Public Version

Before the
UNITED STATES COPYRIGHT ROYALTY JUDGES
Washington, D.C.

In the Matter of: Determination of Royalty Rates and Terms for Transmission of Sound Recordings by Satellite Radio and "Preexisting" Subscription Services (SDARS III)	Docket No. 16-CRB-0001 SR/PSSR (2018-2022)

WRITTEN REBUTTAL TESTIMONY OF

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I. Introduction and Summary of Conclusions

A. Qualifications and Assignment

1. My name is Robert Willig. I previously submitted written testimony in the direct phase of this proceeding.[1] My qualifications, including a list of cases in which I had testified over the previous four years, were provided in that prior testimony. My updated *curriculum vitae* and list of testimony are provided as Appendix 1 to this testimony.

2. I have been retained by counsel for SoundExchange to review certain aspects of the written direct testimony of Professor Carl Shapiro that was filed on behalf of Sirius XM ("SXM"),[2] as well as Professor Shapiro's subsequent deposition testimony.[3] In particular, I focus here on three issues: (a) Professor Shapiro's use of the *Web IV* statutory rate to determine the rate for SXM in this proceeding,[4] (b) Professor Shapiro's claim that the SXM statutory rate for 2017 set in the *SDARS II* proceeding provides an upper bound on the appropriate rate for the current proceeding,[5] and (c) whether any of Professor Shapiro's testimony, or the related testimony filed by SXM in the direct phase of this proceeding on which Professor Shapiro has relied, causes me to change any of the opinions that I previously set forth in my written direct testimony.[6]

3. As was the case for my written direct testimony, my opinions expressed here are based on my overall knowledge and experience as an economist as well as on my prior work in the music industry, along with my review and analysis of pertinent documents and data. The rate charged by Compass Lexecon for my work on this matter is $1,450 per hour. I have a financial interest in the overall profitability of Compass Lexecon, but I have no financial interest in the outcome of this case.

B. Summary of Conclusions

4. My conclusions regarding the three topics that I address in this testimony are summarized briefly below.

5. My first conclusion is that Professor Shapiro's use of the *Web IV* statutory rate to determine the rate for SXM in the current proceeding (for convenience, I term this his "*Web IV* Approach") suffers from many structural and empirical flaws that should disqualify it from being relied upon by the Copyright Royalty Judges.

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[1] Written Direct Testimony of Robert Willig, October 19, 2016 ("Willig WDT").
[2] Written Direct Testimony of Carl Shapiro, October 19, 2016 ("Shapiro WDT").
[3] Deposition of Carl Shapiro, December 16, 2016 ("Shapiro Deposition"), SoundExchange Ex. 73.
[4] Professor Shapiro derives a rate of 8.1% of revenue for SXM based on the *Web IV* statutory rate. Shapiro WDT § 10 and App. D.
[5] *See* Shapiro WDT § 8.
[6] The fact that I do not address here certain aspects of Professor Shapiro's written direct testimony or his deposition testimony should not be construed to imply that I agree with those portions of his opinions.

6. Before summarizing the disqualifying flaws in Professor Shapiro's analysis, I begin by noting certain key high-level similarities and differences between Professor Shapiro's analysis and the analysis that I presented in my written direct testimony. There is an important point of conceptual agreement between Professor Shapiro and myself. Specifically, Professor Shapiro's "Full Marginal Cost" (FMC) concept, which underlies his *Web IV* Approach, is essentially the same concept as what I termed "Creator Compensation Cannibalization" (CCC) in my written direct testimony. Both FMC and CCC address the marginal cost of distributing music through one channel, where such marginal cost includes the marginal *opportunity* cost – *i.e.*, the impact of distribution in the given distribution channel on consumption of music in other distribution channels and the corresponding returns to the content creators from such other distribution channels. However, while our assessments of the appropriate rate for SXM share this common concept, there are critical differences that ultimately distinguish our approaches.

7. One fundamental difference between our approaches is that Professor Shapiro only assesses the FMC for SXM *relative* to a benchmark service (Pandora), whereas I calculated actual values for the SXM CCC. That is, Professor Shapiro claims that the FMC for SXM is lower than the FMC for Pandora; however, he does not quantify the actual value of the FMC for SXM or Pandora. As such, Professor Shapiro's FMC analysis is not capable of producing a "stand-alone" rate for SXM. Rather, his approach is entirely dependent on picking a "starting point" (benchmark) rate for Pandora. Furthermore, Professor Shapiro does not even attempt to quantify the difference between the two FMCs. Thus, his FMC analysis allows him to claim that the rate for SXM should be lower than the "starting point" rate that he picks for Pandora, but he cannot quantify how much lower. This use of a benchmark requires a number of unreliable predicate assumptions that Professor Shapiro fails to establish, and his lack of quantification creates inherent limitations that ultimately render his approach invalid for determining the appropriate rate for SXM. In contrast, my analysis provides guidance on the appropriate rate for SXM without relying on a "starting point" rate for Pandora or any other benchmark – *i.e.*, I calculated actual values for the SXM CCC – so my approach is not subject to the unreliability and the limitations that are inherent in Professor Shapiro's approach.

8. As a general economic principle, the use of a benchmark approach such as Professor Shapiro's *Web IV* Approach requires careful attention to multiple considerations: picking the benchmark, evaluating and adjusting for pertinent differences between the benchmark and the target product (Pandora and SXM, respectively, in this case), and the specific translation of the benchmark rate into the target rate. Each of these considerations represents an important stage in the approach to benchmarking and Professor Shapiro's analysis at each stage is deficient. I explain these deficiencies below.

9. The first stage of Professor Shapiro's analysis is his choice of Pandora as his benchmark. While he points out that SXM and Pandora have certain similarities – *e.g.*, both are ad-free, non-interactive subscription services – that does not eliminate the possibility of significant differences. In utilizing Pandora as his benchmark, Professor Shapiro attempts to control for only one difference between Pandora and SXM: his assessment of which has the

greater level of marginal cost (FMC).[7,8] However, evidence indicates that there are significant differences on the demand side, and economics teaches that such differences are relevant to pricing. In particular, differences in the elasticities of demand should be incorporated into benchmark analysis. Professor Shapiro makes no attempt to account for such differences between SXM and Pandora; nor does he attempt to show that such differences are insignificant for purposes of calculating the appropriate royalty rate. As such, Professor Shapiro's *Web IV* Approach is invalid and unreliable – any economic "benchmark" approach must address and control for all pertinent differences between the benchmark and the target, which he has not done.

10. Professor Shapiro correctly acknowledges in his written direct testimony that the appropriate rate for a given distribution mode (SXM or otherwise) will exceed the FMC for that distribution mode.[9] However, he fails to apply this principle in his *Web IV* Approach. In particular, his analysis fails to consider the fact that Ramsey (public-interest) pricing principles imply that rates should exceed marginal costs by differing amounts across the different forms of music distribution. My analysis shows that the gap between rates and marginal costs should be larger for SXM than for Pandora under Ramsey pricing principles, as both the upstream (content input) and downstream (end-product) elasticities of demand for SXM are smaller in their absolute values than the elasticities of demand for Pandora. Professor Shapiro's *Web IV* Approach ignores this important economic/policy consideration for setting rates.[10]

11. The second stage of Professor Shapiro's analysis is his choice to use as his benchmark for SXM the *Web IV* statutory rate for Pandora. Accepting *arguendo* that Professor Shapiro's decision to use a "starting point" based on Pandora is valid, and that Professor Shapiro's analysis properly addresses all of the pertinent differences, it is invalid for Professor Shapiro to employ the *Web IV* statutory rate for Pandora. As discussed in my written direct testimony, [[redacted]].[11] Thus, the basis for Professor Shapiro's rate of 8.1% is obsolete and the [[redacted]] rate yields a rate for SXM that is about 2.5 times the rate of 8.1% that Professor Shapiro recommends for SXM.

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[7] As discussed earlier, Professor Shapiro does not do a complete analysis of FMC differences – *i.e.*, he does not quantify the actual values or even the difference.

[8] Professor Shapiro does discuss the possibility of making two other adjustments: for steering and for the 801(b)(1) factors. However, he does not present any quantitative analysis of either and ultimately does not propose any adjustment for them. *See* Shapiro WDT at 56-59.

[9] *See* Shapiro WDT at 20; Shapiro Deposition at 152:7-154:6.

[10] By failing to address this factor, Professor Shapiro is effectively making an implicit assumption that the gap between the rate and FMC should be the same for SXM and Pandora. He provides no basis for such an assumption.

[11] The rate is 24.2% of revenue using the (appropriate) ARPU for SXM of $10.72 per subscriber-month. Even if Professor Shapiro's (incorrect) ARPU for SXM of $12.80 per subscriber-month is used, the rate is still 20.3% of revenue.

12. The third stage of Professor Shapiro's analysis is his choice to apply the *Web IV* statutory rate to SXM on a *per-play* basis. If we set aside the first two stages of analysis, and assume that the *Web IV* statutory rate for Pandora is the appropriate benchmark, the question then becomes: How should the *Web IV* statutory rate for Pandora be translated to a rate for SXM? Professor Shapiro chose to apply the *per-play* rate for Pandora to SXM. However, there are (at least) two other possible approaches: applying the *per-subscriber-month* rate or applying the *percentage-of-revenue* rate. Professor Shapiro provides no justification for his choice of using the per-play rate as opposed to a different option. Professor Shapiro's approach (implicitly) assumes that compensation for music content creators should be the same *per-play* between SXM and Pandora. Given the differences in consumption patterns between the subscription versions of these services, this assumption is inappropriate without an analytic justification. In fact, as I understand from the rebuttal testimony of Jonathan Orszag, evidence indicates that using one of the alternative metrics makes more economic sense than using the *per-play* rate in this case, and both alternatives would yield significantly higher rates for SXM than Professor Shapiro's 8.1%.[12]

13. Finally, apart from the structural, analytic, and empirical flaws in Professor Shapiro's *Web IV* Approach that are summarized above, his empirical assessments of the services' FMCs are invalid and unreliable. Professor Shapiro's empirical analysis of the FMCs relies on the survey conducted by Joe Lenski ("Lenski Survey"), which is fundamentally flawed and invalid for the purpose of assessing FMCs. The Lenski Survey focuses on how respondents would spend their SXM listening *time* if they did not have access to SXM – this is the wrong question because it does not capture the impact on creator compensation.[13] Like Professor Shapiro, I also rely on a survey for purposes of assessing relevant marginal costs (what I term CCC) – the survey conducted by Professor Ravi Dhar ("Dhar Survey"). In contrast to the Lenski Survey, however, the Dhar Survey asks the appropriate questions for assessing FMC/CCC: How respondents' overall spending on music would change if they did not have access to SXM.[14] As such, I was able to use the results of the Dhar Survey to quantify CCC reliably. Furthermore, I have reviewed the results of the survey conducted by Professor Itamar Simonson ("Simonson Survey"),[15] and found that they confirm the conclusion regarding the appropriate rate for SXM expressed in my written direct testimony, which was based on the Dhar Survey (see discussion in Section VI).

14. **My second conclusion is that, contrary to Professor Shapiro's claim, the rate that was set in *SDARS II* for 2017 (11% of revenue) is not an appropriate upper bound for the rate in the current proceeding.** The basis for Professor Shapiro's upper bound claim is his contention that all of the industry changes since the *SDARS II* proceeding either: (a) point toward a downward adjustment (*i.e.*, reduction) in the rate for SXM, or (b) do not indicate the need for a change in either direction. I disagree with Professor Shapiro's assessment of industry changes

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[12] Written Rebuttal Testimony of Jonathan Orszag, February 19, 2017 ("Orszag WRT") at § V.

[13] I use the term "creator compensation" to refer to the returns to artists plus the net revenues of the record companies.

[14] I note that music creators do receive some compensation from music consumption that does not involve spending of money by consumers (*e.g.*, ad-supported webcasting).

[15] *See* Written Rebuttal Testimony of Itamar Simonson, February 19, 2016 ("Simonson WRT").

since the prior proceeding. In particular, while Professor Shapiro acknowledges the most dramatic change in the industry since the prior proceeding – a major shift toward distribution of music via streaming services[16] – he fails to properly consider the implications of that shift. Professor Shapiro only considers industry-wide gross revenue, and claims that industry-wide gross revenue has not fallen since 2012. But gross revenue is not the appropriate metric for measuring the impact of the shift in distribution. Rather, as discussed in my written direct testimony, the appropriate metric is creator compensation levels relative to what they would have been in the absence of the streaming that constitutes the distribution shift. My analysis shows that creator compensation is much lower than it otherwise would have been (but-for the explosive and cannibalizing growth of streaming) and, as such, an *upward* adjustment to the *SDARS II* rate is warranted in this proceeding.

15. **Finally, I have concluded that nothing in Professor Shapiro's direct testimony, nor anything else in SXM's direct filing, causes me to change any of the opinions expressed in my written direct testimony.** In particular, my overall opinion continues to be that the appropriate rate for SXM is $2.55 to $3.94 per subscriber-month. In fact, the results of the Simonson Survey that was conducted for this rebuttal phase confirm the reliability of my prior conclusion.

16. The above conclusions are discussed in more detail in the remainder of this testimony. Section II provides a summary of pertinent aspects of Professor Shapiro's *Web IV* Approach, which sets the stage for my critique of that approach. My critique is divided into two parts: Section III addresses the structural flaws in Professor Shapiro's analysis and Section IV focuses on the empirical flaws in his FMC analysis. Section V provides my critique of Professor Shapiro's claim that the rate set in the *SDARSs II* proceeding serves as an upper bound for the rate to be set in the current proceeding. Finally, Section VI provides concluding remarks – explaining why nothing in SXM's direct filing causes me to change any of the opinions that I set forth in my written direct testimony in this matter and how the Simonson Survey submitted with SoundExchange's rebuttal statement corroborates my written direct testimony.

II. Summary of Pertinent Aspects of Professor Shapiro's *Web IV* Approach

17. In his written direct testimony, Professor Shapiro presents three approaches for determining the rate for SXM in this proceeding: (a) rolling forward the rate for SXM set in the *SDARS II* proceeding, (b) using SXM's direct licenses with independent record labels as a benchmark, and (c) deriving the rate for SXM from the statutory rate set in the *Web IV* proceeding. In this section, I address the third of his approaches,[17] which for convenience I have termed his "*Web IV* Approach." As previously mentioned, according to Professor Shapiro, his *Web IV* Approach yields a rate of 8.1% for SXM.[18]

[16] *See* Shapiro WDT at 28.

[17] I address the first of Professor Shapiro's approaches – using the current SXM statutory rate (set in the *SDARS II* proceeding) in Section V below. I understand that Professor Shapiro's use of SXM's direct licenses with independent record labels is addressed in the rebuttal testimony of Dr. Thomas Lys. The fact that I do not address the approach predicated on SXM's direct licenses does not mean that I agree with it.

[18] *See* Shapiro WDT § 10.

18. Professor Shapiro's *Web IV* Approach applies the *Web IV* statutory rate to SXM through a series of steps. The calculations comprising those steps are summarized in the table below.[19] He starts with the *Web IV* statutory rate for a (non-interactive) subscription service, which is $0.0022 per play. He then calculates an estimate of the average number of "plays" per month for an SXM subscriber (469) as the product of: (a) the average SXM music listening hours per subscriber-month (31.3) and (b) the average number of songs broadcast per hour per SXM channel (14.97).[20] Professor Shapiro multiplies these average plays per subscriber-month (469) by the *Web IV* statutory rate ($0.0022 per play) to obtain compensation of $1.03 per subscriber-month. Finally, Professor Shapiro divides this compensation per subscriber-month ($1.03) by his estimate of SXM's average revenue per subscriber ("ARPU," $12.80 per subscriber-month) to obtain his compensation rate as a percentage of revenue (8.1%).

	Professor Shapiro's Analysis
Web IV paid-subscription rate ($/play)	$0.0022
SXM music listening time (hours/sub-month)	31.3
SXM songs played per channel per hour	14.97
SXM performances per sub-month	469
SXM compensation per sub-month	$1.03
SXM ARPU (revenue per sub-month)	$12.80
SXM rate (%revenue)	8.1%

Source: Shapiro WDT, § 10.A

19. Professor Shapiro next considers whether any adjustments are warranted to this "starting point" rate of 8.1% due to differences between the SXM and Pandora (non-interactive subscription) services. Professor Shapiro considers three possible adjustments, as discussed below.

20. **The first adjustment that Professor Shapiro considers is based on the concept that he terms "full marginal cost" ("FMC").** He asserts that pricing by a record company to a distributor reflects the "full marginal cost" of providing its music to the distributor, where the FMC is comprised of three components: the direct marginal cost, the promotional effect, and the substitution effect.[21] Professor Shapiro compares the FMC for SXM with the FMC for Pandora (subscription, non-interactive webcasting) to determine if any adjustments to the rate calculated above (8.1%) are warranted. Ultimately, he concludes that a downward adjustment to the 8.1%

[19] *See also* Shapiro WDT at 51-55.
[20] The average number of "plays" for SXM subscribers must be estimated because SXM does not have the ability to monitor its subscribers' usage on its satellite service.
[21] *See* Shapiro WDT at 18-19, D-1, D-2.

is warranted, although he does not propose any specific amount. His contentions for each component of the FMC can be summarized as follows:

- **Direct marginal cost**. This component is the direct ("out-of-pocket") marginal cost of distributing music, excluding music licensing fees. Professor Shapiro states that the direct marginal cost is essentially zero for digital distribution channels (*e.g.*, SXM, Pandora, and others)[22] and, as such, no adjustment is warranted for this component.

- **Promotional effect**. This component is the extent to which sales through one distribution channel tend to increase sales through other distribution channels (thereby increasing compensation earned by the content creators in those other channels and providing a benefit or a negative cost). Professor Shapiro states that he is not aware of any evidence indicating that SXM is less promotional than Pandora.[23] He later states that he assumes that SXM and Pandora have the same promotional effect,[24] and thus he does not propose any adjustment for this component.

- **Substitution effect**. This component is the extent to which sales through one distribution channel reduce (substitute for, or "cannibalize") sales through other distribution channels (thereby reducing compensation earned by content creators from those other channels and causing what economists call "opportunity costs"). Professor Shapiro asserts that the substitution effect is lower for SXM than for Pandora, based on the results of the Lenski Survey.[25] While Professor Shapiro claims that a downward adjustment to the rate is warranted due to the purportedly lower substitution effect for SXM, he does not attempt to quantify any such adjustment.[26]

21. **The second adjustment to the "starting point" rate of 8.1% that Professor Shapiro considers is based on steering.** He asserts that an adjustment would be warranted for the difference (if any) between the ability of SXM and Pandora to engage in steering.[27] However, Professor Shapiro states that he does "not have empirical data to quantify the difference (if any) in steering ability between webcasters and Sirius XM" and thus, he makes no such adjustment to his proposed rate.[28]

22. **The third adjustment to the "starting point" rate of 8.1% that Professor Shapiro considers is based on the 801(b)(1) policy objectives.** Professor Shapiro discusses

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[22] *See* Shapiro WDT at 17, D-4.
[23] *See* Shapiro WDT at 56.
[24] *See* Shapiro WDT at D-5 to D-6.
[25] *See* Shapiro WDT at 56. A detailed discussion of Professor Shapiro's use of the Lenski Survey appears below, in Section IV.
[26] *See* Shapiro WDT at 56.
[27] *See* Shapiro WDT at 57.
[28] *See* Shapiro WDT at 57.

whether any adjustment is warranted for the 801(b)(1) factors (maximizing the availability of creative works, balancing relative contribution, providing a fair rate of return, and minimizing industry disruption), but ultimately does not propose any quantified adjustments.[29]

23. In sum, Professor Shapiro concludes that his "starting point" rate of 8.1% is the appropriate rate for SXM in this proceeding because he finds that all of the adjustments that he considers either: (a) suggest a downward adjustment to the rate, or (b) cannot be conclusively evaluated for lack of sufficient information.

III. Structural Flaws in Professor Shapiro's *Web IV* Approach

24. In this section, I describe the multiple structural flaws in Professor Shapiro's *Web IV* Approach. I do not address every aspect of his analysis, and that does not mean that I agree with those about which I am silent.

25. Before the details are presented, two overarching points should be emphasized. First, Professor Shapiro's *Web IV* Approach and my analysis of the appropriate rate for SXM, as presented in my direct testimony, share a common concept. Professor Shapiro's FMC concept, in particular, the substitution effect, is essentially the same concept as Creator Compensation Cannibalization (CCC), which I discussed in my direct testimony.[30] Both Professor Shapiro's FMC substitution effect and my CCC are the opportunity cost to a record company of distributing its music through a particular mode or channel ("A"), where that opportunity cost reflects the extent to which distribution through channel A affects the compensation earned by the record company from reduced distribution through all other channels. Although Professor Shapiro and I utilize this same underlying concept, we apply it in much different ways – as I discuss below.

26. My second overarching point emphasizes an important difference between our approaches. Professor Shapiro does not attempt to estimate actual values of the FMC ($/sub-month) for SXM or Pandora. Rather, he just assesses whether SXM has a smaller FMC than Pandora. Professor Shapiro readily acknowledges this in his written direct testimony and his deposition testimony.[31] As such, to the extent that Professor Shapiro's FMC analysis were valid (and it is not, as I show below in Section IV), his analysis could only provide guidance for the SXM rate in this proceeding relative to some "starting point" rate for Pandora, which must then be applied to SXM. Thus, Professor Shapiro's resulting rate for SXM is completely dependent on his starting point. That is, Professor Shapiro's analysis does not provide any guidance regarding the appropriate rate for SXM that is independent of the assumed Pandora rate that Professor Shapiro uses as his "starting point" (*i.e.*, the point from which adjustments, if any, are made).

27. As I will explain, Professor Shapiro's reliance on his chosen "starting point" or benchmark rests on a number of unreliable predicate assumptions that Professor Shapiro fails to

[29] *See* Shapiro WDT at 58-59.
[30] *See* Willig WDT § VI.
[31] *See* Shapiro WDT at D-4; Shapiro Deposition at 168:22-169:2.

justify. Moreover, Professor Shapiro does not attempt to make adjustments to reflect significant differences between Pandora and SXM that he does not consider. In contrast to Professor Shapiro, my written direct testimony contains estimated actual values for the CCC ($/sub-month) for SXM, as well as other services.[32] Therefore, my analysis provides guidance on the appropriate rate for SXM without depending on the rate for Pandora or any other service as a "starting point."[33]

A. Use of Pandora as Benchmark and the Scope of Adjustments Considered

28. As a general economic principle, when using a benchmark approach as Professor Shapiro has chosen to do, it is imperative that all pertinent differences between the benchmark product and the "target" product (Pandora and SXM, respectively, in this case) be considered and taken into account. That is, while the benchmark product generally has similarities to the target product, they inevitably have significant differences as well. Accordingly, adjustments must be considered and perhaps implemented when applying the benchmark to the target product.

29. Professor Shapiro recognizes and accepts this basic principle – *i.e.*, he does consider some potential adjustments to the Pandora rate in developing his SXM rate. Specifically, Professor Shapiro says he considers three such adjustments: (a) differences in the FMC, (b) differences in steering, and (c) differences in the 801(b)(1) factors.[34] Ultimately, Professor Shapiro only proffers an analysis of the first adjustment – the FMC.[35] For the others, Professor Shapiro asserts that he does not have the needed data and/or any evidence indicating that an adjustment is warranted.

30. Professor Shapiro's approach is flawed because he fails to consider some relevant differences and concomitant adjustments. In particular, he fails to consider and adjust for differences in consumer demands for the services, and how these can be encapsulated by differences in the elasticities of demand for the two modes of music distribution. As discussed in my direct written testimony, under Ramsey (public interest) pricing principles, the markups for different distribution channels relative to their marginal costs should be inversely proportional to their own-price elasticities of demand [36] In other words, the markup should be higher when the own price elasticity of demand is lower (in absolute value), and vice versa.

31. Professor Shapiro himself acknowledges that the FMC is a lower bound on the price that would result from negotiations between a buyer and seller; *i.e.*, that the rate should exceed marginal costs.[37] Yet, Professor Shapiro does not attempt to adjust for this consideration in his *Web IV* Approach. By ignoring this issue, Professor Shapiro has, in effect, assumed that

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[32] *See* Willig WDT § VI.
[33] As discussed in my written direct testimony, the CCC that I calculate is a lower bound on the appropriate rate for SXM. *See* Willig WDT § VII.
[34] *See* Shapiro WDT at 55-59.
[35] Professor Shapiro's FMC analysis is based on the Lenski Survey and I address deficiencies with the analysis in Section IV of this testimony.
[36] *See* Willig WDT § V.A.
[37] *See* Shapiro WDT at 20; Shapiro Deposition at 152:7-154:6.

the amount by which its rate should exceed its marginal cost is the same for SXM and Pandora. He provides no basis for such an assumption.

32. In contrast, the empirical analysis presented in my written direct testimony indicates that, due to considerations of consumer demands, an upward adjustment to the benchmark (Pandora) rate would be warranted for SXM. As discussed in my written direct testimony, the elasticity of demand is lower (in absolute value) for SXM than for Pandora.[38] Moreover, as I understand from the rebuttal testimony of Jonathan Orszag, evidence indicates that Pandora has a greater ability to engage in steering than SXM.[39] Both of these factors – differences in the upstream and downstream elasticities – indicate that it is necessary to make an upward adjustment to the Pandora rate.

B. Baseline Rate for Pandora

33. Apart from the scope of differences between Pandora and SXM, and how adjustments for them should be considered and implemented, there is an even more basic question that must be addressed: What is the appropriate rate to use for Pandora as Professor Shapiro's choice of the benchmark for SXM?

34. Professor Shapiro opted to use the *Web IV* statutory rate applicable to Pandora.[40] [[redacted]], Professor Shapiro provides no justification for his use of the *Web IV* statutory rate for Pandora – in fact, he does not even mention [[redacted]] in his written direct testimony.

35. As discussed in my written direct testimony, [[redacted]] Professor Shapiro's *Web IV* Approach yields for SXM – $1.03 per subscriber-month. Professor Shapiro provides no explanation for why it would be appropriate for the compensation rate for two services that he claims are roughly analogous to nevertheless be so vastly different.[43]

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[38] *See* Willig WDT at C-2 and Figure C-1.
[39] *See* Orszag WRT at ¶ 35.
[40] *See* Shapiro WDT at 54.
[41] *See* Willig WDT at B-4.
[42] *See* Willig WDT at B-4. [[redacted]].
[43] I am aware that the relevant [[redacted].] Whether or to what degree the agreement by the record companies to permit this functionality impacted the *per-subscriber-month* rates is an issue I have not explored in any detail, except that it cannot explain why Professor Shapiro's proposed *per-subscriber-month* rate is less than one-half of the direct license rates. In any event, there is no reason to believe that the *percentage-of-revenue* rates in the direct licenses would be affected by the level of functionality permitted.

C. Use of *Per-Play* Rate from *Web IV* Proceeding

36. Apart from the scope of differences between Pandora and SXM, and how adjustments for them should be considered and implemented, and apart from the question of what constitutes the appropriate rate to use for Pandora as Professor Shapiro's choice of the benchmark for SXM, a key remaining question is what metric should be used to translate the rate for Pandora to the rate for SXM?

37. Professor Shapiro has elected to apply the *per-play* rate for Pandora to SXM (*i.e.*, to multiply the per-play rate by his estimate of plays on SXM). There are, however, at least two other possible approaches:

- Apply the subscriber-month rate of Pandora to SXM; or
- Apply the percentage-of-revenue rate of Pandora to SXM.

38. Professor Shapiro provides no justification for taking an approach based on the per-play rate. In fact, he does not even mention the other possibilities. Given that the different approaches would produce significantly different rates for SXM, relying on the unsupported selection of one approach over the alternatives is inappropriate.

39. There is evidence suggesting that Professor Shapiro's per-play approach is not the most appropriate. I have reviewed the rebuttal testimony of Jonathan Orszag, which presents marketplace evidence that creator compensation for subscription services is most commonly based on a *per-subscriber-month* or *percentage-of-revenue* formulation.[44] Indeed, as previously discussed, [[redacted]]. From an economic perspective, this is not surprising. The availability of the music creates the value of the service to subscribers, regardless of the number of their plays, and the value of the service to subscribers is evidenced by both the number of subscribers and how much subscribers pay for their subscriptions. The value of the service that is generated by the availability of the music most directly affects how much above FMC the licensor will bargain for and should obtain under public interest pricing principles. Consumers likely view music from SXM in the car as highly valuable even if the number of plays is limited by the amount of time spent in the car – and a licensor should appropriately share in that value even if the number of plays on SXM is lower than the number of plays on other services. In other words, Professor Shapiro's use of the *per-play* approach can be interpreted as assuming that the value to consumers from a "play" on Pandora is the same as the value from a play on SXM. Given the stark differences in consumption patterns between the two services, such an assumption is unwarranted.

[44] *See* Orszag WRT at ¶ 43.

40. In sum, the structural flaws in Professor Shapiro's *Web IV* Approach discussed in this section should be viewed as disqualifying. Because of these structural flaws, Professor Shapiro's derived rate of 8.1% does not produce any valid or reliable guidance on the appropriate rate for SXM in this proceeding. In the next section, I move on to the flaws in Professor Shapiro's empirical analysis of the substitution effect and his FMC.

IV. Empirical Flaws in Professor Shapiro's Assessment of the Substitution Effect Component of his *Web IV* Approach

41. I now turn to Professor Shapiro's empirical analysis of the substitution component of the FMC – specifically, his claim that the substitution cost is lower for SXM than for Pandora. As I previously mentioned, both Professor Shapiro and I rely to a certain extent on surveys to assess the substitution effect: Professor Shapiro relies on Mr. Lenski's survey ("Lenski Survey") and I rely on Professor Dhar's survey ("Dhar Survey").[45] However, the structures of these two surveys are fundamentally different: they ask fundamentally different questions. As I explain below, the structure of the Lenski Survey is ill-suited to the purpose at hand – assessing the substitution effect. Professor Shapiro's analysis of substitution is completely reliant on the Lenski Survey. As a result, Professor Shapiro's analysis of substitution cannot provide reliable results. In contrast, the Dhar Survey asks the right questions for this purpose. I thus was able to appropriately quantify the substitution effect (CCC) in my written direct testimony, the results of which are confirmed by the Simonson Survey submitted with SoundExchange's rebuttal testimony (see further discussion in Section VI).

A. Professor Shapiro's Use of the Lenski Survey

42. The Lenski Survey can be briefly summarized as follows.[46] The survey asked current SXM subscribers how they would spend their SXM listening time if they did not have their SXM service. Similarly, the Lenski Survey asked current Pandora subscribers how they would spend their Pandora listening time if they did not have their Pandora service. In each case, survey respondents were asked to allocate their SXM or Pandora listening time on a percentage basis among the set of choices presented, including the possibility that a portion of such time would not be spent listening to music at all (*i.e.*, a reduction in listening), with the allocation totaling 100% for each respondent. The table below summarizes the results of the Lenski Survey, as reported by Professor Shapiro.[47]

[45] *Compare* Shapiro WDT at 56 and App. D, *with* Willig WDT ¶ 40 and App. B.

[46] This summary is based on my review of the description provided in the Written Direct Testimony of Joe Lenski, October 19, 2016 ("Lenski WDT").

[47] Note that the percentage reduction in listening (on average) is the difference between 100% and the total shown in this table: 8.8% for Pandora and 10.0% for SXM.

Table D.1: Reallocation of Listening Time to Alternative Audio Media

Allocation to Medium	Allocation of Time From:	
	Pandora	Sirius XM
AM/FM radio	24.4%	40.8%
Interactive streaming	16.6%	7.8%
Non-interactive streaming	11.7%	14.3%
Sirius XM	5.3%	---
Podcasts	2.5%	2.4%
CDs and downloads	26.3%	23.1%
Other	4.4%	1.7%
Total allocation to alternative media	91.2%	90.0%

Source: Shapiro WDT at D-5, Table D-1

43. Professor Shapiro's use of the above results from the Lenski Survey to determine the relative FMC for SXM versus Pandora can be summarized as follows.[48] First, Professor Shapiro observes that, for the alternatives with no value to the record companies, the percentage of time shifted from SXM is *higher* than the percentage of time shifted from Pandora (refer to the table above):

- Terrestrial radio: 40.8% for SXM vs. 24.4% for Pandora
- Not listening to music: 10.0% for SXM vs. 8.8% for Pandora

44. Second, Professor Shapiro observes that, for alternatives with positive value for the record companies, the percentage of time shifted is *lower* from SXM than the percentage of time shifted from Pandora (refer to table above):

- Interactive streaming: 16.6% for Pandora vs. 7.8% for SXM
- Non-interactive streaming: 17.0% for Pandora vs. 14.3% for SXM[49]
- CDs and downloads: 26.3% for Pandora vs. 23.1% for SXM
- Podcasts/other: 2.5/4.4% for Pandora vs. 2.4/1.7% for SXM[50]

45. Based on the above two observations, Professor Shapiro concludes that the substitution component of FMC must be greater for Pandora than for SXM, even without quantifying any of the values indicated above. Professor Shapiro's reasoning is that the first set of options above have no value for either service (regardless of the percentages), and each component of the second set must be larger for Pandora than SXM, so the overall total must be larger for Pandora than SXM. In rough terms, there is about 20% more in the "no value"

[48] This summary is based on my review of Professor Shapiro's Written Direct Testimony. *See* Shapiro WDT at 56 and App. D.
[49] The figure for Pandora includes switching to SXM.
[50] Professor Shapiro indicates that this category is relevant only to the extent that podcasts and/or "other" generate compensation for the record companies. *See* Shapiro WDT at D-6.

categories for SXM and 20% more in the "positive value" categories for Pandora, according to Professor Shapiro.

B. Flaws in Professor Shapiro's Empirical Analysis

46. With the above background summary, I can now make clear the flaws in Professor Shapiro's use of the Lenski Survey to assess the substitution effect. The overriding and fundamental flaw is that the Lenski Survey does not ask the right questions for the purpose of assessing FMC or CCC. For this purpose, one must determine the extent to which dropping SXM service (or Pandora service) would affect compensation earned by music creators through other forms of music distribution. Because it focuses exclusively on how respondents would otherwise spend their listening *time*, the Lenski Survey cannot provide the information needed to assess the relevant effect, namely, the impact on creator compensation. Specific issues that the Lenski Survey fails to address with each of the options for alternative forms of music consumption are discussed in the remainder of this section.

47. First, there are several issues with respect to **interactive streaming services** that the Lenski Survey fails to address. Accordingly, the survey fails to provide the requisite information to assess substitution. While the Lenski Survey asks respondents the extent to which they would replace SXM listening with listening to an interactive streaming service, the impact of that shift on creator compensation would vary depending on the respondent's circumstances. In particular, there are three distinct circumstances:

- Purchasing a new subscription to a paid-interactive service;
- Increasing listening to a paid-interactive service to which the respondent already subscribes; and
- Increasing listening to an ad-supported interactive service (*e.g.*, the ad-supported version of Spotify).

48. The Lenski Survey does not distinguish between increased listening among the three alternatives listed above. Put another way, the survey does not ask respondents to identify whether they would be using a paid-subscription service or an ad-supported service, and it does not ask respondents whether they would be using an existing subscription or purchasing a new subscription. The same is true as to shifting from Pandora to an interactive streaming service. For these reasons, the Lenski Survey does not provide any way to assess the relative frequency with which SXM and Pandora respondents experience each of the above three circumstances. This is a critical shortcoming because the impact on creator compensation is very different in the three circumstances. Creators would receive significant compensation from the purchase of a new paid subscription service, whereas there would be no incremental rise in compensation for increased usage of an existing subscription (since its creator compensation is not linked to usage). Increased consumption of an ad-supported interactive service would provide some incremental compensation, since compensation from an ad-supported interactive service is linked to usage, but the amount could be significantly different from that provided by the paid-subscription option.

49. Thus, the Lenski Survey does not provide sufficient information to compare the impact on creator compensation of shifting from SXM to interactive services with the impact of switching from Pandora to interactive services. As just one example, it is plausible or perhaps even likely that a greater percentage of the Pandora sample than the SXM sample would shift to an ad-supported interactive service as opposed to a paid-subscription interactive service – because the Pandora sample includes many users of the ad-supported version of Pandora (with no subscription fee), whereas the SXM sample includes only users of an ad-free service, most of whom are paying a subscription fee. As such, even if the percentage of the time shifted toward interactive streaming services were greater for Pandora than for SXM respondents, it could be the case that the SXM respondents would nevertheless generate more creator compensation through that channel through the purchase of new subscriptions. The Lenski Survey and, hence, Professor Shapiro's analysis, cannot rule out this or myriad other possibilities that affect creator compensation. Accordingly, they cannot produce a reliable assessment of even the relative FMC for SXM and Pandora, let alone the absolute levels.

50. Second, turning to **non-interactive streaming** services reveals similar flaws in the Lenski Survey for purposes of assessing substitution. As with interactive services, there are both paid-subscription and ad-supported versions of non-interactive services. Therefore, the issues discussed above with respect to interactive services are applicable to this component as well. That is, the Lenski Survey fails to distinguish among: purchasing a new subscription to a paid-non-interactive service (*e.g.*, Pandora One/Plus), increased usage of an existing paid-non-interactive service, and increased usage of an ad-supported non-interactive service. And, again, such a distinction is critical because there are different terms or rates for creator compensation across these different possibilities. Thus, here too, Professor Shapiro's approach is unable to provide a reliable assessment of even the relative FMC for SXM and Pandora, let alone the absolute levels.

51. With regard to **CDs and downloads**, which is another component of substitution for which there is potential creator compensation, there are analogous flaws in the Lenski Survey for purposes of assessing substitution. For CDs/downloads there are two distinct forms of increased listening: (a) increased listening to music that the respondent already owns (or would have purchased while continuing to subscribe to SXM or Pandora), versus (b) increased listening to music that the respondent would not have purchased (or owned) with the continuation of SXM or Pandora. The Lenski Survey cannot and does not distinguish between these two forms of increased listening because it does not ask respondents whether they would change the extent to which they would purchase CDs/downloads in the absence of the SXM or Pandora service.[51] Again, this distinction is critical because it affects creator compensation: There is no incremental compensation from listening more to music recordings already owned, but there is incremental compensation from buying more music.[52] Thus, the Lenski Survey does not provide the information that would be needed to assess this component of substitution. To provide an illustration: It is plausible that SXM subscribers would otherwise buy more new music than Pandora listeners, since the SXM subscribers would be saving more money. The Lenski Survey result that more time would be shifted to CD/downloads from Pandora than from SXM is not

[51] *See* Shapiro WDT at 14 n.15; Lenski WDT at 6 n.4.
[52] In addition, creator compensation is not identical for CDs and downloads.

inconsistent with this hypothesis. Thus, finding that a higher percentage of Pandora listening shifts to CDs/downloads does not allow one to draw any valid conclusions about the relative effect on creator compensation for this component of possible substitution.

52. For purposes of assessing substitution, there is another general shortcoming of the Lenski Survey: it does not cover all potentially relevant music consumption. The Lenski Survey questions are limited to what the respondent would otherwise do with his/her SXM (or Pandora) listening time. However, that is too limited. Not having SXM (or Pandora) could affect music consumption and, as a result, creator compensation – at other times as well. The following are just a few examples:

- An SXM subscriber might listen to SXM only in the car and he/she might shift nearly all of his/her listening time in the car to traditional AM/FM radio. However, at the same time, instead of spending $10-15 per month on the SXM subscription, he/she might spend that money on CDs or downloads that he/she would not otherwise purchase, listening to those additional CDs or downloads at home rather than in the car. The Lenski Survey responses would not reflect this effect.

- Similarly, the respondent might switch listening from SXM to traditional AM/FM radio in the car, but decide to spend the money saved from not paying for SXM on a subscription to another service – perhaps Apple Music, Spotify Premium, or Pandora One/Plus – and listen to that service only outside the car. Again, the Lenski Survey would not capture that effect.

- Suppose that someone were to purchase a subscription to Apple Music or Spotify Premium, but only listen to that service for a portion of his/her car listening time (*e.g.*, suppose a respondent would switch to 75% AM/FM radio and 25% Apple Music). In that case, the respondent would still pay the full subscription price and the creators would still receive the full compensation (in aggregate). The amount of listening time does not affect the record companies' compensation. Record company compensation would be the same whether listening were split 90/10%, 75/25%, 50/50%, or 0/100%. The Shapiro/Lenski approach does not capture this feature of the marketplace.

53. The above situations are just examples to illustrate the general point: by focusing on "SXM listening time" (or "Pandora listening time"), the Lenski Survey is misaligned with the foundational information needs of assessing the substitution effects, FMCs and CCCs for the music distribution services.

C. Other Empirical Issues

54. In addition to its basic misalignment with the concept of FMC and CCC, there are a number of other features of the Lenski Survey that make it unsuitable for the purposes for

which Professor Shapiro employs it. In this section, I briefly touch on some of those issues as well as an issue of financial calibration and an issue of relevant time horizon.[53]

55. First, the Lenski Survey asks respondents what they listened to *before* they ever started listening to SXM (or Pandora), and asks respondents to list only a single service that SXM was mostly replacing.[54] This question is not only irrelevant, but likely biases the responses to the relevant question (what they would do without SXM or Pandora going forward) by putting "old" options, such as terrestrial radio for SXM respondents, at the forefront of their minds prior to asking them the relevant question.[55]

56. Second, the Lenski Survey asks whether the respondent has a paid subscription to Pandora One or SXM,[56] but the results that are reported and on which Professor Shapiro relies combine respondents who do and do not have a paid subscription.[57] Professor Shapiro provides no indication as to why the respondents without a paid subscription are relevant here.

57. Third, for purposes of converting the *per-subscriber-month* rate into a *percentage-of-revenue* rate, Professor Shapiro uses an ARPU for SXM of $12.80 per subscriber-month.[58] However, I have reviewed the rebuttal testimony of Professor Thomas Lys and understand that this is inconsistent with the ARPU for SXM as calculated pursuant to the terms of the SDARS license, which is $10.72 per subscriber-month.[59] The measures of ARPU must be employed consistently. Under Professor Shapiro's approach, SXM would undercompensate the content creators if the 8.1% figure were used. Assuming that Professor Shapiro's figure of $1.03 per subscriber-month were correct, which it is not, the appropriate percentage of revenue would be 9.6%. Furthermore, if the creator compensation [[redacted]], along with the correct ARPU ($10.72 per subscriber-month), the rate for SXM would be 24.3% of revenue.

58. Lastly, I note that Professor Shapiro fails to take into account the expected future trends that he himself indicates are likely. That is, Professor Shapiro indicates that streaming services likely will become more prevalent in the future (during the licensing period for this proceeding).[60] As such, SXM will compete more closely with other streaming services and less closely with AM/FM radio. This trend will tend to increase the FMC for SXM. I made this point in my written direct testimony.[61]

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[53] This is not intended to be an exhaustive discussion of all the relevant flaws in the Lenski Survey or in its use in Professor Shapiro's *Web IV* Approach.
[54] *See* Lenski WDT at App. B (Questions Q.8B, Q.8C, Q10B, and Q.10C).
[55] *See* Written Rebuttal Testimony of Ravi Dhar, February 19, 2017 ("Dhar WRT") at ¶¶ 12-14; Simonson WRT at ¶¶ 36-40.
[56] *See* Lenski WDT at App B (Question Q.5 and Q.9).
[57] *See* Dhar WRT at ¶ 24.
[58] *See* Shapiro WDT at 55.
[59] *See* Written Direct Testimony of Thomas Lys ("Lys WDT") at ¶ 151.
[60] *See* Shapiro WDT at 28.
[61] *See* Willig WDT ¶ 46.

59. In sum, the Lenski Survey is incapable of providing the information needed to assess the substitution effect, which entirely invalidates Professor Shapiro's employment of his *Web IV* Approach. In contrast, rather than focusing on the re-allocation of listening time, the Dhar Survey examines the impact on purchasing behavior. It is this purchasing behavior that determines the impact on creator compensation. Also, in contrast to the Lenski Survey, the Dhar Survey does distinguish between paid-subscription and ad-supported versions of different types of services and it does distinguish between listening to existing music (CDs/downloads) and buying new music. The Dhar Survey also does not suffer from being limited to time spent listening to SXM (or Pandora). This was all described in my written direct testimony, so there is no need to repeat it here.[62] Furthermore, as I discuss in Section VI, the Simonson Survey supports the conclusions that I based on the Dhar Survey.

V. Flaws in Professor Shapiro's *SDARS II* Roll-Forward Approach

60. In this section, I address Professor Shapiro's claim that the rate set in the *SDARS II* proceeding for 2017 (11% of revenue) serves as an upper bound on the appropriate rate for SXM in this proceeding.[63] For convenience, I term this his "*SDARS II* Roll-Forward Approach." In support of that claim, Professor Shapiro purports to analyze industry changes that have occurred since the prior SDARS proceeding to determine whether they indicate that any adjustments to the SXM rate are warranted.[64] He ultimately concludes that none of the industry changes indicate that an upward adjustment in the rate is warranted and, if anything, they indicate a downward adjustment is warranted. Professor Shapiro does not quantify any of the purported downward adjustments and, as such, he only claims that the prior rate of 11% is an "upper bound" for the current proceeding. As I discuss below, Professor Shapiro's assessment of the industry changes is flawed and there is no validity to his conclusion that the rate set in the *SDARS II* proceeding provides an upper bound for the current proceeding.

61. In his written direct testimony, Professor Shapiro identifies and considers the effects of three industry changes that have occurred since the *SDARS II* proceeding: (a) the shift in music distribution toward streaming services, (b) the growth of SXM subscribers, and (c) the increase in the prevalence of direct licensing agreements between music services and record labels.[65] In my rebuttal testimony, I focus on the first of those three changes – the shift in music distribution.[66] In particular, I show that, contrary to Professor Shapiro's analysis, this change suggests that an upward adjustment to the SXM rate is warranted.

A. Professor Shapiro's Assessment of the Shift in Music Distribution Towards Streaming

[62] *See* Willig WDT § VI and App. B.
[63] *See* Shapiro WDT at 34.
[64] *See* Shapiro WDT § 8.
[65] *See* Shapiro WDT at 28-31.
[66] Again, the fact that I do not address certain aspects of Professor Shapiro's testimony on this point should not be construed to indicate that I agree with such testimony.

62. Professor Shapiro acknowledges the recent major shift in music distribution towards streaming, largely at the expense of sales of physical forms of recorded music (primarily CDs) and permanent digital downloads. Specifically, Professor Shapiro notes that the share of record company revenue from streaming increased from 12% in 2012 to 43% in the first half of 2016.[67] Professor Shapiro further states that this trend is "likely to continue" during the statutory licensing period for the present proceeding (2018-2022).[68]

63. Professor Shapiro nevertheless dismisses this shift in distribution as having any relevant impact on rates.[69] As far as I can determine, Professor Shapiro does not specifically articulate in his written direct testimony his reasoning for concluding that the shift in distribution does not have any relevant impact on rates. There are only two places in his written direct testimony where Professor Shapiro even touches on an "argument" that might purport to support his conclusion. Neither provides a valid basis for his suggestion that the statutory rate in 2017 should provide an upper-bound on the rate set in this proceeding.

64. First, Professor Shapiro asserts that total record company revenue was "stable" from 2012 to 2015 and then increased in the first half of 2016.[70] However, he does not follow this assertion with any conclusions. In any case, this purported trend in gross revenue is not the appropriate metric for assessing the impact on creators of music content of the shift in distribution mix towards streaming. I explain this in more detail below.

65. Second, Professor Shapiro states that the 801(b)(1) "availability" objective is a relevant consideration for determining the SXM rate and that returns to music content creators are a relevant component in assessing the availability objective.[71] However, after laying out the conceptual economic framework related to assessing the availability objective in the current context – *i.e.*, whether there was a change in the considerations affecting availability since the *SDARS II* proceeding – Professor Shapiro does not present any corresponding empirical analysis.[72] Rather, he just states he is "not aware of any evidence indicating that such a change has occurred in recent years."[73]

B. My Analysis of the Impact on Creator Compensation of the Shift in Music Distribution Towards Streaming

66. For purposes of the remaining discussion in this section, I accept *arguendo* that there might be some perceived validity to the line of inquiry pursued by Professor Shapiro, namely, using the rate set in the *SDARS II* proceeding as a "starting point" and examining whether intervening industry changes suggest any adjustments to the rate set in that proceeding

[67] *See* Shapiro WDT at 28.
[68] *See* Shapiro WDT at 28.
[69] *See* Shapiro WDT at 29.
[70] *See* Shapiro WDT at 29.
[71] *See* Shapiro WDT at 31-32.
[72] Professor Shapiro does not link this discussion of the 801(b)(1) availability objective with his earlier discussion of the trend in industry gross revenue. *See* Shapiro WDT at 31-32.
[73] *See* Shapiro WDT at 32.

are warranted in light of the 801(b)(1) objectives. The question is then whether there is any evidence indicating that an adjustment to the SXM rate (upward or downward) is warranted based on the shift in music distribution mix. Contrary to Professor Shapiro, who denies awareness of evidence in either direction, I find that there is evidence indicating that an upward adjustment to the SXM rate is warranted.

67. The availability of creative works to consumers (in terms of the supply of recorded music) is affected by the returns to the content creators from the production of such creative works. As such, the effect of the shift in music distribution toward streaming on creator compensation is pertinent to assessing this policy objective. While Professor Shapiro and I appear to agree on these conceptual points, we differ on the empirical assessment. As I previously mentioned, in his written direct testimony, Professor Shapiro examines the trend in industry gross revenue over time.[74] However, there are several flaws in his analysis that render it unsuitable for assessing the 801(b)(1) availability objective. In particular, Professor Shapiro's analysis violates three basic economic principles:

- First, gross revenue is not the pertinent measure for assessing incentives – rather, the pertinent measure is returns. That is a basic economic concept. Thus, Professor Shapiro has examined the wrong metric.

- Second, examining the simple time trend is not the correct approach for measuring the impact of the shift in distribution mix. The reason is that the change over time can, and almost inevitably will, be affected by changes in other factors besides the shift in distribution mix, such as overall macroeconomic trends. As a result, the correct approach is to examine the actual value of creator compensation in 2016 versus what it would have been in 2016 but-for the shift in distribution mix (*i.e.*, keeping all other factors constant). Again, this is a basic economic principle that Professor Shapiro has failed to follow.

- Third, in examining trends, it is important to pick the correct "baseline" period. The *SDARS II* proceeding commenced in January 2011, with written direct testimony submitted in November 2011.[75] However, Professor Shapiro only presents data starting in 2012. Thus, he has failed to choose the appropriate baseline.

68. In contrast to Professor Shapiro, I presented in my written direct testimony an analysis of the impact of the shift in music distribution towards streaming that properly handled all of the issues discussed above.[76] Specifically,

- I examined creator compensation (returns to creators), rather than gross revenue as employed by Professor Shapiro.

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[74] *See* Shapiro WDT at 28 Fig. 5.

[75] Determination of Rates and Terms for Preexisting Subscription Services and Satellite Digital Audi Radio Services, Copyright Royalty Board, Docket No. 2011-1 CRB PSS/Satellite II, Federal Register, April 17, 2013, at 23076.

[76] *See* Willig WDT §§ III and IV.

- I compared actual with but-for creator compensation in 2016, rather than using the simple time trend as employed by Professor Shapiro.

- I used 2010 as the base year, rather than 2012 as employed by Professor Shapiro.

69. There is no need to repeat here the analysis presented in my written direct testimony, and there is no need to adjust my prior analysis based on Professor Shapiro's testimony. Rather, I just reiterate my findings and conclusions expressed in my written direct testimony: the shift in distribution mix has resulted in a creator compensation shortfall in 2016 of about $800 million per year.[77] And, pursuant to Professor Shapiro's assertion that the distribution mix is expected to continue to shift toward streaming, this shortfall would rise in the future if rates previously adopted are maintained.

70. Thus, contrary to Professor Shapiro's conclusion, there is evidence indicating that an upward adjustment in the rate for SXM set in the *SDARS II* proceeding is warranted in the current proceeding pursuant to the 801(b)(1) availability objective. Accordingly, the rate for SXM set in the *SDARS II* proceeding (11%) does not serve as an appropriate upper bound for the current proceeding.

VI. Concluding Remarks

71. My conclusion is that Professor Shapiro's *Web IV* Approach and his *SDARS II* Roll-Forward Approach are both severely flawed. Neither approach provides valid or reliable guidance as to the appropriate rate for SXM in this proceeding. Moreover, nothing in SXM's written direct filing causes me to change any of the opinions that I expressed in my written direct testimony.

72. To recap, with respect to Professor Shapiro's *Web IV* Approach, the key point is that his approach relies on *all* of the following to be appropriate, correct, and reliable:

- His use of Pandora as the benchmark, with consideration only of potential marginal cost differences between Pandora and SXM, as opposed to also considering relevant demand factors.

- His use of the *Web IV* statutory rate for Pandora, [[redacted]].

- His application of the statutory *per-play* rate for Pandora to SXM, as opposed to alternative measures of music content creator compensation (*per-subscriber-month* or *percentage-of-revenue*).

- His empirical analysis of FMC based on the Lenski Survey.

[77] *See* Willig WDT ¶ 29.

73. While Professor Shapiro's approach and, hence, the validity and reliability of his conclusions, requires *all of the above* to be appropriate, correct and reliable, in fact, none are so. The failure of any one invalidates his approach and they all fail. As a result, his approach should be viewed as unqualified for purposes of assessing the appropriate rate for SXM in this proceeding.

74. With respect to Professor Shapiro's *SDARS II* Roll-Forward Approach, the key point is that he fails to properly assess the implications of the major shift in music distribution mix towards streaming that has occurred since the *SDARS II* proceeding. Most notably, he focuses on the wrong metric (gross revenue as opposed to creator compensation) and he fails to account for other factors that have changed over time. As a result, Professor Shapiro's assertion that the prior rate (11% of revenue) serves as an appropriate upper bound on the rate for the current proceeding is unfounded.

75. In contrast, my analysis does not suffer from any of the above shortcomings. Professor Shapiro's testimony provides no reason for me to change any of the opinions that I expressed in my written direct testimony. To reiterate the bottom line expressed there: the appropriate rate for SXM is $2.55 to $3.94 per subscriber-month.

76. Furthermore, I have reviewed the results of the survey conducted by Professor Simonson for the rebuttal phase of this proceeding, and found that those results confirm the conclusion regarding the appropriate rate for SXM expressed in my written direct testimony, which was based on the Dhar Survey. I have reviewed Professor Simonson's testimony and understand that his survey adopted certain methodological features of the Lenski Survey, but corrected for flaws in the Lenski Survey so that the results could be used to assess the substitution effect.[78] For purposes of my approach, the most important aspect of the survey results (*i.e.*, the aspect having the biggest influence on the CCC for SXM) is the extent to which SXM subscribers would choose paid subscriptions to interactive and non-interactive services if they did not have their SXM subscription. The Simonson Survey shows that 31% of the respondents would choose a paid interactive subscription service and 33% would choose a paid non-interactive subscription service,[79] whereas the corresponding percentages from the Dhar Survey were the same or lower: 31% and 15%, respectively.[80] And, based on just these two components (paid subscription services), the Simonson Survey produces a CCC for SXM of $2.65 per subscriber-month,[81] which is greater than the CCC for SXM based on the Dhar Survey ($2.55 per subscriber-month).[82] Thus, if anything, the Simonson Survey results indicate that the appropriate rate for SXM is higher than I had expressed in my written direct testimony, which, again, was based on the Dhar Survey.

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[78] *See* Simonson WRT at ¶¶ 9, 46-50.
[79] *See* Simonson WRT at ¶ 69.
[80] *See* Willig WDT at 27, Table 2.
[81] This figure of $2.65 per subscriber-month is conservative in that it does not include other components of the Simonson Survey results that provide creator compensation – purchasing additional CDs and downloads, increased listening to ad-supported streaming services, and increased viewing of music videos.
[82] *See* Willig WDT at ¶ 41.

APPENDIX A

February, 2017

Curriculum Vitae

Name: **Robert D. Willig**

Address: 220 Ridgeview Road, Princeton, New Jersey 08540

Birth: 1/16/47; Brooklyn, New York

Marital Status: Married, four children

Education:

Ph.D. Economics, Stanford University, 1973
Dissertation: Welfare Analysis of Policies
Affecting Prices and Products.
Advisor: James Rosse

M.S. Operations Research, Stanford University, 1968.

A.B. Mathematics, Harvard University, 1967.

Professional Positions:

Lecturer with the rank of Professor, Woodrow Wilson School of Public and International Affairs, 2/2017 – 6/2017.

Professor of Economics and Public Affairs, Emeritus, Princeton University, 7/2016 –

Professor of Economics and Public Affairs, Princeton University, 7/1978 - 6/2016.

Principal External Advisor, Infrastructure Program, Inter-American Development Bank, 6/97-8/98.

Deputy Assistant Attorney General, U.S. Department of Justice, l989-1991.

Supervisor, Economics Research Department, Bell Laboratories, 1977-1978.

Visiting Lecturer (with rank of Associate Professor), Department of Economics and Woodrow Wilson School, Princeton University, 1977-78 (part time).

Economics Research Department, Bell Laboratories, 1973-77.

Lecturer, Economics Department, Stanford University, 1971-73.

Other Professional Activities

ABA Section of Antitrust Law Economics Task Force, 2010-2012

Advisory Committee, Compass Lexecon 2010 -

OECD Advisory Council for Mexican Economic Reform, 2008 - 2009

Senior Consultant, Compass Lexecon, 2008 -

Director, Competition Policy Associates, Inc., 2003-2005

Advisory Bd., Electronic Journal of I.O. and Regulation Abstracts, 1996-2008.

Advisory Board, Journal of Network Industries, 2004-2010.

Visiting Faculty Member (occasional), International Program on Privatization and Regulatory Reform, Harvard Institute for International Development, 1996-2000.

Member, National Research Council Highway Cost Allocation Study Review Committee, 1995-98.

Member, Defense Science Board Task Force on the Antitrust Aspects of Defense Industry Consolidation, 1993-94.

Editorial Board, Utilities Policy, 1990-2001.

Leif Johanson Lecturer, University of Oslo, November 1988.

Member, New Jersey Governor's Task Force on Market-Based Pricing of Electricity, 1987-89.

Co-editor, Handbook of Industrial Organization, 1984-89.

Associate Editor, Journal of Industrial Economics, 1984-89.

Director, Consultants in Industry Economics, Inc., 1983-89, 1991-94.

Fellow, Econometric Society, 1981-.

Organizing Committee, Carnegie-Mellon-N.S.F. Conference on Regulation, 1985.

Board of Editors, American Economic Review, 1980-83.

Nominating Committee, American Economic Association, 1980-1981.

Research Advisory Committee, American Enterprise Institute, 1980-1986.

Editorial Board, M.I.T. Press Series on Government Regulation of Economic Activity, 1979-93.

Program Committee, 1980 World Congress of the Econometric Society.

Program Committee, Econometric Society, 1979, 1981, 1985.

Organizer, American Economic Association Meetings: 1980, 1982.

American Bar Association Section 7 Clayton Act Committee, 198l.

Principal Investigator, NSF grant SOC79-0327, 1979-80; NSF grant 285-6041, 1980-82; NSF grant SES-8038866, 1983-84, 1985-86.

Aspen Task Force on the Future of the Postal Service, 1978-80.

Organizing Committee of Sixth Annual Telecommunications Policy Research Conference, 1977-78.

Visiting Fellow, University of Warwick, July 1977.

Institute for Mathematical Studies in the Social Sciences, Stanford University, 1975.

Published Articles and Book Chapters:

"Two-Sided Market Definition and Competitive Effects for Credit Cards After United States v. American Express" (with J. Gregory Sidak), The Criterion Journal on Innovation, v. 1, 1301, 2016.

"Unilateral Competitive Effects" (with Bryan Keating), in The Oxford Handbook on International Antitrust Economics, (Roger D. Blair and D. Daniel Sokol, eds.), Oxford University Press, 2014.

"Activating Actavis: A More Complete Story" (with Barry C. Harris, Kevin M. Murphy, and Matthew B. Wright), Antitrust, vol. 28, No. 2 (Spring), 2014.

"'Reverse Payments' in Settlements of Patent Litigation: Split Opinions on Schering-Plough's K-Dur (2005 and 2012)" (with John P. Bigelow), in The Antitrust Revolution (Sixth Edition), (J. Kwoka and Laurence White, eds.), Oxford University Press, 2013.

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World Bank Workshop on Digital Technology Adoption, Skills, Productivity and Jobs in Latin America
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George Mason Law Review Annual Antitrust Symposium: Antitrust in an Interconnected World
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Competition Law & Policy Institute of New Zealand Annual Workshop
"Merger Analysis Keynote" 2015

Economic Studies at Brookings: Railroads, Policy and the Economy
"The Industry Perspective" 2015

Georgetown University McDonough School of Business Railroad Economics Symposium
"The Role of Economic Theory in the 'Deregulated' Rail Industry" 2015

Brazilian School of Economics and Finance (FGV EPGE) Seminario
"Public Interest Regulation: Lessons from Railroads" 2015

NYU School of Law Conference on the Fiftieth Anniversary of United States v. Philadelphia National Bank: The Past, Present and Future of Merger Law
"Discussion with Agency Economists" 2013

Brookings Institution Conference on The Economics of the Airline Industry
"Airline Network Effects and Consumer Welfare" 2012

AGEP Public Policy Conference on Pharmaceutical Industry Economics, Regulation and Legal Issues; Law and Economics Center, George Mason University School of Law
"Pharmaceutical Brand-Generic Disputes" 2012

U.S.-EU Alliance Study Peer Review Conferences
"Review of Cooperative Agreements in Transatlantic Airline Markets" 2012
"The Research Agenda Ahead" 2012

Antitrust in the High Tech Sector Conference
"Developments in Merger Enforcement" 2012

Georgetown Center for Business and Public Policy, Conference on the Evolution of Regulation
"Reflections on Regulation" 2011

Antitrust Forum, New York State Bar Association
"Upward Price Pressure, Market Definition and Supply Mobility" 2011

American Bar Association, Antitrust Section, Annual Convention
"The New Merger Guidelines' Analytic Highlights" 2011

OECD and World Bank Conference on Challenges and Policies for Promoting Inclusive Growth
"Inclusive Growth From Competition and Innovation" 2011

Villanova School of Business Executive MBA Conference
"Airline Network Effects, Competition and Consumer Welfare" 2011

NYU School of Law Conference on Critical Directions in Antitrust
"Unilateral Competitive Effects" 2010

Conf. on the State of European Competition Law and Enforcement in a Transatlantic Context
"Recent Developments in Merger Control" 2010

Center on Regulation and Competition, Universidad de Chile Law School
"Economic Regulation and the Limits of Antitrust Law" 2010

Center on Regulation and Competition, Universidad de Chile Law School
"Merger Policy and Guidelines Revision" 2010

Faculty of Economics, Universidad de Chile
"Network Effects in Airlines Markets" 2010

Georgetown Law Global Antitrust Enforcement Symposium
"New US Merger Guidelines" 2010

FTI London Financial Services Conference
"Competition and Regulatory Reform" 2010

NY State Bar Association Annual Antitrust Conference
"New Media Competition Policy" 2009

Antitrust Law Spring Meeting of the ABA
"Antitrust and the Failing Economy Defense" 2009

Georgetown Law Global Antitrust Enforcement Symposium
"Mergers: New Enforcement Attitudes in a Time of Economic Challenge" 2009

Phoenix Center US Telecoms Symposium
"Assessment of Competition in the Wireless Industry" 2009

FTC and DOJ Horizontal Merger Guidelines Workshop
"Direct Evidence is No Magic Bullet" 2009

Northwestern Law Research Symposium: Antitrust Economics and Competition Policy
"Discussion of Antitrust Evaluation of Horizontal Mergers" 2008

Inside Counsel Super-Conference
"Navigating Mixed Signals under Section 2 of the Sherman Act" 2008

Federal Trade Commission Workshop on Unilateral Effects in Mergers
"Best Evidence and Market Definition" 2008

European Policy Forum, Rules for Growth: Telecommunications Regulatory Reform
"What Kind of Regulation For Business Services?" 2007

Japanese Competition Policy Research Center, Symposium on M&A and Competition Policy
"Merger Policy Going Forward With Economics and the Economy" 2007

Federal Trade Commission and Department of Justice Section 2 Hearings
"Section 2 Policy and Economic Analytic Methodologies" 2007

Pennsylvania Bar Institute, Antitrust Law Committee CLE
"The Economics of Resale Price Maintenance and Class Certification" 2007

Pennsylvania Bar Institute, Antitrust Law Committee CLE
"Antitrust Class Certification – An Economist's Perspective" 2007

Fordham Competition Law Institute, International Competition Economics Training Seminar
"Monopolization and Abuse of Dominance" 2007

Canadian Bar Association Annual Fall Conference on Competition Law
"Economic Tools for the Competition Lawyer" 2007

Conference on Managing Litigation and Business Risk in Multi-jurisdiction Antitrust Matters
"Economic Analysis in Multi-jurisdictional Merger Control" 2007

World Bank Conference on Structuring Regulatory Frameworks for Dynamic and Competitive South Eastern European Markets
"The Roles of Government Regulation in a Dynamic Economy" 2006

Department of Justice/Federal Trade Commission Section 2 Hearings
"(Allegedly) Monopolizing Tying Via Product Innovation" 2006

Fordham Competition Law Institute, Competition Law Seminar
"Monopolization and Abuse of Dominance" 2006

Practicing Law Institute on Intellectual Property Antitrust
"Relevant Markets for Intellectual Property Antitrust" 2006

PLI Annual Antitrust Law Institute
"Cutting Edge Issues in Economics" 2006

World Bank's Knowledge Economy Forum V
"Innovation, Growth and Competition" 2006

Charles University Seminar Series
"The Dangers of Over-Ambitious Antitrust Regulation" 2006

NY State Bar Association Antitrust Law Section Annual Meeting
"Efficient Integration or Illegal Monopolization?" 2006

World Bank Seminar
"The Dangers of Over-Ambitious Regulation" 2005

ABA Section of Antitrust Law 2005 Fall Forum
"Is There a Gap Between the Guidelines and Agency Practice?" 2005

Hearing of Antitrust Modernization Commission
"Assessment of U.S. Merger Enforcement Policy" 2005

LEAR Conference on Advances in the Economics of Competition Law "Exclusionary Pricing Practices"	2005
Annual Antitrust Law Institute "Cutting Edge Issues in Economics"	2005
PRIOR Symposium on States and Stem Cells "Assessing the Economics of State Stem Cell Programs"	2005
ABA Section of Antitrust Law – AALS Scholars Showcase "Distinguishing Anticompetitive Conduct"	2005
Allied Social Science Associations National Convention "Antitrust in the New Economy"	2005
ABA Section of Antitrust Law 2004 Fall Forum "Advances in Economic Analysis of Antitrust"	2004
Phoenix Center State Regulator Retreat "Regulatory Policy for the Telecommunications Revolution"	2004
OECD Competition Committee "Use of Economic Evidence in Merger Control"	2004
Justice Department/Federal Trade Commission Joint Workshop "Merger Enforcement"	2004
Phoenix Center Annual U.S. Telecoms Symposium "Incumbent Market Power"	2003
Center for Economic Policy Studies Symposium on Troubled Industries "What Role for Government in Telecommunications?"	2003
Princeton Workshop on Price Risk and the Future of the Electric Markets "The Structure of the Electricity Markets"	2003
2003 Antitrust Conference "International Competition Policy and Trade Policy"	2003
International Industrial Organization Conference "Intellectual Property System Reform"	2003
ABA Section of Antitrust Law 2002 Fall Forum "Competition, Regulation and Pharmaceuticals"	2002

Fordham Conference on International Antitrust Law and Policy
“Substantive Standards for Mergers and the Role of Efficiencies” 2002

Department of Justice Telecom Workshop
“Stimulating Investment and the Telecommunications Act of 1996” 2002

Department of Commerce Conference on the State of the Telecom Sector
“Stimulating Investment and the Telecommunications Act of 1996” 2002

Law and Public Affairs Conference on the Future of Internet Regulation
“Open Access and Competition Policy Principles” 2002

Center for Economic Policy Studies Symposium on Energy Policy
“The Future of Power Supply” 2002

The Conference Board: Antitrust Issues in Today’s Economy
“The 1982 Merger Guidelines at 20” 2002

Federal Energy Regulatory Commission Workshop
“Effective Deregulation of Residential Electric Service” 2001

IPEA International Seminar on Regulation and Competition
“Electricity Markets: Deregulation of Residential Service” 2001
“Lessons for Brazil from Abroad” 2001

ABA Antitrust Law Section Task Force Conference
“Time, Change, and Materiality for Monopolization Analyses” 2001

Harvard University Conference on American Economic Policy in the 1990s
“Comments on Antitrust Policy in the Clinton Administration” 2001

Tel-Aviv Workshop on Industrial Organization and Anti-Trust
“The Risk of Contagion from Multimarket Contact” 2001

2001 Antitrust Conference
“Collusion Cases: Cutting Edge or Over the Edge?” 2001
“Dys-regulation of California Electricity” 2001

FTC Public Workshop on Competition Policy for E-Commerce
“Necessary Conditions for Cooperation to be Problematic” 2001

HIID International Workshop on Infrastructure Policy
“Infrastructure Privatization and Regulation” 2000

Villa Mondragone International Economic Seminar
“Competition Policy for Network and Internet Markets” 2000

New Developments in Railroad Economics: Infrastructure Investment and Access Policies
"Railroad Access, Regulation, and Market Structure" 2000

The Multilateral Trading System at the Millennium
"Efficiency Gains From Further Liberalization" 2000

Singapore – World Bank Symposium on Competition Law and Policy
"Policy Towards Cartels and Collusion" 2000

CEPS: Is It a New World?: Economic Surprises of the Last Decade
"The Internet and E-Commerce" 2000

Cutting Edge Antitrust: Issues and Enforcement Policies
"The Direction of Antitrust Entering the New Millennium" 2000

The Conference Board: Antitrust Issues in Today's Economy
"Antitrust Analysis of Industries With Network Effects" 1999

CEPS: New Directions in Antitrust
"Antitrust in a High-Tech World" 1999

World Bank Meeting on Competition and Regulatory Policies for Development
"Economic Principles to Guide Post-Privatization Governance" 1999

1999 Antitrust Conference
"Antitrust and the Pace of Technological Development" 1999
"Restructuring the Electric Utility Industry" 1999

HIID International Workshop on Privatization, Regulatory Reform and Corporate Governance
"Privatization and Post-Privatization Regulation of Natural Monopolies" 1999

The Federalist Society: Telecommunications Deregulation: Promises Made, Potential Lost?
"Grading the Regulators" 1999

Inter-American Development Bank: Second Generation Issues In the Reform Of Public Services
"Post-Privatization Governance" 1999
"Issues Surrounding Access Arrangements" 1999

Economic Development Institute of the World Bank -- Program on Competition Policy
"Policy Towards Horizontal Mergers" 1998

Twenty-fifth Anniversary Seminar for the Economic Analysis Group of the Department of

Justice
"Market Definition in Antitrust Analysis" 1998

HIID International Workshop on Privatization, Regulatory Reform and Corporate Governance
"Infrastructure Architecture and Regulation: Railroads" 1998

EU Committee Competition Conference – Market Power
"US/EC Perspective on Market Definition" 1998

Federal Trade Commission Roundtable
"Antitrust Policy for Joint Ventures" 1998

1998 Antitrust Conference
"Communications Mergers" 1998

The Progress and Freedom Foundation Conference on Competition, Convergence, and the Microsoft Monopoly
Access and Bundling in High-Technology Markets 1998

FTC Program on The Effective Integration of Economic Analysis into Antitrust Litigation
The Role of Economic Evidence and Testimony 1997

FTC Hearings on Classical Market Power in Joint Ventures
Microeconomic Analysis and Guideline 1997

World Bank Economists --Week IV Keynote
Making Markets More Effective With Competition Policy 1997

Brookings Trade Policy Forum
Competition Policy and Antidumping: The Economic Effects 1997

University of Malaya and Harvard University Conference on The Impact of Globalisation and Privatisation on Malaysia and Asia in the Year 2020
Microeconomics, Privatization, and Vertical Integration 1997

ABA Section of Antitrust Law Conference on The Telecommunications Industry
Current Economic Issues in Telecommunications 1997

Antitrust 1998: The Annual Briefing
The Re-Emergence of Distribution Issues 1997

Inter-American Development Bank Conference on Private Investment, Infrastructure Reform and Governance in Latin America & the Caribbean
Economic Principles to Guide Post-Privatization Governance 1997

Harvard Forum on Regulatory Reform and Privatization of Telecommunications in the Middle East
Privatization: Methods and Pricing Issues 1997

American Enterprise Institute for Public Policy Research Conference
Discussion of Local Competition and Legal Culture 1997

Harvard Program on Global Reform and Privatization of Public Enterprises
"Infrastructure Privatization and Regulation: Freight" 1997

World Bank Competition Policy Workshop
"Competition Policy for Entrepreneurship and Growth" 1997

Eastern Economics Association Paul Samuelson Lecture
"Bottleneck Access in Regulation and Competition Policy" 1997

ABA Annual Meeting, Section of Antitrust Law
"Antitrust in the 21st Century: The Efficiencies Guidelines" 1997

Peruvian Ministry of Energy and Mines Conference on Regulation of Public Utilities
"Regulation: Theoretical Context and Advantages vs. Disadvantages" 1997

The FCC: New Priorities and Future Directions
"Competition in the Telecommunications Industry" 1997

American Enterprise Institute Studies in Telecommunications Deregulation
"The Scope of Competition in Telecommunications" 1996

George Mason Law Review Symposium on Antitrust in the Information Revolution
"Introduction to the Economic Theory of Antitrust and Information" 1996

Korean Telecommunications Public Lecture
"Market Opening and Fair Competition" 1996

Korea Telecommunications Forum
"Desirable Interconnection Policy in a Competitive Market" 1996

European Association for Research in Industrial Economics Annual Conference
"Bottleneck Access: Regulation and Competition Policy" 1996

Harvard Program on Global Reform and Privatization of Public Enterprises
"Railroad and Other Infrastructure Privatization" 1996

FCC Forum on Antitrust and Economic Issues Involved with InterLATA Entry
"The Scope of Telecommunications Competition" 1996

Citizens for a Sound Economy Policy Watch on Telecommunications Interconnection
"The Economics of Interconnection" 1996

World Bank Seminar on Experiences with Corporatization
"Strategic Directions of Privatization" 1996

FCC Economic Forum on the Economics of Interconnection
Lessons from Other Industries 1996

ABA Annual Meeting, Section of Antitrust Law
The Integration, Disintegration, and Reintegration
of the Entertainment Industry 1996

Conference Board: 1996 Antitrust Conference
How Economics Influences Antitrust and Vice Versa 1996

Antitrust 1996: A Special Briefing
Joint Ventures and Strategic Alliances 1996

New York State Bar Association Section of Antitrust Law Winter Meeting
Commentary on Horizontal Effects Issues 1996

FTC Hearings on the Changing Nature of Competition in a Global and Innovation-Driven Age
Vertical Issues for Networks and Standards 1995

Wharton Seminar on Applied Microeconomics
Access Policies with Imperfect Regulation 1995

Antitrust 1996, Washington D.C.
Assessing Joint Ventures for Diminution of Competition 1995

ABA Annual Meeting, Section of Antitrust Law
Refusals to Deal -- Economic Tests for Competitive Harm 1995

FTC Seminar on Antitrust Enforcement Analysis
Diagnosing Collusion Possibilities 1995

Philadelphia Bar Education Center: Antitrust Fundamentals
Antitrust--The Underlying Economics 1995

Vanderbilt University Conference on Financial Markets

Why Do Christie and Schultz Infer Collusion From Their Data? 1995

ABA Section of Antitrust Law Chair=s Showcase Program
Discussion of Telecommunications Competition Policy 1995

Conference Board: 1995 Antitrust Conference
Analysis of Mergers and Joint Ventures 1995

ABA Conference on The New Antitrust: Policy of the '90s
Antitrust on the Super Highways/Super Airways 1994

ITC Hearings on The Economic Effects of Outstanding Title VII Orders
"The Economic Impacts of Antidumping Policies" 1994

OECD Working Conference on Trade and Competition Policy
"Empirical Evidence on The Nature of Anti-dumping Actions" 1994

Antitrust 1995, Washington D.C.
"Rigorous Antitrust Standards for Distribution Arrangements" 1994

ABA -- Georgetown Law Center: Post Chicago-Economics: New Theories - New Cases?
"Economic Foundations for Vertical Merger Guidelines" 1994

Conference Board: Antitrust Issues in Today's Economy
"New Democrats, Old Agencies: Competition Law and Policy" 1994

Federal Reserve Board Distinguished Economist Series
"Regulated Private Enterprise Versus Public Enterprise" 1994

Institut d'Etudes Politiques de Paris
"Lectures on Competition Policy and Privatization" 1993

Canadian Bureau of Competition Policy Academic Seminar Series, Toronto.
"Public Versus Regulated Private Enterprise" 1993

CEPS Symposium on The Clinton Administration: A Preliminary Report Card
"Policy Towards Business" 1993

Columbia Institute for Tele-Information Conference on Competition in Network Industries, New York, NY
"Discussion of Deregulation of Networks: What Has Worked and What Hasn't" 1993

World Bank Annual Conference on Development Economics
"Public Versus Regulated Private Enterprise" 1993

Center for Public Utilities Conference on Current Issues Challenging the Regulatory Process
"The Economics of Current Issues in Telecommunications Regulation" 1992
"The Role of Markets in Presently Regulated Industries" 1992

The Conference Board's Conference on Antitrust Issues in Today's Economy, New York, NY
"Antitrust in the Global Economy" 1992
"Monopoly Issues for the '90s" 1993

Columbia University Seminar on Applied Economic Theory, New York, NY
"Economic Rationales for the Scope of Privatization" 1992

Howrey & Simon Conference on Antitrust Developments, Washington, DC
"Competitive Effects of Concern in the Merger Guidelines" 1992

Arnold & Porter Colloquium on Merger Enforcement, Washington, DC
"The Economic Foundations of the Merger Guidelines" 1992

American Bar Association, Section on Antitrust Law Leadership Council Conference, Monterey, CA
"Applying the 1992 Merger Guidelines" 1992

OECD Competition Policy Meeting, Paris, France
"The Economic Impacts of Antidumping Policy" 1992

Center for Public Choice Lecture Series, George Mason University Arlington, VA
"The Economic Impacts of Antidumping Policy" 1992

Brookings Institution Microeconomics Panel, Washington, DC,
"Discussion of the Evolution of Industry Structure" 1992

AT&T Conference on Antitrust Essentials
"Antitrust Standards for Mergers and Joint Ventures" 1991

ABA Institute on The Cutting Edge of Antitrust: Market Power
"Assessing and Proving Market Power: Barriers to Entry" 1991

Second Annual Workshop of the Competition Law and Policy Institute of New Zealand
"Merger Analysis, Industrial Organization Theory, and Merger Guidelines" 1991
"Exclusive Dealing and the Fisher & Paykel Case" 1991

Special Seminar of the New Zealand Treasury
"Strategic Behavior, Antitrust, and The Regulation of Natural Monopoly" 1991

Public Seminar of the Australian Trade Practices Commission
"Antitrust Issues of the 1990's" 1991

National Association of Attorneys General Antitrust Seminar
"Antitrust Economics" 1991

District of Columbia Bar's 1991 Annual Convention
"Administrative and Judicial Trends in Federal Antitrust Enforcement" 1991

ABA Spring Meeting
"Antitrust Lessons From the Airline Industry" 1991

Conference on The Transition to a Market Economy - Institutional Aspects
"Anti-Monopoly Policies and Institutions" 1991

Conference Board's Thirtieth Antitrust Conference
"Antitrust Issues in Today's Economy" 1991

American Association for the Advancement of Science Annual Meeting
"Methodologies for Economic Analysis of Mergers" 1991

General Seminar, Johns Hopkins University
"Economic Rationales for the Scope of Privatization" 1991

Capitol Economics Speakers Series
"Economics of Merger Guidelines" 1991

CRA Conference on Antitrust Issues in Regulated Industries
"Enforcement Priorities and Economic Principles" 1990

Pepper Hamilton & Scheetz Anniversary Colloquium
"New Developments in Antitrust Economics" 1990

PLI Program on Federal Antitrust Enforcement in the 90's
"The Antitrust Agenda of the 90's" 1990

FTC Distinguished Speakers Seminar
"The Evolving Merger Guidelines" 1990

The World Bank Speakers Series
"The Role of Antitrust Policy in an Open Economy" 1990

Seminar of the Secretary of Commerce and Industrial Development of Mexico
"Transitions to a Market Economy" 1990

Southern Economics Association
"Entry in Antitrust Analysis of Mergers" 1990
"Discussion of Strategic Investment and Timing of Entry" 1990

American Enterprise Institute Conference on Policy Approaches to the Deregulation of Network Industries
"Discussion of Network Problems and Solutions" 1990

American Enterprise Institute Conference on Innovation, Intellectual Property, and World Competition
"Law and Economics Framework for Analysis" 1990

Banco Nacional de Desenvolvimento Economico Social Lecture
"Competition Policy: Harnessing Private Interests for the Public Interest" 1990

Western Economics Association Annual Meetings
"New Directions in Antitrust from a New Administration" 1990
"New Directions in Merger Enforcement: The View from Washington" 1990

Woodrow Wilson School Alumni Colloquium
"Microeconomic Policy Analysis and Antitrust--Washington 1990" 1990

Arnold & Porter Lecture Series
"Advocating Competition" 1991
"Antitrust Enforcement" 1990

ABA Antitrust Section Convention
"Recent Developments in Market Definition and Merger Analysis" 1990

Federal Bar Association
"Joint Production Legislation: Competitive Necessity or Cartel Shield?" 1990

Pew Charitable Trusts Conference
"Economics and National Security" 1990

ABA Antitrust Section Midwinter Council Meeting
"Fine-tuning the Merger Guidelines" 1990
"The State of the Antitrust Division" 1991

International Telecommunications Society Conference
"Discussion of the Impact of Telecommunications in the UK" 1989

The Economists of New Jersey Conference
"Recent Perspectives on Regulation" 1989

Conference on Current Issues Challenging the Regulatory Process
"Innovative Pricing and Regulatory Reform" 1989
"Competitive Wheeling" 1989

Conference Board: Antitrust Issues in Today's Economy
"Foreign Trade Issues and Antitrust" 1989

McKinsey & Co. Mini-MBA Conference
"Economic Analysis of Pricing, Costing, and Strategic Business Behavior" 1989
1994

Olin Conference on Regulatory Mechanism Design
"Revolutions in Regulatory Theory and Practice: Exploring The Gap" 1989

University of Dundee Conference on Industrial Organization and Strategic Behavior
"Mergers in Differentiated Product Industries" 1988

Leif Johanson Lectures at the University of Oslo
"Normative Issues in Industrial Organization" 1988

Mergers and Competitiveness: Spain Facing the EEC
"Merger Policy" 1988
"R&D Joint Ventures" 1988

New Dimensions in Pricing Electricity
"Competitive Pricing and Regulatory Reform" 1988

Program for Integrating Economics and National Security: Second Annual Colloquium
"Arming Decisions Under Asymmetric Information" 1988

European Association for Research in Industrial Economics
"U.S. Railroad Deregulation and the Public Interest" 1987
"Economic Rationales for the Scope of Privatization" 1989
"Discussion of Licensing of Innovations" 1990

Annenberg Conference on Rate of Return Regulation in the Presence of Rapid Technical Change
"Discussion of Regulatory Mechanism Design in the Presence
of Research, Innovation, and Spillover Effects" 1987

Special Brookings Papers Meeting
"Discussion of Empirical Approaches to Strategic Behavior" 1987
"New Merger Guidelines" 1990

Deregulation or Regulation for Telecommunications in the 1990's
"How Effective are State and Federal Regulations?" 1987

Conference Board Roundtable on Antitrust
"Research and Production Joint Ventures" 1990
"Intellectual Property and Antitrust" 1987

Current Issues in Telephone Regulation
"Economic Approaches to Market Dominance: Applicability of Contestable Markets" 1987

Harvard Business School Forum on Telecommunications
"Regulation of Information Services" 1987

The Fowler Challenge: Deregulation and Competition in The Local Telecommunications Market
"Why Reinvent the Wheel?" 1986

World Bank Seminar on Frontiers of Economics
"What Every Economist Should Know About Contestable Markets" 1986

Bell Communications Research Conference on Regulation and Information
"Fuzzy Regulatory Rules" 1986

Karl Eller Center Forum on Telecommunications
"The Changing Economic Environment in Telecommunications: Technological Change and Deregulation" 1986

Railroad Accounting Principles Board Colloquium
"Contestable Market Theory and ICC Regulation 1986

Canadian Embassy Conference on Current Issues in Canadian -- U.S. Trade and Investment
"Regulatory Revolution in the Infrastructure Industries" 1985

Eagleton Institute Conference on Telecommunications in Transition
"Industry in Transition: Economic and Public Policy Overview" 1985

Brown University Citicorp Lecture
"Logic of Regulation and Deregulation" 1985

Columbia University Communications Research Forum
"Long Distance Competition Policy" 1985

American Enterprise Institute Public Policy Week
"The Political Economy of Regulatory Reform" 1984

MIT Communications Forum
"Deregulation of AT&T Communications" 1984

Bureau of Census Longitudinal Establishment Data File and Diversification Study Conference
"Potential Uses of The File" 1984

Federal Bar Association Symposium on Joint Ventures
"The Economics of Joint Venture Assessment" 1984

Hoover Institute Conference on Antitrust
"Antitrust for High-Technology Industries" 1984

NSF Workshop on Predation and Industrial Targeting
"Current Economic Analysis of Predatory Practices" 1983

The Institute for Study of Regulation Symposium: Pricing Electric, Gas, and Telecommunications Services Today and for the Future
"Contestability As A Guide for Regulation and Deregulation" 1984

University of Pennsylvania Economics Day Symposium
"Contestability and Competition: Guides for Regulation and Deregulation" 1984

Pinhas Sapir Conference on Economic Policy in Theory and Practice
"Corporate Governance and Market Structure" 1984

Centre of Planning and Economic Research of Greece
"Issues About Industrial Deregulation" 1984
"Contestability: New Research Agenda" 1984

Hebrew and Tel Aviv Universities Conference on Public Economics
"Social Welfare Dominance Extended and Applied to Excise Taxation" 1983

NBER Conference on Industrial Organization and International Trade
"Perspectives on Horizontal Mergers in World Markets" 1983

Workshop on Local Access: Strategies for Public Policy
"Market Structure and Government Intervention in Access Markets" 1982

NBER Conference on Strategic Behavior and International Trade
"Industrial Strategy with Committed Firms: Discussion" 1982

Columbia University Graduate School of Business, Conference on Regulation and New Telecommunication Networks
"Local Pricing in a Competitive Environment" 1982

International Economic Association Roundtable Conference on New Developments in the Theory of Market Structure

"Theory of Contestability" 1982
"Product Dev., Investment, and the Evolution of Market Structures" 1982

N.Y.U. Conference on Competition and World Markets: Law and Economics
"Competition and Trade Policy--International Predation" 1982

CNRS-ISPE-NBER Conference on the Taxation of Capital
"Welfare Effects of Investment Under Imperfect Competition" 1982

Internationales Institut fur Management und Verwalturg Regulation Conference
"Welfare, Regulatory Boundaries, and the Sustainability of Oligopolies" 1981
NBER-Kellogg Graduate School of Management Conference on the Econometrics of Market Models with Imperfect Competition
"Discussion of Measurement of Monopoly Behavior: An Application to the Cigarette Industry" 1981

The Peterkin Lecture at Rice University
"Deregulation: Ideology or Logic?" 1981

FTC Seminar on Antitrust Analysis
"Viewpoints on Horizontal Mergers 1982
"Predation as a Tactical Inducement for Exit" 1980

NBER Conference on Industrial Organization and Public Policy
"An Economic Definition of Predation" 1980

The Center for Advanced Studies in Managerial Economics Conference on The Economics of Telecommunication
"Pricing Local Service as an Input" 1980

Aspen Institute Conference on the Future of the Postal Service
"Welfare Economics of Postal Pricing" 1979

Department of Justice Antitrust Seminar
"The Industry Performance Gradient Index" 1979

Eastern Economic Association Convention
"The Social Performance of Deregulated Markets for Telecom Services" 1979

Industry Workshop Association Convention
"Customer Equity and Local Measured Service" 1979

Symposium on Ratemaking Problems of Regulated Industries
"Pricing Decisions and the Regulatory Process" 1979

Woodrow Wilson School Alumni Conference
"The Push for Deregulation" 1979

NBER Conference on Industrial Organization
"Intertemporal Sustainability" 1979

World Congress of the Econometric Society
"Theoretical Industrial Organization" 1980

Institute of Public Utilities Conference on Current Issues in Public Utilities Regulation
"Network Access Pricing" 1978

ALI-ABA Conference on the Economics of Antitrust
"Predatoriness and Discriminatory Pricing" 1978

AEI Conference on Postal Service Issues
"What Can Markets Control?" 1978

University of Virginia Conference on the Economics of Regulation
"Public Interest Pricing" 1978

DRI Utility Conference
"Marginal Cost Pricing in the Utility Industry: Impact and Analysis" 1978

International Meeting of the Institute of Management Sciences
"The Envelope Theorem" 1977

University of Warwick Workshop on Oligopoly
"Industry Performance Gradient Indexes" 1977

North American Econometric Society Convention
"Intertemporal Sustainability" 1979
"Social Welfare Dominance" 1978
"Economies of Scope, DAIC, and Markets with Joint Production" 1977

Telecommunications Policy Research Conference
"Transition to Competitive Markets" 1986
"InterLATA Capacity Growth, Capped NTS Charges and Long Distance Competition" 1985
"Market Power in The Telecommunications Industry" 1984
"FCC Policy on Local Access Pricing" 1983
"Do We Need a Regulatory Safety Net in Telecommunications?" 1982
"Anticompetitive Vertical Conduct" 1981
"Electronic Mail and Postal Pricing" 1980
"Monopoly, Competition and Efficiency": Chairman 1979

"A Common Carrier Research Agenda"	1978
"Empirical Views of Ramsey Optimal Telephone Pricing"	1977
"Recent Research on Regulated Market Structure"	1976
"Some General Equilibrium Views of Optimal Pricing"	1975

National Bureau of Economic Research Conference on Theoretical Industrial Organization

"Compensating Variation as a Measure of Welfare Change"	1976

Conference on Pricing in Regulated Industries: Theory & Application

"Ramsey Optimal Pricing of Long Distance Telephone Services"	1977

NBER Conference on Public Regulation

"Income Distributional Concerns in Regulatory Policy-Making"	1977

Allied Social Science Associations National Convention

"Merger Guidelines and Economic Theory"	1990
Discussion of "Competitive Rules for Joint Ventures"	1989
"New Schools in Industrial Organization"	1988
"Industry Economic Analysis in the Legal Arena"	1987
"Transportation Deregulation"	1984
Discussion of "Pricing and Costing of Telecommunications Services"	1983
Discussion of "An Exact Welfare Measure"	1982
"Optimal Deregulation of Telephone Services"	1982
"Sector Differentiated Capital Taxes"	1981
"Economies of Scope"	1980
"Social Welfare Dominance"	1980
"The Economic Definition of Predation"	1979
Discussion of "Lifeline Rates, Succor or Snare?"	1979
"Multiproduct Technology and Market Structure"	1978
"The Economic Gradient Method"	1978
"Methods for Public Interest Pricing"	1977
Discussion of "The Welfare Implications of New Financial Instruments"	1976
"Welfare Theory of Concentration Indices"	1976
Discussion of "Developments in Monopolistic Competition Theory"	1976
"Hedonic Price Adjustments"	1975
"Public Good Attributes of Information and its Optimal Pricing"	1975
"Risk Invariance and Ordinally Additive Utility Functions"	1974
"Consumer's Surplus: A Rigorous Cookbook"	1974

University of Chicago Symposium on the Economics of Regulated Public Utilities

"Optimal Prices for Public Purposes"	1976

American Society for Information Science

"The Social Value of Information: An Economist's View"	1975

Institute for Mathematical Studies in the Social Sciences Summer Seminar

"The Sustainability of Natural Monopoly" 1975

U.S.-U.S.S.R. Symposium on Estimating Costs and Benefits of Information Services
"The Evaluation of the Economic Benefits of Productive Information" 1975

NYU-Columbia Symposium on Regulated Industries
"Ramsey Optimal Public Utility Pricing" 1975

Research Seminars:

Bell Communications Research (2)	University of California, San Diego
Bell Laboratories (numerous)	University of Chicago
Department of Justice (3)	University of Delaware
Electric Power Research Institute	University of Florida
Federal Reserve Board	University of Illinois
Federal Trade Commission (4)	University of Iowa (2)
Mathematica	Universite Laval
Rand	University of Maryland
World Bank (3)	University of Michigan
Carleton University	University of Minnesota
Carnegie-Mellon University	University of Oslo
Columbia University (4)	University of Pennsylvania (3)
Cornell University (2)	University of Toronto
Georgetown University	University of Virginia
Harvard University (2)	University of Wisconsin
Attachment 1Hebrew University	University of
Wyoming Johns Hopkins University (2)	Vanderbilt
University	
M. I. T. (4)	Yale University (2)
New York University (4)	Princeton University (many)
Northwestern University (2)	Rice University
Norwegian School of Economics and Business Administration	Stanford University (5)
	S.U.N.Y. Albany

Expert Testimony of Robert Willig:

February 15, 2013 to February 16, 2017

PPL EnergyPlus, LLC, et al., v. Douglas R.M. Nazarian, in his official capacity as Chairman of the Maryland Public Service Commission, et al., In the United States District Court of Maryland Northern Division, Case No. 1:12-cv-01286-MJG, expert report 12/21/2012, supplemental expert report 02/01/2013, deposition testimony 02/14/2013, trial testimony 03/08/2013.

PPL EnergyPlus, LLC, et al., v. Robert Hanna (originally, Lee A. Solomon), in his official capacity as President of the New Jersey Board of Public Utilities, et al., In the United States District Court for the District of New Jersey, Case No. 3:11-cv-00745-PGS-DEA, expert report 02/06/2013, deposition 02/14/2013 and 02/21/2013, and trial testimony 4/9-10/2013.

Total Petrochemicals & Refining USA, Inc. v. CSX Transportation, Inc., Before the Surface Transportation Board, Docket Number NOR 42121, verified statement, 6/20/2013.

Australian Taxation Office - Rio Tinto Limited transfer pricing rules mediation matter, Expert Reports: 11/14/2013; 11/24/2013; 5/15/2014; and 8/29/2014.

GSI Technology, Inc. v. Cypress Semiconductor Corporation, United States District Court, Northern District of California, Case No. 5:11-cv-03613-EJD, expert report 3/28/2014, reply report 5/8/2014, deposition 5/29/2014.

In re: Cathode Ray Tube (CRT) Antitrust Litigation, In the United States District Court for the Northern District of California, San Francisco Division, MDL Docket No. 1917, Master File No. CV-07-5944-SC, expert report 8/5/2014; deposition 9/19/2014.

Amazon.com, Inc. v. Commissioner of the Internal Revenue Service, Tax Court Docket No. 31197-12, expert reports 6/6/2104 and 8/1/2014; deposition 9/11/2014; trial testimony 11/21/14.

Commonwealth of Massachusetts v. Partners Health Care System, et al., Suffolk Superior Court Civil Action No. 14-2033-BLS, affidavit 9/25/2014.

Before the Surface Transportation Board; Railroad Revenue Adequacy, Docket No. EP 722; Reply Verified Statement on Behalf of the Association of American Railroads, 11/4/14.

In re: Wellbutrin XL Antitrust Litigation, In the United States District Court for the Eastern District of Pennsylvania, No. 08-cv-2431, 2433, expert report 12/23/2014; deposition 1/20/2015.

In the Matter of the Merger of Exelon Corporation and Pepco Holdings, Inc., Before the Public Service Commission of Maryland, Case No. 9361, Rebuttal Testimony of Dr. Robert D. Willig, 1/7/2015; Rejoinder Testimony of Dr. Robert D. Willig, 1/29/2015; Hearing testimony, 1/30/2015.

In re: Domestic Drywall Antitrust Litigation, In the United States District Court for the Eastern District of Pennsylvania, MDL No. 2437 13-MD-2437, expert report 03/13/15; deposition 4/9/15, 4/10/15.

The Valspar Corporation, and Valspar Sourcing, Inc. v. Millennium Inorganic Chemicals, Inc., Court File No. 13-3214-RHK-LIB; The Valspar Corporation, and Valspar Sourcing, Inc. v. E.I. DuPont De Nemours and Company, Case No. 14-527-RGA; and The Valspar Corporation, and Valspar Sourcing, Inc. v. Huntsman International, LLC, and Kronos Worldwide, Inc., expert report 6/12/2015; deposition 7/16/2015.

Methodist Health Services Corporation v. OSF Healthcare System, In the United States District Court For the Central District of Illinois, Peoria Division, Case No.: 13-cv-1054, expert report 8/14/2015, deposition 10/8/2015, Reply Report, 9/2016.

BRFHH Shreveport, LLC d/b/a University Health Shreveport and Vantage Health Plan, Inc. v. Willis-Knighton Medical Center, d/b/a Willis-Knighton Health System, In the United States District Court for the Western District of Louisiana, Shreveport Division, Case No.: 5:15-CV-02057, Joint Declaration of Margaret E. Guerin-Calvert and Robert D. Willig 9/8/2015.

Australian Consumer and Competition Commission v. Informed Sources Pty Ltd & Ors, Before the Federal Court of Australia, Victoria Registry, File number VID450/2014, expert report 11/24/15.

Clark R. Huffman, Brandi K. Winters, Patricia L. Grantham, and Linda M. Pace, Individually and on behalf of all others similarly situated vs. The Prudential Insurance Company of America, In the United States District Court For the Eastern District of Pennsylvania, Civ. No. 2:10-cv-05135-EL, expert report 2/25/16, deposition 4/5/16.

Maxon Hyundai Mazda, et al., vs. Carfax Inc., In the United States District Court For the Southern District of New York, Case No.: 13 CV 2680 (AJN) (RLE), expert report 2/26/16, deposition 4/21/16.

Federal Trade Commission and Commonwealth of Pennsylvania vs. Penn State Hershey Medical Center and Pinnacle Health System, In the United States District Court For the Middle District of Pennsylvania, Civil Action No. 1:15-cv-02362, expert report 3/7/16, deposition 3/25/16, Trial testimony 4/15/16.

In the Matter of Business Data Services in an Internet Protocol Environment; Special Access for Price Cap Local Exchange Carriers; AT&T Corporation Petition for Rulemaking to Reform Regulation of Incumbent Local Exchange Carrier Rates for Interstate Special Access Services; Before the FCC; WC Docket No. 16-143; WC Docket No. 05-25; RM-10593; Declaration 8/8/16.

United States et al. v. Anthem Inc. and Cigna Corp., In the United States District Court For the District of Columbia, Civil Action No. 16-cv-01493 (ABJ), expert report 10/7/16, Rebuttal and supplemental expert report 10/28/16, deposition 11/9/2016, Trial testimony 12/2/16 and 1/3/17.

In the Matter of: Determination of Royalty Rates and Terms for Transmission of Sound Recordings by Satellite Radio and "Preexisting" Subscription Services (SDARS III), Before the United States Copyright Royalty Judges, Washington, D.C., Docket No. 16-CRB-0001 SR/PSSR (2018-2022), Written Direct Testimony 10/19/16.

Petition for Rulemaking to Adopt Revised Competitive Switching Rules, Before the Surface Transportation Board, Docket Number EP 711 (Sub-No. 1), verified statement 10/26/16.

In re: Evanston Northwestern Healthcare Corporation Antitrust Litigation, In the United States District Court Northern District of Illinois Eastern Division, Master File No. 07-CV-4446, expert report 10/26/16, deposition 1/12/17.

Independent Power Producers of New York, Inc. v. New York Independent System Operator, Inc., Before the Federal Energy Regulatory Commission, Docket No. EL13-62-002, declaration 1/26/17.

Calpine Corporation et. al. v. PJM Interconnection, L.L.C., Before the Federal Energy Regulatory Commission, Docket No. EL16-49-000, declaration 1/30/17.

I declare under penalty of perjury that the foregoing testimony is true and correct.

Date: 2/13/17

Robert Willig

Robert Willig