Exhibit 11

[PUBLIC VERSION - REDACTED]

1   UNITED STATES DISTRICT COURT

2   NORTHERN DISTRICT OF CALIFORNIA

3   OAKLAND DIVISION

4

5   THE APPLE iPOD iTUNES   Lead Case No. C 05-00037
    ANTI-TRUST LITIGATION

6

7   _____

8   This Document Relates To:

9   ALL ACTIONS

10 _____

11

12

13

14   CONFIDENTIAL - ATTORNEYS' EYES ONLY

15   VIDEOTAPED DEPOSITION OF ROGER G. NOLL, PH.D.

16   Wednesday, December 18, 2013

17   Palo Alto, California

18

19

20

21

22

23 Reported by:
    Darcy J. Brokaw
24 RPR, CRR, CSR No. 12584

25 Job No. 10008944

1   regression are correlated within a particular group

2   and you don't do anything to correct for that, what

3   would be the impact on the reported standard errors?

4   MS. BERNAY: Objection. Vague and

5   ambiguous.

6   THE WITNESS: I didn't completely follow

7   the question. Ask it again.

8   BY MR. KIERNAN:

9   Q. If the residual errors in the regression

10   are correlated within a particular group and you

11   don't do anything to correct for that, what would be

12   the impact on the reported standard errors?

13   MS. BERNAY: Same objection.

14   THE WITNESS: It could be either way. It

15   could make them higher or it could make them lower,

16   depending on the nature of the correlation.

17   BY MR. KIERNAN:

18   Q. And why would it impact the reported

19   standard errors?

20   A. Well, it's all built up in the -- in the

21   nature of the assumptions one makes in doing a

22   regression analysis, which is an independence of the

23   standard errors. And if the standard errors -- if

24   the -- if the random shock that is --

25   (Reporter inquires.)

1   THE WITNESS: If the random shock that is

2   in the regression equation does not satisfy the

3   independence assumption, then the effect on the

4   standard errors of the coefficients could be either

5   to elevate them or to reduce them, depending on the

6   nature of the violation of the independence

7   assumption.

8   BY MR. KIERNAN:

9   **Q.   Okay. And are there standard statistical**

10   **tests to test whether the residual errors are**

11   **correlated within a particular group?**

12   MS. BERNAY: Objection. Vague.

13   THE WITNESS: There are many such tests

14   and many such corrections. But the effect is -- the

15   existence of even statistically significant

16   correlations is small unless those correlations are

17   high. All right.

18   So the corrections for autocorrelation of

19   residuals are not something that actually matters in

20   the vast majority of cases because the -- it's

21   almost never the case there's no correlation in

22   residual errors, but it's almost never the case that

23   making a correction for the auto- -- the correlation

24   that does exist matters in terms of the regression.

25   It's also the case here that we're not

1   talking about a source of bias in the coefficients.

2   We're talking about a source of bias in the

3   estimated statistical significance, the --

4   BY MR. KIERNAN:

5   **Q.   The standard errors?**

6   A.   Yeah, the values of the -- the expected

7   value of the regression coefficients is not

8   affected.

9   **Q.   The coefficients aren't affected, but the**

10   **calculations of the standard errors are affected?**

11   A.   Right, the calculations of the standard

12   errors are affected, but the -- but the estimated

13   effect of the independent variable is the same, the

14   expected estimated effect.

15   **Q.   And if the residual errors are correlated**

16   **within a particular group, the standard errors could**

17   **either be overstated or understated?**

18   A.   Yes.

19   **Q.   Without a correction?**

20   A.   They could be. Although, again, the --

21   it's not -- it's not a dichotomous issue. They --

22   A, they may be affected, and B, the magnitude of the

23   effect depends on the exact conditions.

24   **Q.   And to know the magnitude of effect, you'd**

25   **have to test it, you'd have to run one of the**

http://www.yeslaw.net/help

1   that -- that's a good way to see if there's positive

2   error correlation, but it's not a good way to see if

3   there's negative error correlation.

4   And the second point is that the nature of

5   the error correlation may be that it's dependent on

6   particular combinations of variables; and that one,

7   the standard tests wouldn't even tell you that it

8   exists.

9   **Q. In this case, did you do anything to check**

10   **whether the residual errors in your regression set**

11   **forth in Exhibits 3A and 3B to Noll 10 are**

12   **correlated with any particular group?**

13   MS. BERNAY: Objection. Vague and

14   ambiguous.

15   THE WITNESS: What do you mean by "group"?

16   BY MR. KIERNAN:

17   **Q. Within any group.**

18   A. What do you mean, "a group"? I don't

19   understand what you mean by a group.

20   **Q. We've been using group for the last ten**

21   **minutes.**

22   MS. BERNAY: Objection. Argumentative.

23   BY MR. KIERNAN:

24   **Q. Same group that you've -- the same group**

25   **that you've been referring to.**

1   A.   I didn't refer to a group. I don't know

2   what you're talking about. I know I fully

3   intended --

4   **Q.   You used the term "cluster" --**

5   (Reporter admonishes.)

6   BY MR. KIERNAN:

7   **Q   You used the word cluster, within a**

8   **cluster.**

9   A.   I don't agree that there are any clusters

10   here.

11   MS. BERNAY: Objection.

12   BY MR. KIERNAN:

13   **Q.   That's not my question, Dr. Noll. I asked**

14   **you, did you do anything to check whether the**

15   **residual errors in your regressions set forth in**

16   **Exhibit 3A and 3B are correlated within any cluster**

17   **or group?**

18   MS. BERNAY: Objection. Asked and

19   answered.

20   THE WITNESS: I don't know what you mean

21   by a group. And you used the word "or," and I don't

22   believe there are any clusters. So how can I test

23   for something when I don't -- I think it either

24   doesn't exist or I don't understand what you're

25   asking?

1   What is it you're asking? Can't you just

2   give me an example of what you mean by a group, and

3   then we won't have to discuss it?

4   BY MR. KIERNAN:

5   Q.   So you don't understand the question?

6   A.   I don't understand what you mean by a

7   group, no. I don't know what you have in mind.

8   Q.   And you don't know what I mean by cluster?

9   MS. BERNAY: Objection --

10   THE WITNESS: I know what you mean by a

11   cluster, and there aren't any in this particular

12   regression.

13   BY MR. KIERNAN:

14   Q.   How do you know?

15   A.   Because I know what cluster analysis is,

16   and it doesn't apply to this regression because this

17   isn't a sample.

18   Q.   What did you do to determine if there were

19   clusters? What statistical tests did you apply?

20   MS. BERNAY: Objection.

21   THE WITNESS: I looked at the definition

22   of a cluster, and it doesn't apply to anything in

23   this regression. I know -- I know what cluster

24   analysis is, and it doesn't apply to this

25   regression, notwithstanding what many of your

1   experts have said. They're just not right.

2   BY MR. KIERNAN:

3   **Q.   Anything else other than looking at a**

4   **definition?**

5   MS. BERNAY: Objection. Argumentative.

6   THE WITNESS: I know -- the report, about

7   a third of this report is about what cluster

8   analysis is and what kinds of problems you apply to

9   it and why this isn't a cluster sample problem. All

10   right.

11   So, yes, there it is. I've cited articles

12   in the professional literature of which I not only

13   have read, but I actually know what they do. I have

14   taught this stuff. So I know what I'm talking

15   about. And there's references here. It's not that

16   I just read a definition and decided that something

17   didn't apply.

18   But I know, just from knowing what cluster

19   analysis is, that it doesn't apply here.

20   BY MR. KIERNAN:

21   **Q.   You just know it when you see it?**

22   MS. BERNAY: Objection. Argumentative,

23   misstates his prior testimony.

24   Come on, David.

25   THE WITNESS: That's complete nonsense.

1 There is --

2 BY MR. KIERNAN:

3   Q. I'm just trying to understand what you did

4 other than reading some books to determine if there

5 are clusters in the case.

6   MS. BERNAY: Objection. Argumentative.

7   THE WITNESS: There is no such thing as a

8 test for whether you ought to use cluster analysis

9 in a regression that doesn't satisfy the conditions

10 for clustering.

11 BY MR. KIERNAN:

12   Q. Okay. That's what you teach your

13 students?

14   MS. BERNAY: Objection. Argumentative.

15   THE WITNESS: Of course it is.

16 BY MR. KIERNAN:

17   Q. On page 34 of Noll 10 -- let me know when

18 you get there.

19   A. I'm there.

20   Q. The first paragraph, the last third, you

21 state that "Professors Murphy and Topel do not test

22 whether the mean residual errors from this procedure

23 are statistically significantly different from zero,

24 which would have to be the case if the errors within

25 a cluster are correlated."

1   A.   Yes.

2   Q.   Did you perform that analysis?

3   A.   No, because I don't believe there are

4   clusters. The premise of that paragraph is if you

5   assume a cluster analysis is appropriate, here's

6   something you do. And they didn't do it. But I

7   don't think you should even do that because it's not

8   a cluster sample problem.

9   Q.   If it turns out that within a group,

10   within a cluster -- we can use the one defined by

11   Professors Murphy and Topel -- the mean residual

12   errors are statistically significantly different

13   from zero, what would that tell you?

14   A.   Nothing.

15   Q.   Why not?

16   A.   Because as I said before, you only get

17   that far if you have a cluster sampling problem, and

18   we don't have a cluster sampling problem. So

19   there's no point in testing for cluster, the

20   presence of clustering effects if you don't have a

21   cluster to begin with.

22   This is a paragraph written on if there --

23   if it were a sample -- if the way I had done the

24   analysis was to sample some transactions according

25   to a subset of the models of iPods that were out

1   could get still get a high squared with a very small

2   subset getting big prediction errors.

3   (Reporter inquires.)

4   THE WITNESS: You can have a high

5   R-squared in a regression and still have a group of

6   predictions that were -- where the prediction error

7   is large. And then you would -- you would still

8   want to address whether that group -- you had some

9   omitted variable for that group or something.

10   But again, that's not really likely to

11   happen if you already have group identifiers. See,

12   again, the -- by definition, if you have group

13   identifiers, the residual error within that group is

14   going to be zero. The mean residual error is going

15   to be zero, because that's what regression analysis

16   does.

17   So that's why, for example, the most

18   conventional solution to cluster problems is to use

19   group identifiers, indicator variables, to get the

20   mean of those residual errors for each group to

21   zero.

22   BY MR. KIERNAN:

23   Q. In this case, did you perform any

24   statistical test to determine or to test your

25   independence assumption?

1   MS. BERNAY: Objection. Asked and

2 answered.

3   THE WITNESS: I have -- I have not

4 performed a test of the independence assumption as

5 you've put it in that way, no. It would be

6 unnecessary, because there are no groups with

7 outlying residual errors in the R-squared spot. And

8 by definition, the mean residual errors by group are

9 going to be zero.

10 BY MR. KIERNAN:

11   **Q. And if statistical tests show that mean**

12 **residual errors within groups are correlated, that**

13 **does not affect your analysis or any of your**

14 **opinions in any way?**

15   MS. BERNAY: Objection. Calls for

16 speculation.

17   THE WITNESS: It might or it might not,

18 depending on what the reason for finding that

19 correlation was, that statistically significant

20 correlation was. It would purely depend on the way

21 the test was performed and the way the groups were

22 created and the way the residual errors were

23 calculated. All right. That's what it would depend

24 on.

25 ///

 1   understand it.

 2   Q. Well, yeah, okay.

 3   MR. KIERNAN: Move to strike the last

 4   part.

 5   BY MR. KIERNAN:

 6   Q. So the new iPod owners includes both

 7   purchasers of iPods with 7.0 and iPods without 7.0?

 8   A. To differing degrees, yes.

 9   Q. Okay. And in the rest of the paragraph,

10   you state that the "lock-in would not have affected

11   the demand for subsequent iPods for a long period

12   because these purchasers would not soon make

13   repurchase decisions."

14   What's the basis for that?

15   A. That it's information we have about how

16   long people own electronic devices. They don't buy

17   a new electronic device with the same frequency they

18   buy music.

19   Q. And that's the 18-month to two-year period

20   that you referred to in your initial merits report?

21   A. I think that's those -- I don't remember

22   from memory, but that sounds about right as to

23   frequency of repurchase of iPods.

24   Q. Okay.

25   A. The mean frequency. Some are more, some

1   are buying replacement iPods are the -- what this is

2   about is the fact that it's mainly people who are

3   buying replacement iPods that experience the

4   immediate effect of lock-in. They are, to some

5   degree, locked in. And the point of Harmony was to

6   reduce the degree to which existing users of iPods

7   were locked in.

8   BY MR. KIERNAN:

9   **Q.   Okay.   And I think I'm following you now,**

10   **Dr. Noll.   When you're referring to "new iPod**

11   **purchasers" in the last paragraph on page 27, you're**

12   **referring to customers who did not own an iPod**

13   **before that time?**

14   A.   Yes.   This is new purchasers.   This is not

15   replacement purchasers.

16   **Q.   Okay.   And for a new purchaser in late**

17   **2006, your opinion is for most of the damages**

18   **period, they would not be an important factor**

19   **affecting iPod prices because they wouldn't purchase**

20   **a replacement for the 18- to 24-month period?**

21   A.   The -- yeah.   Of course, it's not

22   dichotomous, it's continuous.   Their importance

23   grows through time.   But initially, it would not be

24   important because you don't replace your iPod every

25   month.   All right.   So it would take a while before

1   you start to see an effect.

2   There would be other things happening that

3   would cause it to have some effect on demand, like

4   multiple iPods within the same family unit that want

5   access to the same music, things like that.

6   But the main immediate effect of lock-in

7   is the existing or established base. It's not the

8   new people. And the new people would just gradually

9   through time get added to the people who are

10 affected by lock-in in terms of their effect on the

11 demand for iPods.

12   MR. KIERNAN: Let's just take a short

13 break.

14   THE VIDEOGRAPHER: Off the record at

15 10:05.

16   (A brief recess was taken.)

17   THE VIDEOGRAPHER: On the record at 10:18.

18 BY MR. KIERNAN:

19   **Q. In the regression that is in Exhibits 3A**

20 **and 3B to Noll 10, you turn on the dummy variable**

21 **for 7.0 at different times for different models; is**

22 **that right?**

23   A. Well, the indicator is on for a model that

24 has 7.0 on it. So anything that was released after

25 the first date would have it, quote, turned on,

```
 1   BY MR. KIERNAN:
 2        Q.  So the existing Harmony sales -- the sales
 3   from Harmony that already have completed, they will
 4   continue to impact the price of models that did not
 5   have 7.0?
 6             MS. BERNAY:  Objection.  Vague and
 7   ambiguous.
 8             THE WITNESS:  Yes.  I mean, the -- first
 9   of all, Harmony isn't sales.  All right.  But
10   Harmony is out there on people's computers, and it
11   can still be used to load songs onto devices
12   regardless of whether RealNetworks continues to
13   distribute it.  It's still out there, so it would
14   still continue to affect people, people's behavior.
15   BY MR. KIERNAN:
16   ███████████████████████████████████████████████
     █████████████████████████████████████████████
     ████████████████████████████████████████████████
     ██████████████████████████████████████████████████
     ████████████████████████████████████████████████
     ████████████████████████████████████████████
     ███████████████████
     █████████████████████████████████████████████
     ██████████████████████████████
25   ///
```

[REDACTED]

22   Q. Did you do anything to determine whether

23 or not 7.0 impacted the demand for iPods that did

24 not contain 7.0?

25   MS. BERNAY: Objection.

1   would be another anticompetitive effect of 7.0

2   because the consumers who bought those things were

3   harmed. But I have basically assumed that's zero

4   because I think the supply conditions in the MP3

5   market would not make it possible for anybody to

6   sustain a significant price increase in that market

7   just because of 7.0.

8   BY MR. KIERNAN:

9   Q. Okay. And is your opinion, Dr. Noll, that

10   **the impact on prices caused by 7.0 would be**

11   **immediate because of the lock-out effect?**

12   A. Yes.
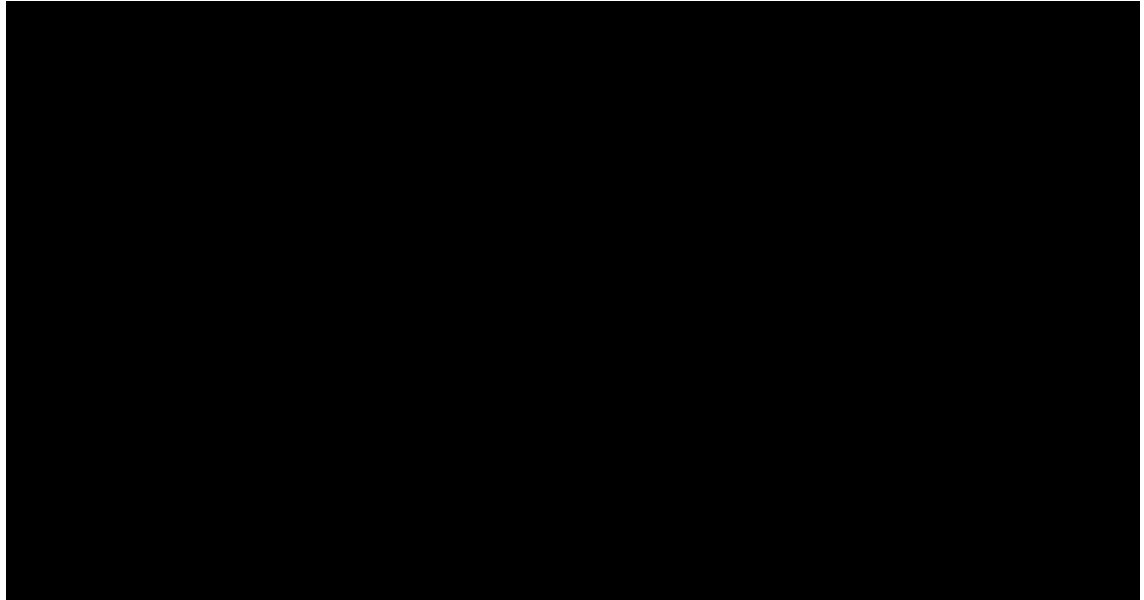
13   Q. **Okay. And why is that? Why would it be**

14   **immediate?**

15   A. Because there's this group of people,

16   there's just a continuous flow of people who want to

17   replace an MP3 player that were available to Apple

18   before 7.0 was introduced and for at least some

19   models are not available to them afterwards.

20

21

22

23

24

25   MS. BERNAY: Objection. Vague and

1   ambiguous.

2

3

4

5

6

7

8

9

10

11   So I'm not aware of any documents that

12   explicitly analyze lock-in and lock-out.

13   **Q.   Okay.   So what are you relying on for the**

14   **basis of your opinion that the impact on price would**

15   **be immediate due to lock-in or lock-out as a result**

16   **of 7.0?**

17   A.   It would -- why a demand curve becomes

18   more inelastic is not really relevant to the

19   question of what is an increase in the degree of

20   inelasticity of the demand curve on price.   There's

21   no -- it doesn't matter what the cause is.   If the

22   demand curve becomes more inelastic, the profit

23   maximizing price goes up.

24   (Reporter inquires.)
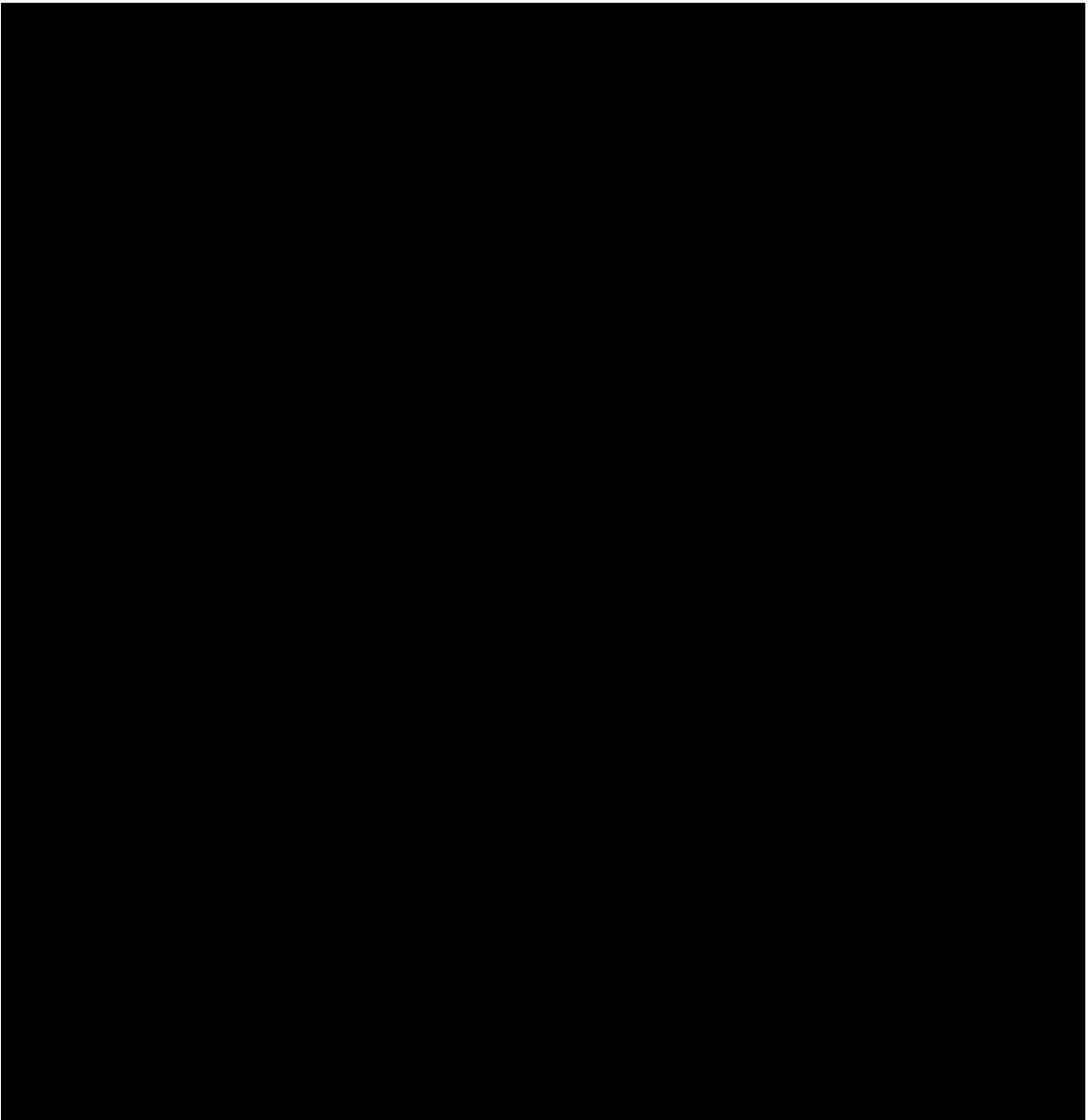
25   THE WITNESS: The profit maximizing price

1   goes up.

2   And so the basis for it is the economic

3   theory of lock-in, the optimal pricing of a firm

4   that has a product with lock-in and other switching

5   costs, and then the empirical test of whether that
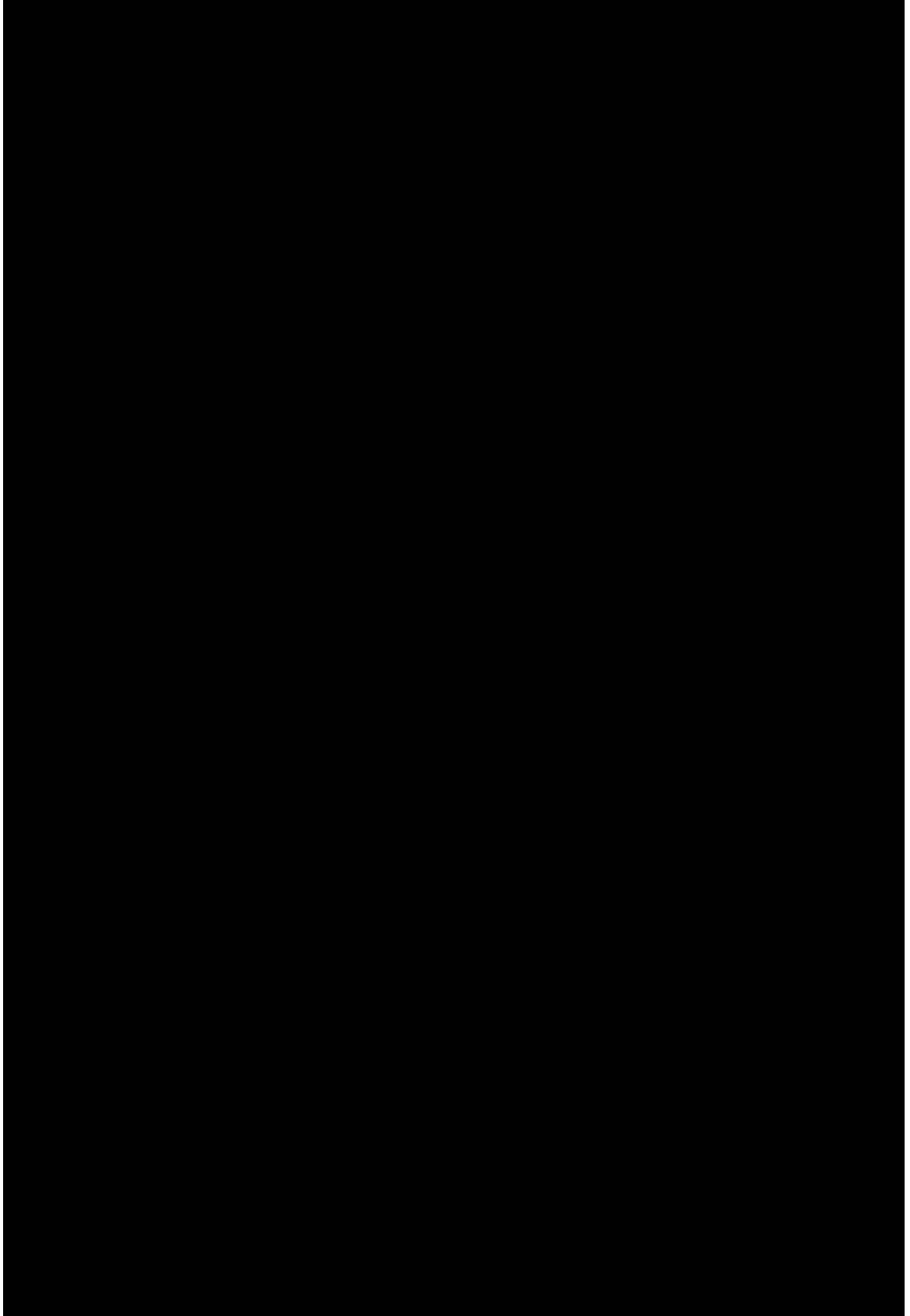
6   theory predicts what actually happened.

7   BY MR. KIERNAN:

8

9

10

11

12

13

14

15

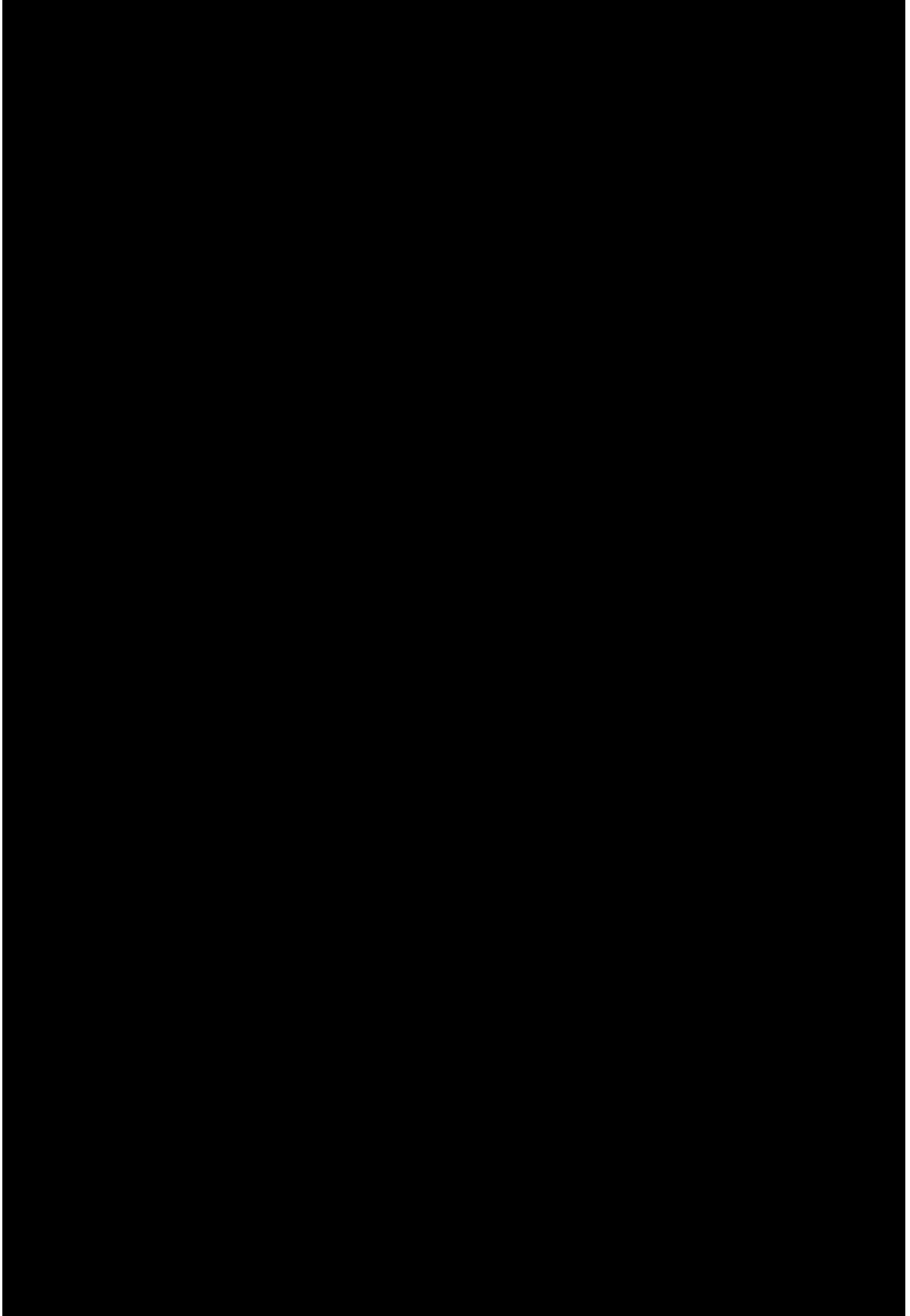16

17

18

19

20

21

22

23

24

25

Roger Noll, Ph.D. **The Apple iPod iTunes Anti-Trust Litigation**

1

2

3

4

5

6

7

8

9

10

11

12

13

14

15

16

17

18

19

20

21

22

23

24

25

1

2

3

4

5

6

7

8

9

10

11

12

13

14

15

16

17

18

19

20

21

22

23

24

25

http://www.yeslaw.net/help

1   in general, creating incompatibilities caused prices

2   to go up. And there's evidence in all those reports

3   that the creation of incompatibility causes prices

4   to go up, which is only true if it makes demand

5   curves more inelastic.

6   So anything in any report that discusses

7   the relationship between lock-in and prices is

8   evidence in support that 7.0 did, in fact, cause the

9   demand to become more inelastic.

10   BY MR. KIERNAN:

11   **Q. With respect to the impact on prices on**

12   **iPods as a result of the lock-out effect, would you**

13   **expect the impact to be the same throughout the --**

14   **well, would you expect the impact on prices to**

15   **remain the same, to remain constant?**

16   MS. BERNAY: Objection. Calls for

17   speculation.

18   THE WITNESS: I would expect it to be,

19   yeah, mostly constant through time, although toward

20   the end of the period, it might become worse.

21   But on the other hand, there are other

22   things in the model that would offset that, such as

23   the move to DRM-free files by competitors of the

24   iTunes Store.

25   ///

1   guys.

2   Q.   Right.   Okay.

3   (Reporter inquires.)

4   THE WITNESS: The installed base of the

5   other guys.

6   BY MR. KIERNAN:

7   Q.   The installed base for the non-iPods?

8   A.   The non-iPods.

9   Q.   All right.

10   So focusing on the installed base for

11 iPods, would the impact of 7.0 on locking them into

12 iPods or increasing the lock-in of those people on

13 iPods, that would occur over time depending upon

14 their future purchases, correct?

15   A.   Yeah.   And it's not just that.   As well,

16 it's also -- it doesn't really happen until they buy

17 their next device.

18   So there's not going to be an

19 instantaneous effect.   It's going to be a longer

20 term effect.   It's the lack of competition for the

21 other guys that is the principal short-term effect.

22   Q.   I've got to get one update.

23   Since your last deposition, have you

24 purchased any iPods?

25   A.   Probably not since my last one.   I bought

1   REPORTER CERTIFICATION

2

3   I, Darcy J. Brokaw, a Certified Shorthand

4   Reporter, do hereby certify:

5   That prior to being examined, the witness in

6   the foregoing proceedings was by me duly sworn to

7   testify to the truth, the whole truth, and nothing but

8   the truth;

9   That said proceedings were taken before me at

10   the time and place therein set forth and were taken down

11   by me in shorthand and thereafter transcribed into

12   typewriting under my direction and supervision;

13   I further certify that I am neither counsel

14   for, nor related to, any party to said proceedings, nor

15   in any way interested in the outcome thereof.

16   In witness whereof, I have hereunto subscribed

17   my name.

18

19   Dated: December 19, 2013

20

21   _____

22   Darcy J. Brokaw
      CSR No. 12584, RPR, CRR

23

24

25