J. Singer on behalf of Bell Canada Enterprises, In the Matter of Hearings before the Standing Committee On Industry, Science And Technology of the House of Commons of Canada Pursuant to Standing Order 108(2), Consideration of Foreign Investment Restrictions Applicable to Telecommunications Common Carriers (Feb. 20, 2003).
23. Declaration of J. Gregory Sidak and Hal J. Singer on behalf of The Walt Disney Company, *et al.*, In the Matter of Nondiscrimination in the Distribution of Interactive Television Services over Cable, Notice of Inquiry, Federal Communications Commission, CS Dkt. No. 01-7 (May 11, 2001).

24. Declaration of Hal J. Singer on behalf of Allegheny Communications, Inc., In Allegheny Communications Inc. v. F.C.C. (D.C. Cir. 2000) (No. 00-1524).

COMMISSIONED WHITE PAPERS

1. Is Greater Price Transparency Needed in The Medical Device Industry? (prepared for Advanced Medical Technology Association), co-authored with Robert W. Hahn (Nov. 30, 2007).
2. Should the FCC Depart from More than a Decade of Market-Oriented Spectrum Policy? Reply to Skrzypacz and Wilson (prepared for CTIA), co-authored with Gerald Faulhaber and Robert W. Hahn (Jun. 18, 2007).
3. Does Retransmission Consent Contribute To Rising Cable Rates? (prepared for the National Association of Broadcasters), co-authored with Jeffrey A. Eisenach and James C. Miller III (Mar. 9, 2007).
4. Does Public Safety Need More Spectrum? (prepared for Verizon Wireless), co-authored with Peter Cramton, Thomas S. Dombrowsky, Jr., Jeffrey A. Eisenach and Allan Ingraham (Nov. 9, 2006).
5. The Budgetary Impact of Eliminating the GPOs' Safe Harbor Exemption from the Anti-Kickback Statute of the Social Security Act (prepared for the Medical Device Manufacturers Association) (Dec. 20, 2005).
6. Reply to "The Life Settlements Market: An Actuarial Perspective on Consumer Economic Value" (prepared for Coventry First), co-authored with Eric Stallard (Nov. 15, 2005).
7. The Competitive Effects of Telephone Entry into Video Markets (prepared for the Internet Innovation Alliance), co-authored with Robert W. Crandall and J. Gregory Sidak (Nov. 9, 2005).
8. How Do Consumers and the Auto Industry Respond to Changes in Exhaust Emission and Fuel Economy Standards? A Critique of Burke, Abeles, and Chen (prepared for General Motors Corp.), co-authored with Robert W. Crandall and Allan T. Ingraham (Sept. 21, 2004).
9. Inter-City Competition for Retail Trade in North Texas: Can a TIF Generate Incremental Tax Receipts for the City of Dallas? (prepared for Harvest Partners), co-authored with Thomas G. Thibodeau and Allan T. Ingraham (July 16, 2004).
10. An Accurate Scorecard of the Telecommunications Act of 1996: Rejoinder to the Phoenix Center Study No. 7 (prepared for BellSouth), co-authored with Robert Crandall (Jan. 6, 2004).
11. Competition in Broadband Provision and Implications for Regulatory Policy (prepared for the Alcatel, British Telecom, Deutsche Telekom, Ericsson, France Telecom, Siemens, Telefónica de España, and Telecom Italia), co-authored with Dan Maldoom, Richard Marsden, and Gregory Sidak (Oct. 15, 2003).
12. The Effect of Ubiquitous Broadband Adoption on Investment, Jobs, and the U.S. Economy (prepared for Verizon), co-authored with Robert W. Crandall (Sept. 17, 2003).
13. The Deleterious Effect of Extending the Unbundling Regime on Telecommunications Investment (prepared for BellSouth), co-authored with Robert W. Crandall (July 10, 2003).
14. Letter Concerning Spectrum Auction 35 to the Honorable Michael K. Powell, Chairman, Federal Communications Commission, from Peter C. Cramton, Robert W. Crandall, Robert W. Hahn, Robert G. Harris, Jerry A. Hausman, Thomas W. Hazlett, Douglas G. Lichtman, Paul W. MacAvoy, Paul R. Milgrom, Richard Schmalensee, J. Gregory Sidak, Hal J. Singer, Vernon L. Smith, William Taylor, and David J. Teece (Aug. 16, 2002).

WORKING PAPERS POSTED TO SSRN

1. *Evaluating Market Power with Two-Sided Demand and Preemptive Offers to Dissipate Monopoly Rent: Lessons for High-Technology Industries from the Proposed Merger of XM and Sirius Satellite Radio*, co-authored with J. G. Sidak (Jan. 2008).
2. *Irrational Expectations: Can a Regulator Credibly Commit to Removing an Unbundling Obligation?*, AEI-Brookings Joint Center Related Publication No. 07-28, co-authored with Jeffrey A. Eisenach (Dec. 2007).
3. *An Antitrust Analysis of Google's Proposed Acquisition of DoubleClick*, AEI-Brookings Joint Center Related Publication No. 07-24, co-authored with Robert W. Hahn (Sept. 2007).
4. *Inter-City Competition for Retail Trade in North Texas: Can a TIF Generate Incremental Tax Receipts for the City of Dallas?*, co-authored with Thomas G. Thibodeau and Allan T. Ingraham (revise and resubmit to JOURNAL OF REAL ESTATE RESEARCH) (July 16, 2004).
5. *An Economic Assessment of the Weight-Based CAFE Standard Proposed by the National Highway Traffic Safety Administration*, co-authored with Robert W. Crandall and Allan T. Ingraham (Apr. 2004).
6. *How Common Are "Conflicts of Interests" in the Investment Banking Industry?*, co-authored with Charles W. Calomiris (Dec. 2003).
7. *Does Clustering by Incumbent MSOs Deter Entry by Overbuilders?* (July 2002).

SPEAKING ENGAGEMENTS

1. *Merger Policy in High-Tech Industries*, GEORGE MASON UNIVERSITY SCHOOL OF LAW, Washington, D.C., Feb. 1, 2008.
2. *Telecommunications Symposium*, U.S. DEPARTMENT OF JUSTICE ANTITRUST DIVISION, Washington, D.C., Nov. 29, 2007.
3. *Wireless Practice Luncheon*, FEDERAL COMMUNICATIONS BAR ASSOCIATION, Washington, D.C., Nov. 29, 2007.
4. *Association for Computing Machinery's Net Neutrality Symposium*, GEORGE WASHINGTON UNIVERSITY, Washington, D.C., Nov. 12, 2007.
5. *Regulators' AdvanceComm Summit*, NEW YORK LAW SCHOOL, New York, N.Y., Oct. 14, 2007.
6. *Annual Conference*, CAPACITY USA 2007, New York, N.Y., Jun. 26, 2007.
7. *William Pitt Debating Union*, UNIVERSITY OF PITTSBURGH, SCHOOL OF ARTS & SCIENCES, Pittsburgh, PA., Feb. 23, 2007.
8. *Annual Conference*, WIRELESS COMMUNICATIONS ASSOCIATION INTERNATIONAL, Washington, D.C., June 27, 2006.
9. *Annual Conference*, MEDICAL DEVICE MANUFACTURERS ASSOCIATION, Washington, D.C., June 14, 2006.
10. *Annual Conference*, ASSOCIATION FOR ADVANCED LIFE UNDERWRITING, Washington, D.C., May 1, 2006.
11. *Entrepreneur Lecture Series*, LAFAYETTE COLLEGE, Easton, PA., Nov. 14, 2005.

EDITORIALS AND MAGAZINE ARTICLES

1. *Foxes in the Henhouse: FCC Regulation through Merger Review*, MILKEN INSITUTE REVIEW (First Quarter 2008), co-authored with J. Gregory Sidak.

2. *Don't Drink the CAFE Kool-Aid*, WALL STREET JOURNAL, Sept. 6, 2007, at A17, co-authored with Robert W. Crandall.
3. *The Knee-Jerk Reaction: Misunderstanding the XM/Sirius Merger*, WASHINGTON TIMES, Aug. 24, 2007, at A19, co-authored with J. Gregory Sidak.
4. *Net Neutrality: A Radical Form of Non-Discrimination*, REGULATION, Summer 2007.
5. *Telecom Time Warp*, WALL STREET JOURNAL, July 11, 2007, at A15, co-authored with Robert W. Crandall.
6. *Earmarked Airwaves*, WASHINGTON POST, June 27, 2007, at A19, co-authored with Robert W. Hahn.
7. *Not Neutrality*, NATIONAL POST, Mar. 29, 2007, at FP19.
8. *Should ATM Fees Be Regulated?*, NATIONAL POST, Mar. 8, 2007, at FP17, co-authored with Robert W. Crandall.
9. *Life Support for ISPs*, REGULATION, Fall 2005, co-authored with Robert W. Crandall.
10. *No Two-Tier Telecommunications*, NATIONAL POST, Mar. 7, 2003, at FP15, co-authored with Robert W. Crandall.

MEMBERSHIPS

American Economics Association

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JOURNAL OF COMPETITION LAW AND ECONOMICS

JOURNAL OF REGULATORY ECONOMICS

PERSONAL INFORMATION

American citizen, born March 31, 1972. Married to Ingrid Arraut Singer. Two daughters: Alexis and Kayla. Resident of Oakton, Virginia.

February 1, 2008