UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF NEW YORK

THOMAS LAUMANN, FERNANDA GARBER, ROBERT SILVER, GARRETT TRAUB, DAVID DILLON and PETER HERMAN, representing themselves and all other similarly situated, Plaintiffs v. NATIONAL HOCKEY LEAGUE, *et al.* Defendants	CA No. 12-1817 (SAS) ECF Case
FERNANDA GARBER, MARC LERNER, DEREK RASMUSSEN, ROBERT SILVER, GARRETT TRAUB, and PETER HERMAN, representing themselves and all other similarly situated, Plaintiffs v. OFFICE OF THE COMMISSIONER OF BASEBALL, *et al.* Defendants	CA No. 12-3704 (SAS) ECF Case **[FILED UNDER SEAL]**

REPLY DECLARATION OF DANIEL L. MCFADDEN

Emeritus Professor of Economics, University of California, Berkeley
Presidential Professor of Health Economics, University of Southern California

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I. Introduction and summary of conclusions

1. My name is Daniel L. McFadden. I previously filed a Declaration (the "McFadden Declaration") in the above-captioned cases.[1] Subsequently, Dr. Roger Noll has filed a Reply Declaration (the "Noll Reply Declaration") that, in part, responds to claims in the McFadden Declaration.[2] I was asked by counsel for the Defendants in the above-captioned cases to evaluate the opinions and modeling in the Noll Reply Declaration.
2. In the McFadden Declaration, I conclude that "Dr. Noll's model and conclusions are unreliable and fail to meet accepted scientific standards."[3] Based upon my review of the Noll Reply Declaration and the associated backup materials, I continue to believe that Dr. Noll's model is unreliable for estimating alleged injury and damages arising from the leagues' use of home television territories ("HTT"), despite the substantial changes made by Dr. Noll to his model.
3. Specifically, I conclude that:

    - Dr. Noll's results continue to be disconnected from the underlying viewership data. In particular, his model understates the variety of individual team RSNs watched by subscribers to the league bundle.
    - Dr. Noll uses a biased approach to impute missing Regional Sports Network (RSN) viewing times. These viewing times are missing for all observations in the NHL GameCenter LIVE data.
    - The market sizes used by Dr. Noll are likely grossly overstated relative to the but-for world that Dr. Noll identifies in the Noll Reply Declaration.

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[1] Declaration of Daniel L. McFadden, filed November 12, 2014 (submitted in cases CA No. 12-3704 (SAS) and CA No. 12-1817 (SAS) in S.D.N.Y).

[2] Reply Declaration of Roger G. Noll, filed December 29, 2014 (submitted in cases CA No. 12-3704 (SAS) and CA No. 12-1817 (SAS) in S.D.N.Y).

[3] McFadden Declaration, p. 3.

- Dr. Noll incompletely accounts for blackouts in out-of-market RSN offerings and the league bundle.

The first three points all act to make the league bundle appear less desirable to consumers in the but-for world than would be implied by data.[4] As a result, the but-for world league bundle price is underestimated and therefore alleged damages are overstated in Dr. Noll's new model. Thus, I find Dr. Noll's new model to be unreliable for use by the court.

4. Due to the short period that I had to respond to the Noll Reply Declaration, I have focused my attention to the case of the NHL and I will continue to conduct similar analyses for the other two data sources considered by Dr. Noll and perform further diagnostics of Dr. Noll's new model. Furthermore, I discuss only selected elements of the Noll Reply Declaration and reserve the opportunity to offer additional testimony as the cases progress, including at the scheduled ***Daubert*** hearing.

II. Dr. Noll has introduced a new model in the Noll Reply Declaration

5. In the Noll Reply Declaration, Dr. Noll responds based upon a new model that has several major departures from the two prior versions of the model that he submitted in this matter.[5] There are three major changes Dr. Noll made to his model in response to my critiques:[6]

- Dr. Noll records viewing times at the RSN, rather than team, level to rebut my criticisms that he incorrectly derived the utility-maximizing behavior of consumers when viewing times are double counted (***i.e.***, once for each team participating in a game).

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[4] The impact of the last point is ambiguous.

[5] Declaration of Roger G. Noll filed February 18, 2014 and Supplemental Declaration of Roger G. Noll filed September 19, 2014 (submitted in cases CA No. 12-3704 (SAS) and CA No. 12-1817 (SAS) in S.D.N.Y).

[6] There are other changes as well, including increasing the number of simulated potential buyers of league and team packages to address the random ordering of team prices.

- Dr. Noll allocates viewers in his estimation and simulation steps into three categories: fans of a single team, fans of two teams, and fans of more than two teams. He determines the proportion of fans in each category based upon the proportion of time fans spent watching their "favorite" teams.
- Dr. Noll presents a different number of choices to each viewer depending upon his or her type in his simulation exercise to determine the counterfactual market shares and prices.

6. Dr. Noll's changes have the effect of addressing specific illustrative critiques that I make in the McFadden Declaration, but his new model still fails to make appropriate use of the viewership data. As a result, each of the changes listed above has introduced new problems to his approach. In this brief Reply Declaration, I highlight these new issues as well as issues that remain from the previous iterations of his model.

III. But-for world outcomes are not driven by intensity of viewership

7. As I discuss in the McFadden Declaration, Dr. Noll's damages are largely determined by assumptions regarding market share and marginal cost and less dependent on the viewership data. There, I show that Dr. Noll's model was insensitive to the allocation of viewing times across teams. In this section, I show that Dr. Noll's new damages estimates are not sensitive to the intensity of viewing.

8. As a new test of the relationship between damages and the data used in Dr. Noll's model, I take the estimated RSN viewing times for each subscriber and divide them in half. This preserves the ranking of team viewing times and the number of RSNs viewed for each subscriber (***i.e.,*** the allocation), but significantly decreases the quantity of viewing out-of-market sports broadcasting (***i.e.,*** the intensity). I run Dr. Noll's model on these halved data and calculate but-for world outcomes. The results are presented in Table 1 along with the results using the original data.

Table 1: But-for world outcomes using the actual and halved viewing time GameCenter LIVE data

Data	Bundle price	Bundle share	Avg. team price	Total team share
Actual	$17.98	1.08%	$6.24	11.22%
Halved	18.12	1.25%	$6.73	10.81%

9. Using the halved data, the price of the league bundle differs (upwardly) by only 14 cents, while the market share for it and the individual RSNs combined are very similar when using the actual and the halved data. This demonstrates that Dr. Noll's model is not primarily driven by the level of viewing times, but instead by fixed parameters related to market shares and margins. Dr. Noll's model accounts for the decreased intensity of viewing by decreasing the price sensitivity of subscribers, leaving the overall value of the league bundle fixed by the price and market share of the league bundle in the actual world. Put another way, damages are driven mostly by assumptions about market share (and margin), rather than the underlying viewership data.

IV. Dr. Noll's new model continues to generate predictions contrary to the actual viewership data

10. A fundamental requirement of scientifically valid economic models is that they are able to replicate the basic features of the environment that they mimic. This is particularly true of the specific features of the data that the estimation procedure is designed to mimic. A primary point that I make in the McFadden Declaration is that Dr. Noll's results are not tied to the underlying viewership data that he uses. In response, Dr. Noll now estimates a model specifically designed to pass (some of) the diagnostics that I propose in the McFadden Declaration, rather than create a model better suited to using the available data. In doing so, he has introduced new ways that his model is disconnected from the viewership data and, as a result, his model continues to be scientifically unreliable.

11. In his new model, Dr. Noll classifies subscribers as fans of one, two, or three or more teams based upon the proportion of time that they spend watching their favorite teams. As I show below, using this procedure, Dr. Noll under-predicts the variety of RSNs actually viewed in the data. In fact, despite being designed to match the proportion of viewing times for fans' favorite teams observed in the data, Dr. Noll's model fails to do so. Additionally, Dr. Noll uses a biased method to impute missing RSN viewing records, itself an independent methodological flaw. Each of these issues serves to lower the value that a consumer is expected to derive from the league bundle, leading to understated values for the league bundle in the but-for world, and render the model unsound as a scientific aid to the court. I elaborate on these points in the following sections.

A. DR. NOLL'S NEW MODEL UNDERPREDICTS THE VARIETY IN RSN VIEWING AND DOES NOT ACCURATELY PREDICT THE DISTRIBUTION OF FAVORITE TEAMS' VIEWING TIMES

12. The determination of but-for world market share and price of the league bundle depend upon the extent to which individual team RSNs are viewed as reasonable substitutes. As a result, a scientifically valid model must accurately capture the value of the league bundle relative to that of a single RSN. The prime advantage of the league bundle over an individual RSNs is that it offers access to all (non-blacked out) RSNs. Hence, for a model to be useful, it must accurately reflect how valuable a consumer finds the RSNs of teams other than his favorite. Contrary to the data, Dr. Noll's model asserts that the majority of consumers get no value from these additional RSNs, rendering his model incapable of accurately capturing the relative value of the league bundle to the individual RSNs and distorting but-for world outcomes.

13. Dr. Noll estimates that [redacted] of GameCenter LIVE subscribers prefer to watch a single RSN. Hence, in the simulation that he uses to estimate but-for world prices and market shares, [redacted] of his predicted subscribers prefer to watch only one RSN. For these consumers, they are

offered their preferred RSN, the league bundle, and the option not to subscribe to programming. The consumers make this decision based upon the deterministic components of utility that Dr. Noll models plus a random component.

14. For the single-RSN fans, Dr. Noll assumes that, even were they to have access to all (non-blacked out) RSNs in the league bundle, the only RSN that they would watch would be their preferred RSN. That is, for [redacted] of Dr. Noll's market, these consumers get no value from any other RSN that is part of the league bundle—Dr. Noll's model "zeroes out" all value from other RSNs.

15. According to his estimation, [redacted] of GameCenter LIVE subscribers prefer two RSNs.[7] These subscribers only derive value from two RSNs when they have the league bundle. Hence, only [redacted] of his potential market would watch more than two RSNs when they have access to the league bundle that contains ***all*** RSN feeds.

16. In Table 2, I compare the viewing patterns dictated by Dr. Noll's estimation to those that actually arise in the GameCenter LIVE data used by Dr. Noll. While the model finds that only [redacted] of consumers would view more than two RSNs, [redacted] of viewers in the data do so. As in the previous versions of his model, the predicted viewing data is significantly disconnected from the actual viewing data.

Table 2: Actual versus predicted GameCenter LIVE subscriber types

Subscriber behavior	Actual data %	Predicted data %
Watches a single RSN	[redacted]	[redacted]
Watches two RSNs		
Watches more than two RSNs		

[7] Dr. Noll reports that the proportions of subscribers preferring a single team, two teams, and three or more teams are [redacted] percent respectively (Noll Reply Declaration, p. 39). I believe that these numbers were calculated in error and provide results based upon my review of his backup materials.

17. By assuming that the vast majority of consumers only derive value from one or two RSNs in the league bundle and zeroing out the remainder, Dr. Noll effectively devalues the league bundle in his model and, as a result, understates the price that consumers would be willing to pay for the bundle in the but-for world. As a matter of economic science, this renders the model unreliable as a predictor of but-for world outcomes.

18. The degree of zeroing out of RSN value is determined by the proportion of time subscribers spend watching their favorite teams. Specifically, Dr. Noll's model incorporates four new equations that attempt to match the distribution of this proportion in multiple ways. In Figure 1, I compare predictions of this proportion from Dr. Noll's new model to the actual GameCenter LIVE data.

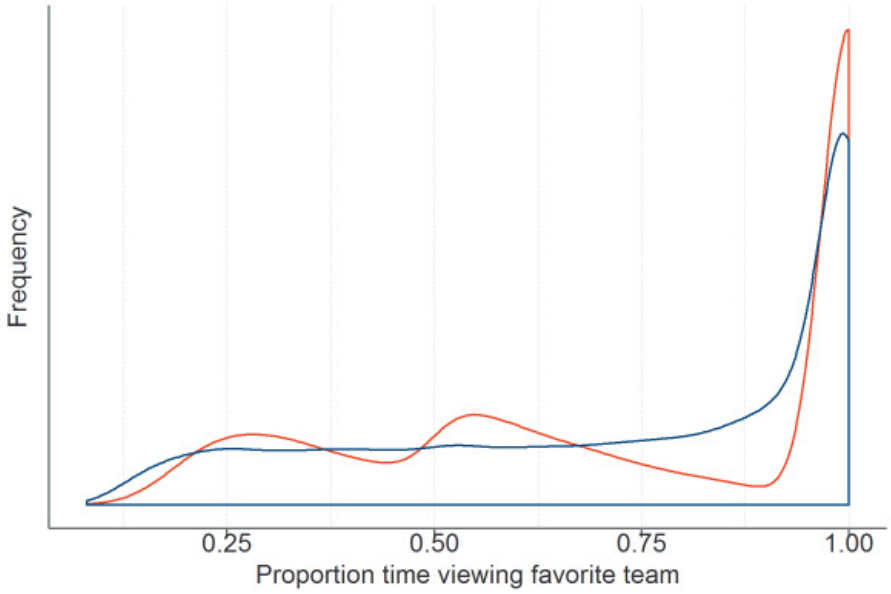

Figure 1: Actual (blue) and predicted (red) frequencies of the proportion of time spent watching GameCenter LIVE subscribers' favorite teams

19. As expected based upon the RSN viewing results above, Dr. Noll's new model over-predicts the proportion of fans who view a single RSN—that is, the proportion of fans who only watch their favorite teams. The predicted distribution also has "humps" that arise from Dr. Noll's discrete characterization of fans as viewing only two RSNs versus three or more (in

addition to the peak at viewing time for a single RSN). Despite using four equations to match this distribution, Dr. Noll's model fails to do so. This is because of Dr. Noll's artificial, discrete characterization of viewers as fans of one, two, or three or more clubs.

20. The results in this section arise from the four new equations that Dr. Noll introduces, which all focus on the share of subscriber's viewing time spent watching his most preferred team's RSN. Instead of these equations, Dr. Noll should have matched the proportions of consumers that he predicts will watch a single RSN, two RSNs, three RSNs, ***etc.*** to the actual data, then ensured that the predicted proportions of fans who watch the Anaheim Ducks RSN, the Boston Bruins RSN, the Buffalo Sabres RSN, ***etc.*** are the same as in the actual data. This is analogous to the approach taken in the Crawford and Yurukoglu paper that Dr. Noll claims as a basis for his approach.[8] There, the authors first model whether a household watches a particular television channel at all, then they model how much the household would watch the channel given that they do watch it. As I have discussed at my deposition, Dr. Noll could have made better use of the actual data and filled any gaps with survey data, a standard approach in our field.

B. DR. NOLL ESTIMATES MISSING RSN VIEWING TIMES IN A BIASED MANNER

21. The accuracy of a model is limited by the quality of the data used to estimate it. If the data used to determine the parameters of the model is inaccurate, then the model's predictions can be unreliable. In his new approach, Dr. Noll uses RSN viewing times, rather than the double-counted team viewing times from his previous two reports (a data structure that led to mistakes in Dr. Noll's utility maximization calculations). Though the DirecTV and MLB.tv

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[8] Crawford, G. and Yurukoglu, A. (2012) "The Welfare Effects of Bundling in Multichannel Television Markets" ***American Economic Review*** Vol. 102(2): 643-685.

data do generally report which RSN feed an individual was watching, his NHL data contain no information about which feed was viewed. While Dr. Noll states that "the data that were produced do not always record the identity of the channel on which a viewer watched a game," the NHL data never contain this information.[9] Instead, these data only list which game is being viewed.

22. To assign time viewing a game to an unknown RSN, Dr. Noll ranks teams by hours of viewing, where viewing time is counted once for each team in the match. Then, all hours played by the most-watched team are allocated to that team's RSN, then all hours remaining that were watched by the second most-watched team are allocated to that RSN, and so on until all the viewing times are assigned to RSN feeds.

23. To evaluate the accuracy of this procedure, I consider the DirecTV data. These observations provide the specific RSN watched by a viewer. I take these data and apply the allocation approach used by Dr. Noll for the entirety of the NHL data to get predicted viewing times. Then, I compare the actual viewing times with those arising from Dr. Noll's approach. Specifically, I focus on the proportion of time that a viewer watches his or her favorite team, a value of particular importance in the Noll Reply Declaration; indeed, all four new equations that he introduces involve this proportion.

24. In calculating this proportion, Figure 2 reveals that the predicted results are systematically biased. Over 88% of DirecTV subscribers have predicted viewing times for their favorite teams that are higher than they actually are; in the figure, this is indicted by the points that

[9] Noll Reply Declaration, p. 35.

lie above the red diagonal line. On average, the proportion of time spent viewing a subscriber's favorite team is overestimated by 31% when using Dr. Noll's method.[10]

25. Dr. Noll's biased approach to estimating RSN viewing times for the favorite team has important consequences for his analysis. In particular, it makes viewers appear more interested in a single team than they actually are; put another way, it makes them appear less interested in watching a variety of teams. As a result, the league bundle will appear less valuable than it actually is, lowering its price in the but-for world.

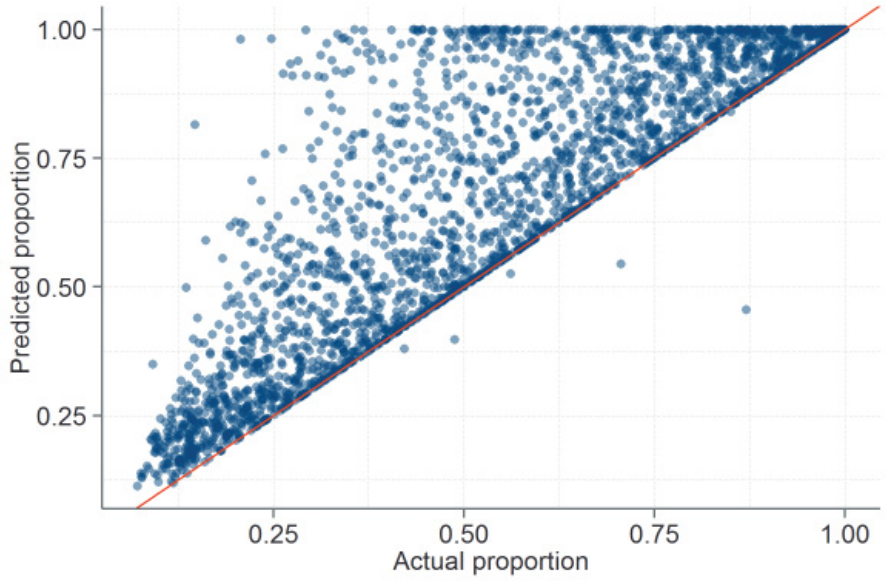

Figure 2: Actual and predicted proportions of time viewing DirecTV subscribers' favorite teams

26. Because Dr. Noll's model is predicated on the effects of competition between the league bundle and individual RSN offerings, replicating the diversity of viewer preferences over RSN feeds—the number watched and for how long—is critical to the reliability of his

[10] Put another way, the predicted proportion is on average 12 percentage points higher than the actual value.

conclusions. Reviewing the predictions of Dr. Noll's model compared to actual viewing behavior shows that the analysis lacks basic cohesiveness and connection to the viewing data and does not pass a basic screen for model validity.

V. Dr. Noll improperly inflates the size of the potential market

27. A valid structural economic model must be estimated based on accurate data in order for the results to be useful for scientific purposes. A key data element for Dr. Noll's model is the market share obtained by the MLB and NHL league packages for out-of-market games. Dr. Noll has clarified that in-market games are not blacked out in his but-for world.[11] Hence, the potential market is specifically for access to out-of-market RSNs that have blackouts specific to each HTT.

28. Dr. Noll assumes that the market size is the average number of viewers of the 2012 Stanley Cup Finals for the NHL data and the 2012 World Series for MLB data. These were arbitrary, imperfect estimates of the number of hockey and baseball fans in the country respectively. But, more importantly for purposes here, they are not justified as estimates of the numbers of fans of out-of-market hockey or baseball teams in the country.

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[11] Prior to the Noll Reply Declaration, his conception of the but-for world was not clear. For example, during his deposition, Dr. Noll had this exchange (Deposition of Roger G. Noll, October 16, 2014, p. 311):

> Q. So -- so this would not -- if, in fact, the but-for world involved just a change in out-of-market territories, your model would not apply to just -- to just that? If it didn't -- if it didn't change the in-market rights, it just changed the out-of-market rights, your model would not apply?
> A. You'd have to reestimate the model, because the very first thing that would change is the market shares of the individual channels would go down because they had less access to the market. Because their market shares went down, their equilibrium price would change.

29. An internal marketing document prepared for DirecTV estimates the potential market size for the Extra Innings package.[12] The survey estimates that, in 2009, [redacted] DirecTV subscribers are fans of out-of-market teams and [redacted] are baseball fans, but not fans of an out-of-market team.[13] Hence, internal DirecTV estimates find that only [redacted] of its subscribers who are baseball fans are fans of an out-of market team. This suggests that Dr. Noll's estimates of the size of the markets are likely [redacted]

30. Because the market size assumption is crucial in determining the demand elasticity, the value chosen must be well-founded, yet Dr. Noll has not provided any basis for his estimates of the relevant market sizes. Dr. Noll fails to accurately measure the inputs that directly affect the model results and therefore the model cannot be used for valid inference of any features of the market.

VI. Dr. Noll does not correctly account for in-market blackouts

31. Dr. Noll states that he "incorporate[s] the restrictions on consumer choice that are created by blackout rules."[14] He claims to accomplish this by not permitting a simulated consumer to choose a blacked out RSN and values arising from the blacked out RSN are zeroed out when considering the league bundle. While these steps are correct, they are not sufficient, leading Dr. Noll to incompletely account for in-market blackouts.

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[12] "MLB Extra Innings Pricing Study Full Report," dated December 13, 2012 (DTV-SP0001208).

[13] Further note that DirecTV's internal study finds a total baseball market size of [redacted] households, while Dr. Noll assumes a market size of [redacted], notwithstanding the fact that the majority of DirecTV households are [redacted]. Hence, his market size is [redacted].

[14] Noll Reply Declaration, p. 41.

32. For example, consider a simulated NHL consumer living within the New York City RSN.[15] Here, the Devils, Islanders, and Rangers would all be blacked out. The value derived from these teams should be set to 0 in the league bundle and the consumer should not be permitted to purchase these RSNs individually. Dr. Noll implements these restrictions.

33. Now consider the viewing times possible for other teams. The Pittsburgh Penguins played each of these three New York area teams 6 times in 2011-2012, implying 18 of the Penguins' 82 games (22%) would be blacked out on its own RSN when broadcast into New York City. On the other hand, the San Jose Sharks played each team only once, implying 3 of 82 games (4%) broadcast into New York City would be blacked out.

34. The correct approach to accounting for in-market blackouts would cap the possible viewing time for each team based upon the actual number of games that could be viewed within a particular HTT. This is a point that I made in the McFadden Declaration and which remains uncorrected in Dr. Noll's new model.[16]

VII. Conclusion

35. Based on my review of both of the Noll Reply Declaration, I conclude that Dr. Noll's model continues to be disconnected from the viewership data and that Dr. Noll incorrectly accounts for blackouts and market size in his new model. As a result, his approach is unreliable for estimating impact or injury arising from the leagues' use of HTTs.

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[15] Dr. Noll's new model explicitly simulates consumers by RSN.

[16] McFadden Declaration, p. 20.

Executed on January 16, 2014 at Berkeley, California