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UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF CALIFORNIA
OAKLAND DIVISION

ORACLE USA, INC., *et al.*,	CASE NO. 07-CV-01658 PJH (EDL)
Plaintiffs,	**DECLARATION OF DANIEL S. LEVY, PH.D. IN SUPPORT OF PLAINTIFF ORACLE'S REPLY IN SUPPORT OF MOTION NO. 1 TO EXCLUDE EXPERT TESTIMONY OF STEPHEN K. CLARKE**
v.	**[REDACTED VERSION]**
SAP AG, *et al.*,	
Defendants.	Date: September 30, 2010
	Time: 2:30 p.m.
	Place: Courtroom 3
	Judge: Hon. Phyllis J. Hamilton

Case No. 07-CV-01658 PJH (EDL)

DECLARATION OF DANIEL S. LEVY, PH.D. IN SUPPORT OF PLAINTIFF ORACLE'S REPLY IN SUPPORT OF
MOTION NO. 1 TO EXCLUDE EXPERT TESTIMONY OF STEPHEN K. CLARKE

1   I, Daniel S. Levy, Ph.D., declare as follows:

2 **I.   INTRODUCTION AND ASSIGNMENT**

3   1.   My name is Daniel S. Levy. I am the National Managing Director and a founder

4 of Advanced Analytical Consulting Group, Inc. ("AACG"). I have a Ph.D. in Economics from

5 The University of Chicago. I have testified in a range of matters over a number of years,

6 including on the topics of regression analysis, statistical methods, and damages analysis. I

7 perform and review regression analyses for use in reports to government agencies, academic

8 research, business consulting and legal disputes. I, and my company, are currently engaged in

9 consulting projects for Fortune 500 companies in the United States and internationally in which

10 the main purpose of our work is the construction of advanced econometric models, regression

11 analyses, statistical analyses, large-scale sample design and data collection to help major

12 corporations understand their revenues, costs, liabilities and risks. I have taught classes in

13 statistical methods, including regression analysis, to corporate economists, accountants and

14 statisticians. I have served as a computer advisor at The University of Chicago Computation

15 Center, where I advised researchers on the implementation of statistical and econometric

16 methods, including regression analysis. For the past 30 years I have used regression analysis, for

17 most of that time, on a daily basis, discussing results, designing models, programming

18 regressions and delivering results based on regression models to corporate clients and

19 government agencies. I have worked on hundreds of projects where regression analyses of

20 various types have been a central feature of the research.

21   2.   I have been retained by counsel for the Plaintiffs in the matter of Oracle USA,

22 Inc, *et al.* v. SAP AG, *et al.* (Case No. 07-CV-01658 PJH (EDL)) to provide a declaration in

23 response to the Declaration of Stephen K. Clarke in support of Defendants' Opposition to

24 Plaintiffs' Motion No. 1 to Exclude Expert Testimony of Stephen K. Clarke ("Clarke Decl").

25 My billing rate for this case is $627 per hour. The rates of my staff assigned to this project range

26 from $250 to $507. Compensation for AACG is not contingent on the outcome of the

27 proceedings.

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A/73470503.1/2021039-0000324170   1   Case No. 07-CV-01658 PJH (EDL)

LEVY DECLARATION IN SUPPORT OF PLAINTIFF ORACLE'S REPLY IN SUPPORT OF MOTION NO.
1 TO EXCLUDE TESTIMONY OF DEFENDANTS' EXPERT STEPHEN CLARKE

II. EXECUTIVE SUMMARY

3. I have reviewed Mr. Clarke's declaration dated September 9, 2010, portions of Mr. Clarke's deposition on June 10, 2010 where he discussed regressions, and Mr. Clarke's report dated May 7, 2010. Mr. Clarke's declaration does not address or resolve the fundamental issue I raised in my declaration dated August 16, 2010: Mr. Clarke's regression analysis is structured in such a way that it cannot capture the relationship between costs and revenues needed to estimate the percentage of variable costs in total costs or the change in costs associated with changes in the volume of revenues in the relevant range. This relationship, the change in costs as revenues change over the relevant range of sales, is a key ingredient in his attempted calculation of Relevant Margins for OUSA and OEMEA. Further, many of the statements made by Mr. Clarke in his declaration are misleading. Finally, many of Mr. Clarke's statements are simply incorrect.

III. MR. CLARKE'S FAILURE TO ADDRESS CENTRAL ISSUE

4. In his declaration, Mr. Clarke claims that I have either misunderstood some topic of his analysis, or that I have incorrectly concluded what he was trying to do. Contrary to Mr. Clarke's claims, I understood clearly the goal of his analysis. I also understood clearly the ways in which he failed to accomplish his stated goal. Mr. Clarke's declaration demonstrates his failure to address the most fundamental criticism about his regression analysis. As I said in my declaration dated August 16, 2010 (Declaration of Daniel S. Levy, Ph.D. In Support of Plaintiffs' Motion NO. 1 to Exclude Testimony of Defendants' Expert Stephen Clarke ("Levy Decl")):

> "Although Mr. Clarke's stated goal in performing his regression analysis is to "apportion the fixed and variable costs," he performs a type of regression, which he calls a zero intercept technique, that is incapable of measuring variable costs as distinct from other costs." (Levy Decl at 2:14-17).

Further, his incorrect and misleading attempts in his declaration to defend his work, which I discuss in detail in the next section, continue to reveal his lack of understanding of regression techniques and fundamental economic principles and related empirical facts.

1   **IV.   MR. CLARKE'S ERRONEOUS APPLICATION OF REGRESSION TECHNIQUE**

2   5.   I turn first to the central, unfixable error in Mr. Clarke's regression analysis, the

3   use in this setting or the "zero intercept technique" which distorts Mr. Clarke's regression

4   analysis to such an extent that it is incapable of providing the required information needed to

5   "estimate the slope (i.e. the 'b') of the variable cost function $(VC = a + bQ)$".[1] My critique

6   demonstrates that the tool Mr. Clarke developed to estimate "the ratio of variable to total costs at

7   Average Revenue" (Clarke Decl at 10:15) in order to "quantify a variable cost percentage in [his]

8   subsequent analysis" (Clarke Decl at 10:15-16) is structured in such a way that it fails to identify

9   the very relationship in the data that Mr. Clarke required for his later calculation of Relevant

10   Margin. Mr. Clarke dismisses my use of hypothetical examples in my declaration because he

11   says they "do not conform to appropriate cost accounting" (Clarke Decl at 15:6-7) or are not

12   "economically sensible and are actually misleading" (Clarke Decl at 15:12-13) among other

13   things. However, I used examples with differing relationships between costs and revenue to

14   demonstrate that Mr. Clarke's technique does not distinguish between different sets of data with

15   widely differing relationships between costs and revenues. These examples demonstrate that that

16   Mr. Clarke's regression model (with zero intercept) does not, and further cannot, measure the

17   correct relationship between costs and revenues that he needs to estimate his "Relevant Margin."

18   6.   For the OUSA data, Mr. Clarke's zero intercept technique will produce a slope of

19   0.6327 for "cost functions" estimated from sets of data for which the change in costs for a unit

20   change in revenues are obviously and provably very different from 0.6327.

21   7.   Mr. Clarke's statement that the implied fixed costs in Scenario 3 would have a

22   "negative" value is incorrect because costs curves are generally, just that, curves and not straight

23   lines.[2] The regression analysis is just an estimate of the cost curve in the relevant range so the

24   _____

25   [1] Dkt 783 Opening Declaration of Holly House in Support of Plaintiffs' Motion to Exclude
       Expert Testimony of Stephen K. Clarke, Ex A ("Clarke Report") at 277.

26   [2] Mr. Clarke's economic reference sources show similar curved cost functions, which he does not
       consider in his declaration; for example, in his Exhibit 10, on page 180, Figure 8-2 has a total

27   cost curve such that if one were to try to estimate its slope near the origin, the tangent line would
       intersect the y-axis below zero. (Clarke Decl, Ex. 10 at 180) However, as is clear from the

28   (Footnote Continued on Next Page.)

LEVY DECLARATION IN SUPPORT OF PLAINTIFF ORACLE'S REPLY IN SUPPORT OF MOTION NO.
1 TO EXCLUDE TESTIMONY OF DEFENDANTS' EXPERT STEPHEN CLARKE

1   intercept, while critically necessary to fit the cost curve correctly, does not have a simple

2   interpretation as the fixed costs. I discuss this issue in more detail below.

3   8.   The main focus here is whether Mr. Clarke's regression model has any value as a

4   mechanism to measure the relationship between costs and revenue as reflected in the data. Mr.

5   Clarke says in his report that the first step he takes for the OUSA data is to "estimate the slope

6   (i.e. the 'b') of the variable cost function $(VC = a + bQ)$ using a zero intercept technique."[3] The

7   issue is that Mr. Clarke's technique, used in this situation, is so fundamentally wrong that it does

8   not recover the change in costs that occurs as revenues increases (the 'b'), which is a critical

9   piece of information he needs for his "Relevant Margin" calculation. I have constructed another

10 example that I hope fits Mr. Clarke's description of what is economically sensible.[4] I do this

11 simply so as to not argue about comments that may cloud the issue of whether Mr. Clarke's

12 regression method can "estimate the slope (i.e. the 'b') of the variable cost function $(VC = a +$

13 $bQ).$"[5] If his regression method cannot measure the magnitude of the change in total costs for a

14 change in a dollar of revenues it cannot produce numbers Mr. Clarke needs to calculate his

15 Relevant Margin. In Figure 1 below, the OUSA data used in Mr. Clarke's analysis are depicted

16 by black diamonds. Additionally, there is one set of hypothetical data depicted by brown dots.

17 The two sets of data in Figure 1 have different slopes. That is clear simply by looking at them

18 and is scientifically demonstrable. The slope of the top line is 0.1181. The slope of the line

19 through the original OUSA data is 0.3544, as reported in my previous declaration. But the

20 regression method used by Clarke, which forces the intercept through zero, measures the slope of

21 both sets of data as 0.6327 (as labeled by "Clarke's Zero Intercept Regression Line"), incorrectly

22 _____

23 (Footnote Continued from Previous Page.)

24 graph, the fixed costs in this example are clearly not less than zero. Interestingly, Mr. Clarke's
    Expert Report (Clarke Report at 243) describes *curved* (not straight line) cost functions.
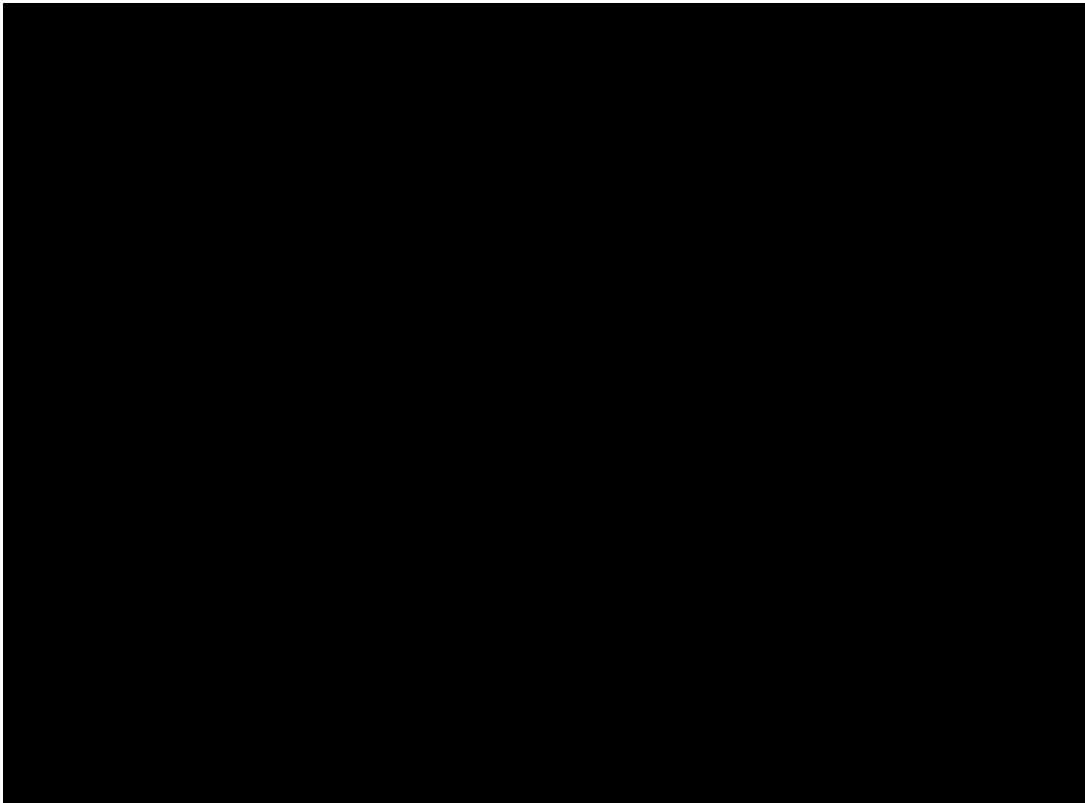25 [3] Clarke Report at 277.
    [4] I do not believe Mr. Clarke's comment about the economic sensibleness of the example data is
26 relevant for the purposes I presented it. I also do not agree with his characterization that "None
    of these models pass muster as economically sensible and are actually misleading." (Clarke Decl.
27 P. 15: 12-13.
    [5] Clarke Report at 277.

28

1   indicating that the change in that magnitude of total costs associated with a dollar change

2   revenues was the same for these two different sets of data. This is the same slope Mr. Clarke

3   reported for the OUSA data, which I have replicated here. Obviously, these two sets of data (as

4   well as all of the other sets of data in Figure 4 of my previous declaration)[6] do not have the same

5   relationship between costs and revenues. One can simply see that they do not, and the regression

6   analyses I have performed confirm as well that these different sets of data have differing

7   measured slopes across the sets of data. But Mr. Clarke's zero intercept technique cannot

8   distinguish among them. It produces the same slope for all of them. Accordingly, Mr. Clarke's

9   technique cannot measure the slope reflected in these sets of data, nor is it measuring the slope

10   that Mr. Clarke said he set out to measure in the original OUSA data. Mr. Clarke's regression

11   technique does not work and is completely useless for identifying the very relationship he uses to

12   construct his Relevant Margin.

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27   [6] Levy Decl at 12:5-19 – 17:15.

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LEVY DECLARATION IN SUPPORT OF PLAINTIFF ORACLE'S REPLY IN SUPPORT OF MOTION NO.
1 TO EXCLUDE TESTIMONY OF DEFENDANTS' EXPERT STEPHEN CLARKE

Figure 1

In my previous declaration and here as well, the intercept and the b (slope) of the regression on

OUSA data is presented with the measure of the standard error in parentheses. Both the b (slope)

and the intercept are statistically significant. The fact that the intercept of the regression on the

original OUSA data is statistically significant means that we can scientifically reject the

hypothesis the OUSA data reflects a relationship where the intercept is zero. In my original

declaration, Figure 5 illustrated that Mr. Clarke's technique will identify two different slopes for

two sets of data that, in fact, have identical slopes. (Levy Decl at 16:1-15) Again to make this

point, but this time with data that I hope Mr. Clarke will find economically sensible.[7] In

Appendix 1, I provide an example with data similar to Figure 5 in my earlier declaration.

    9.   While Mr. Clarke says the examples I have provided in my declaration do not

make sense, he does not provide any evidence that his zero intercept technique will estimate the

change in costs for a unit change in revenues correctly. That is, he does not provide information

to contradict my evidence that his zero intercept regression model is dysfunctional for

[7] I note that I do not agree with Mr. Clarke's characterization of the data I used as examples.

LEVY DECLARATION IN SUPPORT OF PLAINTIFF ORACLE'S REPLY IN SUPPORT OF MOTION NO.
1 TO EXCLUDE TESTIMONY OF DEFENDANTS' EXPERT STEPHEN CLARKE

1   distinguishing between sets of total cost and revenue data that have very different relationships.

2   My examples in Figure 1 above, Appendix 1, and my previous declaration demonstrate that Mr.

3   Clarke's zero intercept technique cannot identify slopes that actually differ, on the one hand, and,

4   in other cases, incorrectly produces different slopes when they are, if fact, they are the same. I

5   hope any further discussion will elucidate this topic further, rather than obscure it.

6   **V.   MR. CLARKE DOES NOT ESTIMATE THE CORRECT RELATIONSHIP**

7   **   BETWEEN COSTS AND REVENUES**

8   10.   In paragraph 16 of Mr. Clarke's declaration, he incorrectly claims the

9   following:

10   "Levy admits in his declaration at 5:1 and 8:2-5, my equation estimates the change in cost

11   due to a change in revenue." (Declaration of Stephen K. Clarke in Support of

12   Defendants' Opposition to Plaintiffs' Motion No. 1 to Exclude Expert Testimony of

13   Stephen K. Clarke ("Clarke Decl.") at 5:15-16)

14   Mr. Clarke's citation to 5:1 is a sentence fragment. Review of the cited text is informative.

15   Below I provide the full sentence along with the four following lines.

16   "The change in costs for a change in a unit of revenue is important to Mr. Clarke's

17   analysis because it directly impacts the profit margins Oracle would have earned if

18   Oracle's support sales revenue had been higher (i.e., it directly impacts Oracle's lost

19   profits damages). Mr. Clarke performs this regression using what he calls the "zero

20   intercept technique." As discussed in detail below, performing a regression of total costs

21   on total revenue without an intercept, as Mr. Clarke has done, prevents Mr. Clarke from

22   identifying those costs that vary with the relevant change in revenue from those that do

23   not." (Levy Decl at 5:1-7).

24   I hope it is clear that I was not saying here, or anyplace in my declaration, that Mr. Clarke's

25   "equation estimates the change in cost due to a change in revenue." (Clarke Decl. at 5:15-16) To

26   reiterate, Mr. Clarke's regression method simply does not measure the change in costs for a

27   change in a dollar of revenue in the relevant range of revenues at issue in this case. But this

28   measure, the change in costs for a change in a dollar of revenue, is critical to Mr. Clarke's

LEVY DECLARATION IN SUPPORT OF PLAINTIFF ORACLE'S REPLY IN SUPPORT OF MOTION NO.
1 TO EXCLUDE TESTIMONY OF DEFENDANTS' EXPERT STEPHEN CLARKE

1   calculation of the Relevant Margin. Since Mr. Clarke's "**zero intercept technique**" does not

2   allow him to measure the change in costs for a change in a dollar of revenue, he does not have a

3   key pillar of his Relevant Margin calculation, and his calculation becomes some miscalculation,

4   fundamentally different from the Relevant Margin that Mr. Clarke says he is trying to calculate.

5   Mr. Clarke also cites my declaration on page 8, at lines 2-5, saying "Levy admits in his

6   declaration at 5:1 and 8:2-5, my equation estimates the change in cost due to a change in

7   revenue." (Clarke Decl. at 5:15-16). Text from that citation is provided below:

8   "[The][8]slope of the line reflects the amount by which costs increase as revenues increase

9   by one dollar. Equivalently, it reflects the decrease in costs as revenues fall by a dollar.

10   So in this OLS regression, as revenues go up by one dollar, costs increase by about 0.18,

11   or 18 cents. The slope of the line is a piece of information frequently used in the analysis

12   of variable costs." (Levy Decl at 8:2-5)

13   The regression line I described is the one that *I* calculated *including* the intercept. The quote

14   above is not discussing the regression line Mr. Clarke calculated using an intercept through zero.

15   This is absolutely clear from reading the text around this quote. But more pointedly, it is also

16   absolutely clear in this excerpt alone, because I am referencing the slope of the line as 0.18,

17   which is the slope of the regression for the OEMEA data *with* an intercept that *I* calculated. The

18   regression line that Mr. Clarke calculated, with his zero intercept techniques for the OEMEA

19   data, has a slope of 0.3695. This is a fact that Mr. Clarke should have been clear about. Even

20   without the context in the lines above and below this text, it should be clear that in the section

21   Mr. Clarke quoted, I am saying the regression *with an intercept*, the one I calculated, with the

22   slope of 0.18, measures the amount by which costs increase as revenues increase by one dollar as

23   reflected in the data. Equivalently, it reflects the decrease in costs as revenues fall by a dollar.

24   The *zero intercept* regression, the one Mr. Clarke calculated, with the slope of 0.3695, does *not*

25   measure the amount by which costs increase as revenues increase by one dollar. Furthermore in

26   ───────────────────

27   [8] The word "The" is added to the section of my report that Clarke quoted. It falls on line 1 of
      Page 8.

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LEVY DECLARATION IN SUPPORT OF PLAINTIFF ORACLE'S REPLY IN SUPPORT OF MOTION NO.
1 TO EXCLUDE TESTIMONY OF DEFENDANTS' EXPERT STEPHEN CLARKE

1   numerous places in my declaration, I stated that Mr. Clarke's regression did not capture the

2   relevant relationship between costs and revenues.[9] I concluded my report in no uncertain terms

3   as follows:

4   "Mr. Clarke's lack of econometric knowledge leads him to make numerous errors in his

5   analysis, which prevent him from accomplishing the main goal of his regression analysis,

6   estimation of how costs change as revenues change. His numerous errors, which have a

7   significant empirical impact on his results, his lack of knowledge of the econometric tools

8   that he attempts to use, and his reliance on baseless assumptions render his regression

9   analyses at best unreliable and unusable and at worst, in the case of his OEMEA and

10   OUSA regressions, completely meaningless." (Levy Decl at 28:10-17)

11   I did not say anywhere in my declaration that Mr. Clarke's equation estimates the change in cost

12   due to a change in revenue. It is unfathomable how my statements, even the sentence Mr. Clarke

13   quoted taken in isolation, can be read and interpreted as an intended or unintended admission by

14   me that Mr. Clarke's equations "estimate[s] the change in costs due to change in revenues."

15   (Clarke Decl at 5:15-16) Clearly Mr. Clarke's interpretation of written text is misguided here.

16   His repeated efforts, discussed here and in the following section, to simply change what I have

17   said to fit his arguments are very misleading and serve to obscure, not illuminate, the important

18   issue in this case.

19   _____

20   [9]   "My findings are that Mr. Clarke's regression methods used to determine variable costs
             in the OEMEA and OUSA data are based on a series of mistakes and misconceptions that
21   are so fundamental that they render his estimates of variable costs not only unreliable, but
             entirely useless; the calculations do not conceptually, or in actual fact, measure variable
22   costs." (Levy Decl at 2:2-6)

23   A few lines below that, I said
             "Although Mr. Clarke's stated goal in performing his regression analysis is to "apportion
24   the fixed and variable costs," he performs a type of regression, which he calls a **zero
             intercept technique**, that is incapable of measuring variable costs as distinct from other
25   costs." (Levy Decl at 2:14-17)

     At one point in my declaration, I also say:
26   "His results are not a reflection of the relationships in the data, as he claims, but rather
             simply the aftermath of errant assumptions and methods." (Levy Decl at 17:14-15)

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LEVY DECLARATION IN SUPPORT OF PLAINTIFF ORACLE'S REPLY IN SUPPORT OF MOTION NO.
1 TO EXCLUDE TESTIMONY OF DEFENDANTS' EXPERT STEPHEN CLARKE

VI.   MR. CLARKE MISCHARACTERIZES MY DECLARATION AND ECONOMIC
TEXTS

11.   This is not the only instance in which Mr. Clarke attributes a statement to me that is in direct contradiction to what I wrote in my declaration. Mr. Clarke baldly asserts that "Levy repeatedly insists that the intercept value of the regression equation represents the firm's fixed costs." (Clarke Decl. 9:12-13) Had he carefully read my declaration, he could have seen that I used the term "fixed costs" a total of six times and in five of these instances,[10] I was criticizing Mr. Clarke's calculation of fixed costs, without any commentary on what the intercept value represents. In my only affirmative commentary on the interpretation of the intercept, I correctly observed "For the purposes at hand, the intercept in the regressions allows the regression line to fit through the data better. Its specific value may not be of great interest in this case, but it is critical to include the intercept in most settings to obtain a more accurate, unbiased result."(Levy Decl at 8:8-10).

12.   Mr. Clarke has also omitted important parts of at least one text by Dr. Damodar Gujarati that he cited in his declaration.[11] In an effort to justify his use of a regression without an intercept, Mr. Clarke cites a text that discusses two situations where a zero intercept regression makes sense.[12] They fundamentally differ from Mr. Clarke's errant attempt to analyze the OUSA and OEMEA cost and revenue data in that they do have extremely strong, well-known theoretical justifications for performing the regressions in this way. Mr. Clarke provides pages 155-157 of the text by Dr. Damodar Gujarati in his Exhibit 17 of his declaration. In concluding the discussion about "Regression-through-Origin" on page 159, a page not provided in Clarke Decl. Ex 17, Dr. Gujarati points out that this Regression-through-Origin method should be use with great caution. This warning is similar to those found in the other texts I cited in my declaration, which acknowledge the method exists, but warn that, used inappropriately; the method is prone to bias estimates. As it turns

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[10] Levy Decl 3:16-19, 5:15-16, 5:20-21, 20:13, 20: 22-24, and 27:14-16.
[11] Clarke Decl, Ex 17.
[12] Clarke Decl, Ex 17 at 155-157.

LEVY DECLARATION IN SUPPORT OF PLAINTIFF ORACLE'S REPLY IN SUPPORT OF MOTION NO.
1 TO EXCLUDE TESTIMONY OF DEFENDANTS' EXPERT STEPHEN CLARKE

1   out, they are the very biases that Mr. Clarke's regression estimates exhibit and which make his

2   estimates unfit for use in the case. Dr. Gujarati says the following on Page 159 of his text:

3   "Because of these special features of this model, one needs to exercise great caution in using

4   the zero intercept regression model. *Unless there is very strong a priori expectation*, one

5   would be well advised to stick to the conventional intercept-present model. This has a dual

6   advantage. First, if the intercept term is included in the model but it turns out to be

7   statistically insignificant (i.e., statistically equal to zero), for all practical purposes we have a

8   regression through the origin. Second, and more important, if in fact there is an intercept in

9   the model, but we insist on fitting a regression through the origin, we would be committing a

10   **specification error**, thus violating Assumption 9 of the classical linear regression model."[13]

11   **VII.   MR. CLARKE'S INCONSISTENT STATEMENTS REGARDING THE**

12   **INTERCEPT AS THE FIXED COST**

13   13.   Contrary to his vigorous statement in paragraph 25 of his declaration, the

14   following statements drawn from Mr. Clarke's report suggest that, at least recently, Mr. Clarke

15   believed that the intercept of a regression line should be interpreted as a measure of fixed costs.

16   "Theoretically, the total cost function is a multivariate non-linear equation[1095] in the form

17   of: $TC = a + b_1Q + b_2Q^2 + b_3Q^3$ Where: TC represents total cost; the intercept 'a'

18   theoretically represents fixed costs; Q is the level of output; and the 'b' coefficients

19   represent measured constants (see Figure 1 below)." (Clarke Report at 243)

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21   "Mathematically the intercept value represents the value of Y (in this case, total costs)

22   when X (in this case, revenue) is zero." (Clarke Decl at 9:11-12)

23

24   "To quantify fixed costs, I used a standard statistical formula found in numerous statistics

25   textbooks that estimates the intercept value from the slope coefficient (b) in the equation:

26   _____

27   [13] Gujarati, D.N., <u>Basic Econometrics</u>, Third Edition, p. 159, attached to this declaration as
     Exhibit 1.

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1   Intercept = average Y minus [b times average X]

2   Where: **Intercept = estimated fixed costs**" (emphasis added) (Clarke Decl at 10:4-9)

3   Here, Mr. Clarke seems to be saying that he thinks the intercept of a regression represents the

4   fixed costs. At other times he vigorously says just the opposite.[14] Mr. Clarke also asserts that I

5   used the intercept as the fixed cost.[15] I did not. And in fact, as discussed below, I have said just

6   the opposite in my declaration, and in addition discuss why the intercept of a regression typically

7   will not be a measure of fixed costs.

8   **VIII.   MR. CLARKE'S INTERPRETS HIS R^2 INCORRECTLY**

9   14.   In paragraphs 17-19 of Mr. Clarke's declaration, he claims that I used the

10   incorrect method in Excel to calculate R^2. First, Mr. Clarke has once again missed the point I

11   made in my declaration. I said "Mr. Clarke misunderstands the definition of R^2 upon which he

12   relies; he provides the definition, and citation for one type of R^2, but calculates another." (Levy

13   Decl at 3:7-8). Second, I *did* replicate Mr. Clarke's results exactly by using the LINEST

14   function in Excel 2007. Therefore we can tell there is no issue with difference in software as Mr.

15   Clarke claims. So if Mr. Clarke says that *I* calculated the R^2 incorrectly, this would mean that he

16   calculated them incorrectly because I got the exact same R^2 results as he did. Once I replicated

17   Mr. Clarke's results, I then calculated the standard R^2 that is discussed in many statistical texts.[16]

18   The R^2, as described in Macfie and Nufrio, is not the R^2 that Mr. Clarke calculated that Excel's

19   Analysis ToolPak (ATP) produces for regressions without intercepts. Third, I did *not* use the

20   Chart Tool he claims I used. Mr. Clarke has made an incorrect conclusion. I used the LINEST

21   function in Excel 2007.[17] The LINEST function is the same exact function that is used in ATP,

22   _____

23   [14] Clarke Decl. 9:11-10:3
     [15] Clarke Decl. 9:11-10:3

24   [16] Robert Pindyck and D. Rubinfeld, Econometric Models and Economic Forecasts, 4th Edition,
     p. 72, attached to this declaration as **Exhibit 6.** Nowhere in the Macfie and Nufrio text cited by
25   Mr. Clarke is the type of r^2 Mr. Clarke calculated in Excel or Stata when the intercept is
     restricted to 0 discussed.
26   [17] More importantly, the Chart Tool produces results different from the ones in Figure 2 of my
27   declaration because Chart Tool truncates values instead of rounding. For $R^2 = -0.1089$ reported
     in the lower box in the Figure 2 of my declaration, the Chart Tool would have produced -0.10

28   (Footnote Continued on Next Page.)

_____
LEVY DECLARATION IN SUPPORT OF PLAINTIFF ORACLE'S REPLY IN SUPPORT OF MOTION NO.
1 TO EXCLUDE TESTIMONY OF DEFENDANTS' EXPERT STEPHEN CLARKE

1 which produces the same results as the Excel function used by Mr. Clarke.[18] Paragraphs 17-19

2 of Mr. Clarke's declaration demonstrate that (1) Mr. Clarke jumped to an incorrect conclusion

3 about how I used Excel, (2) he does not understand the difference between the formulas for R^2,

4 and (3) perhaps most importantly, that he does not understand the formula of the R^2 he is

5 reporting.

6 **IX.   MR. CLARKE'S INCORRECT STATEMENTS ABOUT MY COMMENTS**

7 **REGARDING R^2**

8   15.   In paragraph 20 of his declaration, Mr. Clarke claims that I critique his use of R^2

9 as a measure of the goodness of fit and that I imply "that R^2 is not important in determining the

10 strength of a regression equation." (Clarke Decl at 6:25-26). Once again, Mr. Clarke

11 mischaracterizes my declaration. I specifically said the following:

12   "The R^2 of a regression is a measure of "goodness of fit" – that is, a measure of how well

13   the variation in the dependent variable is explained by the explanatory variables." (Levy

14   Decl at 24:1-3)

15 Mr. Clarke has simply missed the point of the critique in my declaration. In his deposition, Mr.

16 Clarke repeatedly used the R^2 value of his regressions to justify that his model was a robust

17 model and that the slope coefficient was well estimated.[19] My critique was focused on the fact

18 that a high R^2 does *not* provide an indication that the slope of the line was measured without

19 severe statistical problems. I cited econometric texts that discuss the fact that a large value on

20 this measure of goodness of fit does *not* imply that the parameter of interest is estimated well.

21 This means that just because a regression has a high R^2, it does not indicate that the slope and the

22 _____

23 (Footnote Continued from Previous Page.)

24 instead of correct value of -0.11 shown in the cell B35 in the tab labeled "*Negative Slope Scenario*" where this particular value is computed. Mr. Clarke's guess is simply incorrect. This
25 issue of truncation versus rounding is not significant in this setting.
[18] See Microsoft Help document entitled "Perform statistical and engineering analysis with the
26 Analysis ToolPak," attached to this declaration as **Exhibit 3.**
[19] Dkt 783, Declaration of Holly House in Support of Plaintiffs' Motion to Exclude Expert
27 Testimony of Stephen K. Clarke, Ex B ("Clarke Depo") at 934:10-19 ; 934:24-935:2; 935:12-
18; 944:8-18; 948:13-24.

28

1   intercept are measured without severe bias. I said the following:

2   "…basic econometrics textbooks caution researchers against using the R^2 as a means of

3   determining whether the coefficient of the independent variables is meaningful." (Levy

4   Decl at 24:3-5)

5   Mr. Clarke also discusses "adjusted" or "corrected" R^2 in his declaration even though he did not

6   discuss this topic in his original report. The "corrected" R^2 also is not indicative of whether the

7   model was correctly specified. The R^2, corrected or not, is not a measure of whether or not there

8   is severe bias in the estimated slope. The "corrected" R^2 is simply another metric that establishes

9   goodness of fit. The regression of one variable on another can have a high R^2 (or "corrected" R^2

10   or "adjusted" R^2 as it is sometimes called) simply because the two data series move together, and

11   not because there is some meaningful underlying relationship between the two variables.

12   **X.   MR. CLARKE'S MISCHARACTERIZATION ABOUT MY STATEMENTS**

13   **REGARDING COST CURVES**

14   16.   In paragraph 21 of his declaration, Mr. Clarke says that because of a lack of

15   understanding of accounting principles, I make a mistake about whether he is trying to estimate

16   incremental or variable costs. His statements are both misleading and wrong. Mr. Clarke's

17   definition of variable costs is "variable costs change with the level of sales" (Clarke Report, p.

18   243). In my declaration, I refer to variable costs as costs that vary with the level of output (in

19   Mr. Clarke's case, revenues). Despite what Mr. Clarke claims in his declaration, there is no

20   disagreement about which costs he is attempting to measure. The discussion is about whether he

21   actually did measure these costs with his regression. Further, the various economics textbooks

22   that Mr. Clarke cites define Total Cost = Fixed Cost + Variable Costs. Based on this definition

23   in his report, Mr. Clarke failed to estimate variable costs, despite his claims to the contrary.

24   **XI.   MR. CLARKE'S ERRANT THEORIES ABOUT ESTIMATION OF COSTS**

25   **CURVES**

26   17.   In paragraphs 22-24 of his declaration, Mr. Clarke spends time explaining the

27   relationship between fixed, variable and total cost curves. He offers many texts that cite this

28   relationship and he even presents Figure 2, which is a schematic representation of the

LEVY DECLARATION IN SUPPORT OF PLAINTIFF ORACLE'S REPLY IN SUPPORT OF MOTION NO.
1 TO EXCLUDE TESTIMONY OF DEFENDANTS' EXPERT STEPHEN CLARKE

1 relationship between fixed, variable and total costs.[20] His Figure 2 depicts the total cost curve as

2 having a parallel (upward) shift from a variable cost curve that goes through the origin. Mr.

3 Clarke says:

4   "In my analysis, I establish the slope of the variable cost curve according to basic

5   economic principles. My equation matches the variable cost curves illustrated in multiple

6   economic texts. (Clarke Decl 8:26 – 9:1-2) "Because the slope of the total cost curve

7   and the slope of the variable cost curve are identical (which is mathematically inarguable)

8   and the slope is derived from the regression equation, it follows that my variable cost

9   analysis is correct." (Clarke Decl 9:8-10)

10 There are numerous issues I could take with Mr. Clarke's discussion of economic principles. I

11 set aside discussion of those errors to focus on the fundamental issue of concern here: that Mr.

12 Clarke simply estimated the relationship between costs and revenues incorrectly. Therefore, his

13 statements about his analysis being correct are wrong and misleading. First, Mr. Clarke

14 estimates a regression based on the total costs and revenue data he has available.[21] Based on

15 what he claims is an inarguable mathematical fact,[22] he says he is able recover the slope of the

16 variable cost. The variable costs line is the lower line in his Figure 2. Mr. Clarke's regression

17 was based on total costs and therefore could not directly estimate the slope of the lower line his

18

19

20

[20] Mr. Clarke says that these cost curves "are often straight lines in spite of being called
'curves'." (Clarke Decl at 7:22-23) He claim is simply incorrect. These curves are not "often"
straight lines. There are sound theoretical reasons why they are curves. All four of the texts he
cites show curves instead of straight lines. In his report, Mr. Clarke's Figure 1 showed a cost
curve and not a straight line. (See Clarke Report, p. 243) Not only is Mr. Clarke's statement
wrong based on economic theoretical, it also empirically incorrect in many cases; one of the texts
that he cites shows figures based on empirical studies of cost curves, at least two of these
empirical studies present average cost curves which could not be associates with linear total cost
curves. (O'Sullivan, Sheffrin and Perez, Microeconomics, 6th Edition, p. 191, attached to this
declaration as **Exhibit 4.**)

[21] In his report, Mr. Clarke states it a different way. I provide the quote from his report for
completeness. "I first estimate the slope (i.e. the 'b') of the variable cost function ($VC = a + bQ$)
using a **zero intercept technique**. Clarke Report at 277 and related text continuing to 278.

[22] Clarke Decl. at 9:8-10.

LEVY DECLARATION IN SUPPORT OF PLAINTIFF ORACLE'S REPLY IN SUPPORT OF MOTION NO.
1 TO EXCLUDE TESTIMONY OF DEFENDANTS' EXPERT STEPHEN CLARKE

1 Figure 2 because he did not have separate data for variable costs. His data was for total costs.[23]

2 But Mr. Clarke also did not estimate the slope of the upper curve in his Figure 2 because his zero

3 intercept technique rotates that upper curve to force it through the origin. The upper line, unlike

4 Mr. Clarke's zero intercept regression, has a *non zero* intercept. This is the fundamental reason

5 why he gets the wrong result. **Since Mr. Clarke calculates the wrong slope, his estimates of**

6 **variable cost are wrong.** If he had used a regression with an intercept, he would have been able

7 to estimate the upper line.[24] But he did not.

8   18.   To demonstrate this point, Figure 2 below replicates key features of Mr. Clarke's

9 Figure 2,[25] except I have added the OUSA data used by Mr. Clarke, depicted by black diamonds.

10 The line with the intercept running through the y-axis at 3,134.7702 is similar to the upper line in

11 Mr. Clarke's Figure 2. It is the same regression with an estimated intercept based on OUSA data

12 presented in Figure 1. Additionally, Figure 2 below shows a line running through the origin,

13 which would be similar to the variable cost curve (the lower line) in Mr. Clarke's schematic

14 diagram of cost curves. This lower line is not based on any empirical estimation. However,

15 according to Mr. Clarke it would have the same slope as total cost curve above.[26] The total cost

16 curve (which is what Mr. Clarke has data for) does not go through the origin. Fitting a total cost

17 curve through the origin (which is what Mr. Clarke's zero intercept technique does) necessarily

18 forces the slope of the total cost curve to change, as depicted by the dashed line. Consequently,

19 instead of measuring the slope of the data correctly as 0.3544, he incorrectly measures it as
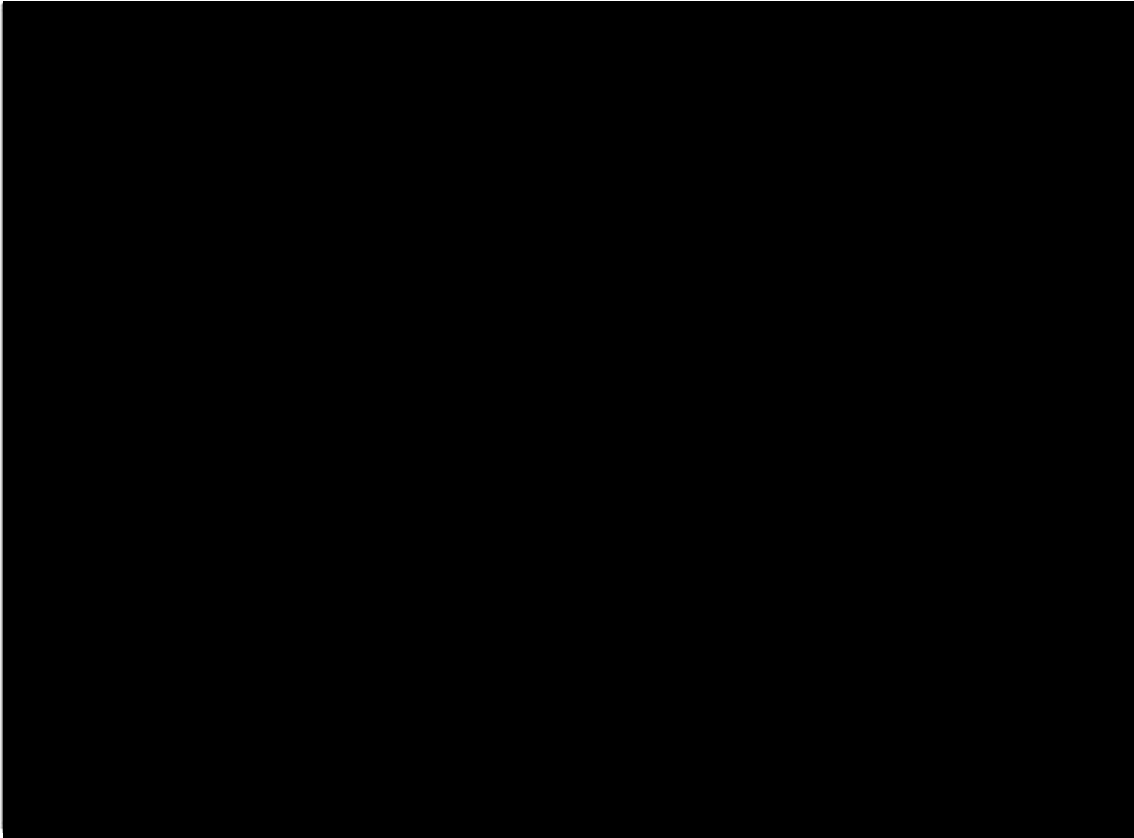
20

21 [23] "In my analysis, I analyze the total costs (the dependent variable) against total revenues (the independent variable)." (Clarke Report at 278)

22 [24] I do not imply that the many errors in Mr. Clarke's analysis would be fixed by simply estimating a regression with an intercept. There are many other errors Mr. Clarke made that

23 would prevent his estimated slope from being a useful measure of variable cost. However, here I focus on this major, fundamental error in Mr. Clarke's analysis.

24 [25] Total cost curves are typically depicted as curves. Although Mr. Clarke has presented numerous texts showing that total cost curves and variable cost curves are typically presented in

25 microeconomics texts as curves, he has presented them in his Figure 2 as straight lines. I do not believe that the total or variable cost curves for OUSA would be straight lines, but again I put

26 that issue aside in an effort to keep the focus on the central issue of Mr. Clarke's dysfunctional regression model.

27 [26] Again, I think there are many reasons why the variable cost curve may not be exactly parallel to the total cost curve, but I put that aside to maintain focus on the central issue I am addressing.

28

LEVY DECLARATION IN SUPPORT OF PLAINTIFF ORACLE'S REPLY IN SUPPORT OF MOTION NO.
1 TO EXCLUDE TESTIMONY OF DEFENDANTS' EXPERT STEPHEN CLARKE

1   0.6327.

16   Figure 2

17   I also made this same point in my declaration by showing that Mr. Clarke's regression technique

18   would change the slope of his total cost curve for OEMEA data. (Levy Decl at 9 Figure 2) In

19   paragraph 25 of his declaration, Mr. Clarke claims that because the intercept is "nothing more

20   than a mathematical anchor," his zero intercept technique is relevant and useful. In my

21   declaration, I said "For the purposes at hand, the intercept in the regressions allows the

22   regression line to fit through the data better. Its specific value may not be of great interest in this

23   case, but it is critical to include the intercept in most settings to obtain a more accurate, unbiased

24   result." (Levy Decl at 8:8-10) So while I agree that the *value* of the intercept may not itself be of

25   central importance here, nonetheless it is of critical importance in constructing unbiased

LEVY DECLARATION IN SUPPORT OF PLAINTIFF ORACLE'S REPLY IN SUPPORT OF MOTION NO.
1 TO EXCLUDE TESTIMONY OF DEFENDANTS' EXPERT STEPHEN CLARKE

1   estimates of the parameters of interest in Mr. Clarke's regression analyses.[27] In addition, in

2   Figure 1 of his report (Clarke Report, p. 243) and in all the economics texts he cites, the cost

3   curves are *not* straight lines. They are curves. Because this total cost curve has curves in it the

4   estimated slope of the cost curve drawn from available data along some segment of that total cost

5   curve will have an intercept that is typically *not* equal to zero. So even if the total cost curve is

6   zero when there are zero sales[28] the slope of the regression line correctly measuring variable

7   costs would rarely, if ever, go through the intercept. Forcing it to do so, as Mr. Clarke has done,

8   does not have the theoretical economic justification Mr. Clarke asserts.[29]

9   **XII.   MR. CLARKE'S INVALID EXCLUSION OF AN INTERCEPT FROM**

10   **REGRESSION MODELS**

11   19.   In paragraph 25 of his declaration, Mr. Clarke makes another misleading

12   statement when he says that "if Oracle's revenues were zero…it would incur no fixed…costs" in

13   justification of his exclusion of the intercept from his regression model. First, Mr. Clarke has

14   vigorously stated that he does not believe that the intercept of the regression is a measure of

15   fixed costs.[30] In this setting, I have stated in my declaration that I do not disagree.

16   20.   So it is clear that no one believes, based on this data, that there is a direct

17   theoretical connection between the magnitude of the intercept and the magnitude of the fixed

18   costs. Mr. Clarke offers the justification that a business with zero sales has zero costs for the use

19   of his zero intercept regression. If we accept this assertion that a company with zero sales will

20

---

21 [27] Indeed, the texts he includes that caution that the *interpretation* of the intercept may be meaningless (e.g., Clarke Decl Ex 2 at 7.7 and Clarke Decl Ex. 14 at 432 and at 466) come

22 nowhere close to suggesting that because the intercept may not have a meaningful interpretation, the analyst should exclude it from the model. And the citation to Professor Kennedy in my

23 declaration explains why this is the case—the inclusion of a constant controls for variables that may have been left out of the model. (Levy Decl at 20:2-6)

24 [28] I am not saying I agree with the implications Mr. Clarke's draws from the fact that a long shuttered company with zero sales has zero costs, or that his statement has implications about for

25 the issues at hand. I am just putting those issues aside to clarify other important topics.
[29] If Mr. Clarke had the variable costs segregated from the total costs, alternative strategies to a

26 regression analysis may have been open to Mr. Clarke for extracting the variable cost information he needed to calculate his effective margins.

27 [30] Notably, Mr. Clarke has also frequently stated the exact opposite as detailed in this declaration. For now I put that internal conflict in Mr. Clarke's report and declaration aside.

28

1   have zero costs for the present discussion, it does not provide any justification for forcing the

2   intercept in the regression to be zero because as Mr. Clarke has forcefully stated, the intercept is

3   not a measure of fixed costs in this setting. Therefore Mr. Clarke's statement about zero costs at

4   zero revenues does not provide any economic, statistical or other theoretical justification for

5   forcing the intercept of his OUSA regressions through zero.

6   21.   In paragraph 26 of his declaration, Mr. Clarke claims his method of "estimating"

7   the fixed costs is consistent with the method of estimating a constant as shown in the Pindyck

8   and Rubinfeld textbook he cites (Clarke Decl at 10:Footnote 11). Again, his statement is

9   incorrect and demonstrates his lack of understanding of econometric techniques and contributes

10   to his errant estimates. The footnote in Pindyck and Rubinfeld that Mr. Clarke references here

11   shows how to estimate a constant when using "first-differenced" data. Mr. Clarke did not use

12   this first-difference data regression. In a first-difference regression, the constant gets dropped

13   because two sequential observations (for which the constant is the same) are subtracted from

14   each other. Therefore, Pindyck and Rubinfeld are demonstrating a way of effectively recovering

15   the value of the constant from this specific case when a first-difference regression is originally

16   employed.[31] This method is not applicable to Mr. Clarke's regression analysis because he does

17   *not* use a first-difference regression. He has combined two techniques, a zero intercept

18   regression with a calculation to estimate an intercept that does not exist. These two methods are

19   logically inconsistent and as expected, combining them produces nothing of logical or functional

20   usefulness. Indeed, a first difference regression for OUSA produces a slope of 0.3493, which is

21   virtually identical to the slope of 0.3544 shown in Figure 2 above for the regression line *with an*

22   *intercept.* Therefore, if Mr. Clarke had used the first-difference method in its entirety to estimate

23   variable costs, he would have estimated a slope similar to the regression line with an intercept.

24   Instead Mr. Clarke only used part of the first-difference process and matched it up with his zero

25   intercept technique, which was logically inconsistent and produced a different estimated slope.

26

27   [31] Clarke Decl, Ex 15 at 156.

28

1   22.   He further misleads by providing another irrelevant citation. Mr. Clarke refers

2   to a text by Macfie and Nufrio to support his approach (Clarke Decl at 10: Footnote 11). Rather

3   than providing support for Mr. Clarke's analysis, Mr. Clarke's own Exhibit 14 (Macfie and

4   Nufrio) demonstrates that he started with an improper slope estimate. Mr. Clarke refers to

5   formula 17.3 in his Exhibit 14 for support of his calculation. However, formula 17.3 is based on

6   two preceding formulas, 17.1 and 17.2, which produce the slope coefficient for a model *with a*

7   *non-zero intercept*.[32] In his declaration, he defines the intercept as an estimate of the fixed costs.

8   (Clarke Decl at 10:9). However, his zero intercept model is based on the *assumption* that the

9   intercept is zero. Therefore he cannot use the formulas from his Exhibit 14 to get to an estimate

10   from this formula for fixed costs. As I stated in my declaration, his estimate of fixed costs is

11   nothing more than the "error" between the data points and the estimated regression line:

12   "His calculation simply reflects the difference between a predicted value for total costs

13   on a regression line and the actual average value of those same total costs." (Levy Decl

14   at 21:3-5).

15   23.   Paragraphs 22, 25, and 26 of Mr. Clarke's declaration demonstrate very well that

16   he repeatedly contradicts himself and fundamentally has no understanding of what his regression

17   analysis did. In paragraph 22 of his declaration he says that there are certain costs for a company

18   that are "fixed over a given range." (Clarke Decl at 8:1). His own reference describes the

19   intercept as an estimate of fixed costs. "(Clarke Decl Ex 2 at 7.15-7.17) In the paragraph

20   immediately following this, he himself defines the intercept as the estimated fixed costs in the

21   following equation: "Intercept = estimated fixed costs." (Clarke Decl at 10:9)

22   24.   Mr. Clarke's attempt to justify his use of a "zero intercept" method is internally

23   inconsistent and actually contradicts the sources he offers in support of his approach. In

24   particular, he begins by correctly observing "Certain of the costs of a company incurs are fixed

25   over a given range of activity…, while other costs vary with the level of sales…" (Clarke Decl at

26   _____

27   [32] Brian P. Macfie and Philip M. Nufrio, <u>Applied Statistics for Public Policy,</u> p. 428, attached to
     this declaration as attached to this declaration as **Exhibit 2** and Clarke Decl, Ex 15 at 430.

28

LEVY DECLARATION IN SUPPORT OF PLAINTIFF ORACLE'S REPLY IN SUPPORT OF MOTION NO.
1 TO EXCLUDE TESTIMONY OF DEFENDANTS' EXPERT STEPHEN CLARKE

1 7:24-8:2)[33] Then, consistent with the economics texts he offers to support his discussion, Mr.

2 Clarke represents fixed costs as an amount the firm takes on when it opens for business and

3 remains constant over the range depicted in his Figure 2. In the same figure, he represents total

4 costs as an upward sloping line, constructed by adding the constant fixed costs to variable costs.

5 Clearly, if one believed that Figure 2 represented total costs, a regression model of total costs

6 would necessarily include an intercept. Then in paragraph 25, he dismisses my criticism of his

7 excluding the intercept on the grounds that it is a "mathematical anchor and has no practical

8 meaning"[34] and that "if Oracle's revenues were zero the firm would be out of business and it

9 would incur no fixed or variable costs."[35]

10   25.   As discussed above, Mr. Clarke's methodology for estimating the slope of the

11 cost curve is wrong from the start. Therefore, his claim in paragraph 27 of his declaration that

12 his "model, therefore, only generates one output; namely the ratio of variable to total costs at

13 Average Revenue." is wrong.

14   26.   In paragraph 28, Mr. Clarke describes how he believes I would estimate fixed

15 costs. I do not calculate fixed costs the way he says I do. In fact, I never calculate fixed costs in

16 my declaration. Mr. Clarke does not provide a citation to support his assertion. The method Mr.

17 Clarke describes looks similar to the one described in one of Mr. Clarke's own references, the

18 Litigation Services Handbook (Clarke Decl, Ex 2 at 7.15-7.17). The example discussed in Mr.

19 Clarke's Exhibit 2, pages 7.15-7.17 shows that the intercept term of a regression like his

20

21 [33] The existence of these fixed costs necessarily implies that you need both an intercept and a
22 slope coefficient to estimate a regression model that explains how total costs vary with output
over the relevant range.
23 [34] Whether or not the intercept has meaning, it is nonetheless still an anchor, which is properly
placed when the regression includes it, but badly biases the results when, as Mr. Clarke has done,
24 the anchor is planted at the origin.
[35] This statement clearly contradicts his own Figure 2 and the economics texts he cites as
25 support. For example, Clarke Decl, Ex. 7 at 136 explains "Some costs associated with inputs do
not vary as the firm changes the level of production. For instance, the firm may need to hire
26 someone to run the personnel office and someone to supervise the workers, and the cost of these
inputs do not change as production varies, within limits." Mr. Clarke's observation that a firm
27 that has gone out of business has no costs is irrelevant to understanding the costs of firms that
have opened for business as long as they remain in business.

28

LEVY DECLARATION IN SUPPORT OF PLAINTIFF ORACLE'S REPLY IN SUPPORT OF MOTION NO.
1 TO EXCLUDE TESTIMONY OF DEFENDANTS' EXPERT STEPHEN CLARKE

1   OEMEA and OUSA regressions is sometimes interpreted as fixed cost. But I emphasize that I

2   did not perform this calculation and do not think it necessary, since it would be better to take the

3   variable costs from the slope of the regression line with an intercept.

4   **XIII.   MR. CLARKE'S FAILURE TO ESTIMATE VARIABLE COSTS**

5   27.   In paragraph 29 of his declaration, Mr. Clarke says his "analysis is the only

6   evidence on what the relevant variable costs are in this case." Once again he is incorrect and

7   therefore his statement is misleading. As explained above and at length in my declaration, **Mr.**

8   **Clarke's analysis does not measure variable costs because he has constructed a model such**

9   **that it is incapable of measuring variable costs. Instead it measures something closer to**

10   **average total cost per unit of revenue, which cannot be used for this purpose.**[36]

11   28.   In paragraph 33 of his declaration, Mr. Clarke states that my estimate of variable

12   costs "directly" contradicts Meyer's numbers. The purpose of my declaration was to analyze Mr.

13   Clarke's methods. In doing so, I was demonstrating that Mr. Clarke's analysis was rife with

14   errors and fundamentally wrong in that it would significantly alter the magnitude of his

15   estimates. I did not correct all of the errors in Mr. Clarke's regression analysis, nor did I even

16   enumerate all of them. I simply discussed a set of fundamental flaws and demonstrated that they

17   had a significant impact on the estimate values.

18   29.   In paragraph 34 of his declaration, Mr. Clarke says he modeled "costs against

19   revenue according to standard microeconomic principles to arrive at a factor measuring the

20   change in cost due to a change in revenue." While some components of Mr. Clarke's analysis

21   can be found in econometric texts, they are combined in a way that makes his results

22   meaningless. The clear evidence of this is that Mr. Clarke's regression model cannot distinguish

23   between the slopes of the sets of data that clearly depict very divergent relationships in the

24   ────────────────

25   [36] Mr. Clarke makes such an array of errors in his regression analysis, that it is not correct to say
     that he has measured average total cost per unit of revenue correctly. But if all of the other errors
26   in Mr. Clarke's regression analysis were corrected he could approximate the average total cost
     per unit of revenue with his zero intercept regression technique. As stated above, the average
27   total cost per unit of revenue is not something that can be placed into Mr. Clarke's calculation of
     Relevant Margin. It is simply the wrong construct for use there.

28

LEVY DECLARATION IN SUPPORT OF PLAINTIFF ORACLE'S REPLY IN SUPPORT OF MOTION NO.
1 TO EXCLUDE TESTIMONY OF DEFENDANTS' EXPERT STEPHEN CLARKE

1 magnitude of the change in costs associated with a one unit change in revenues. As discussed

2 above and in my previous declaration, **it simply cannot measure the critically important**

3 **relationship between costs and revenues that is a pillar of his Relevant Margin calculation.**

4 **The problem is that he made so many fundamental errors along the way that not only did**

5 **he not apply standard economic principles, he recovered no such relationship between costs**

6 **and revenue. He simply estimated the difference between actual and predicted total costs,**

7 **after rotating the total cost curve, which has no bearing on variable or fixed costs.**

8   30.   In paragraph 35 of his declaration, Mr. Clarke says that I am confused about what

9 he is estimating. He claims that he uses "the equation only to identify the slope of the variable

10 cost curve which I [Clarke] then use to quantify the percentage of variable to total cost." Mr.

11 Clarke is the one who is confused about what he is estimating. Given that the data series used in

12 Mr. Clarke's regressions are total costs,[37] he cannot claim he estimates variable costs when he

13 does nothing to extricate fixed and variable costs from each other. Mr. Clarke claims that I am

14 "incorrect" and "misleading the court" (Clarke Decl at 14:9-10) when I say that he estimates

15 average costs. In my declaration I said the following:

16

17   "Therefore, instead of estimating variable costs, as Mr. Clarke states he believes he is

18   doing, he is simply estimating an average cost, which includes both fixed and variable

19   costs over the relevant range in revenue." (Levy Decl at 5: 12-14.)

20

21 I am not saying that Mr. Clarke intended to estimate the average total cost, but that it is closer to

22 what the slope of his regression line is. **However, as demonstrated in Figure 2 above, and as**

23 **demonstrated by the fact that the data series Mr. Clarke used are in fact total costs and not**

24 **variable (as shown in footnote 35), Mr. Clarke incorrectly describes his own calculations.**

25 **He did the wrong calculations and his interpretation of results in his report is incorrect.**

26 _____

27 [37] "In my analysis, I analyze the total costs (the dependent variable) against total revenues (the
    independent variable)." (Clarke Report at 278)

28

LEVY DECLARATION IN SUPPORT OF PLAINTIFF ORACLE'S REPLY IN SUPPORT OF MOTION NO.
1 TO EXCLUDE TESTIMONY OF DEFENDANTS' EXPERT STEPHEN CLARKE

1   His continued misinterpretation and incorrect calculations will mislead the court.

2   **XIV.   MR. CLARKE'S ERRANT INTERPRETATION OF THE LOG-LOG MODEL**

3   31.   In paragraphs 36-37 of his declaration, Mr. Clarke is stating a critique that I made

4   of his interpretation of his own results, but still fails to understand the nature of my criticism. He

5   admits that he said in deposition that the intercept in the log-log model "has no meaning" (Clarke

6   Decl. at 14:22) while in my declaration I said that the intercept in a log-log model does have a

7   very specific meaning. Of greater importance, in the log-log model, the value of the intercept

8   interacts with the value of the slope to determine the percentage change in costs with a

9   percentage change in revenue in the relevant range. I agree that the intercept in a log-log model

10   is likely to be required. This is because it influences the magnitude of the change in costs when

11   there is a one dollar change in revenue. Mr. Clarke does not provide a text that supports his

12   method of apportioning fixed and variable costs by dropping the intercept from his analysis

13   altogether. Further, he fails to acknowledge that he contradicted himself between his report and

14   his deposition. As I said in my declaration,

15   "Mr. Clarke contradicts himself between his deposition, where he says that the intercept

16   value from his log-log regression is meaningless, and his report, where he claims that the

17   interpretation of the intercept is that of fixed costs. (House Decl., Ex. B (Clarke Depo.) at

18   962:10-963:2 and Ex. A (Clarke Report) at p. 244)." (Levy Decl at 27:14-17)

19   **XV.   MR. CLARKE'S FAILURE TO INVESTIGATE OR APPLY FIXED EFFECTS**

20   32.   In paragraphs 45-46 of his declaration, Mr. Clarke discusses my critique of his

21   lack of use of "fixed effects". Fixed effects is a well-known technique used by econometricians

22   that uses dummy variables in a specific way. It is not synonymous with dummy variables. In his

23   deposition Mr. Clarke did not know of this technique. (Clarke Depo at 935:3-4)   Later in his

24   deposition, Mr. Clarke said he had heard of the technique but had never used it (Clarke Depo at

25   944:3-7).

26   33.   Mr. Clarke uses panel data in his regressions and should have should have applied

27   or investigated the use of panel data techniques, such as fixed effects. In fact, he says that SAP's

28   operations vary in size across countries. The econometrics text by Dr. Gujarati, cited by Clarke,

LEVY DECLARATION IN SUPPORT OF PLAINTIFF ORACLE'S REPLY IN SUPPORT OF MOTION NO.
1 TO EXCLUDE TESTIMONY OF DEFENDANTS' EXPERT STEPHEN CLARKE

1 discusses the fixed effects model.[38] The differing sizes of SAP operations across countries

2 suggest that a fixed effect model, or other panel data techniques, would important to analyze.

3 Dr. Gujarati mentions that in panel data based on country units, there are bound to be differences

4 across countries that can be addressed with panel data techniques, such as fixed effect. The

5 existence of data in geographic units is not a reason to avoid fixed effects models in panel data.

6 Having all the data for these countries in one regression (i.e. pooling all of the data) without

7 using panel data techniques can cause bias in the estimates of the slope, in this case, and

8 therefore in the measure of variable costs. Not analyzing the appropriateness of panel data

9 techniques, on what is inherently panel data demonstrates that he does not understand panel data

10 techniques, which would produce substantially different estimates than the method Mr. Clarke

11 used. I said the following in my declaration:

12   "When a fixed effects regression (with fixed effects for each subsidiary) is performed

13   using Mr. Clarke's SAP data, it lowers his coefficient of log of real total revenues from

14   0.95 to 0.80." (Levy Decl at 21:21-23)

15   34.   Despite Mr. Clarke's claims that I do not understand accounting data, I have used

16 accounting data in many econometric analyses, and continue to do so on a daily basis. Similarly,

17 despite Mr. Clarke's claims that I do not understand the difference between variable and

18 incremental costs, I very clearly understand these terms and how they are used in economic

19 analyses.

20 **XVI. CONCLUSION**

21   35.   Mr. Clarke's response in his declaration only serves to reinforce my previous

22 conclusions from my earlier declaration, as listed below:

23   **"I have found that Mr. Clarke's regression analyses are unreliable and unusable**

24   **for the purpose for which they were intended. These criticisms are not based on**

25 _____

26 [38] Gujarati, D.N. and D.C. Porter, <u>Basic Econometrics</u>, Fifth Edition, Pp. 592-599 attached to this
    declaration as **Exhibit 5.** This is an updated edition of the text Mr. Clarke included as Exhibit 17

27 of his declaration.

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1   **small, minor changes to his regression models. Rather, the issues I found with Mr.**

2   **Clarke's regression analysis reflect his lack of knowledge of the fundamentals of**

3   **econometrics, which have a significant impact on his estimate of the relevant profit**

4   **margins estimated by Mr. Clarke. Mr. Clarke's lack of econometric knowledge**

5   **leads him to make numerous errors in his analysis, which prevent him from**

6   **accomplishing the main goal of his regression analysis, estimation of how costs**

7   **change as revenues change. His numerous errors, which have a significant**

8   **empirical impact on his results, his lack of knowledge of the econometric tools that**

9   **he attempts to use, and his reliance on baseless assumptions render his regression**

10   **analyses at best unreliable and unusable and at worst, in the case of his OEMEA**

11   **and OUSA regressions, completely meaningless." (Levy Decl at 28:6-17)**

12 I do not claim here, or in my first declaration, that I have corrected all of the econometric issues

13 present in Mr. Clarke's analysis. My first declaration and this declaration demonstrate that **Mr.**

14 **Clarke's regression analyses have so many flaws that even some changes have important**

15 **impacts on his results and that he had misused regression analysis.** Mr. Clarke's declaration

16 only reinforces the evidence that Mr. Clarke does not understand regression analysis and

17 techniques and does not apply them correctly. His declaration makes it clear that he does not

18 understand his fundamental mistake of assuming that a variable is zero and then attempting to

19 estimate it. Further, on more than one occasion in his declaration, he provides references and

20 methods in support of his analysis, when in fact these references and methods are irrelevant and

21 inapplicable to his analysis. Finally, Mr. Clarke characterizes my declaration, on more than one

22 occasion, in ways that are not only incorrect, but are *obviously* incorrect, demonstrating that he

23 will make statements that are obviously contrary to fact. For these reasons – and others that are

24 not addressed specifically in this section – his declaration is wrong and misleading.

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LEVY DECLARATION IN SUPPORT OF PLAINTIFF ORACLE'S REPLY IN SUPPORT OF MOTION NO.
1 TO EXCLUDE TESTIMONY OF DEFENDANTS' EXPERT STEPHEN CLARKE

1   I declare under penalty of perjury under the laws of the United States that the

2   foregoing is true and correct and that this declaration is executed on September 16, 2010 at

3   Boston, Massachusetts.

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5   Daniel S. Levy, Ph.D.

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LEVY DECLARATION IN SUPPORT OF PLAINTIFF ORACLE'S REPLY IN SUPPORT OF MOTION NO.
1 TO EXCLUDE TESTIMONY OF DEFENDANTS' EXPERT STEPHEN CLARKE

XVII. APPENDIX 1 – EXAMPLE TO ILLUSTRATE THAT MR. CLARKE'S TECHNIQUE MEASURES DIFFERENT SLOPES FOR TWO SETS OF DATA WITH IDENTICAL SLOPES
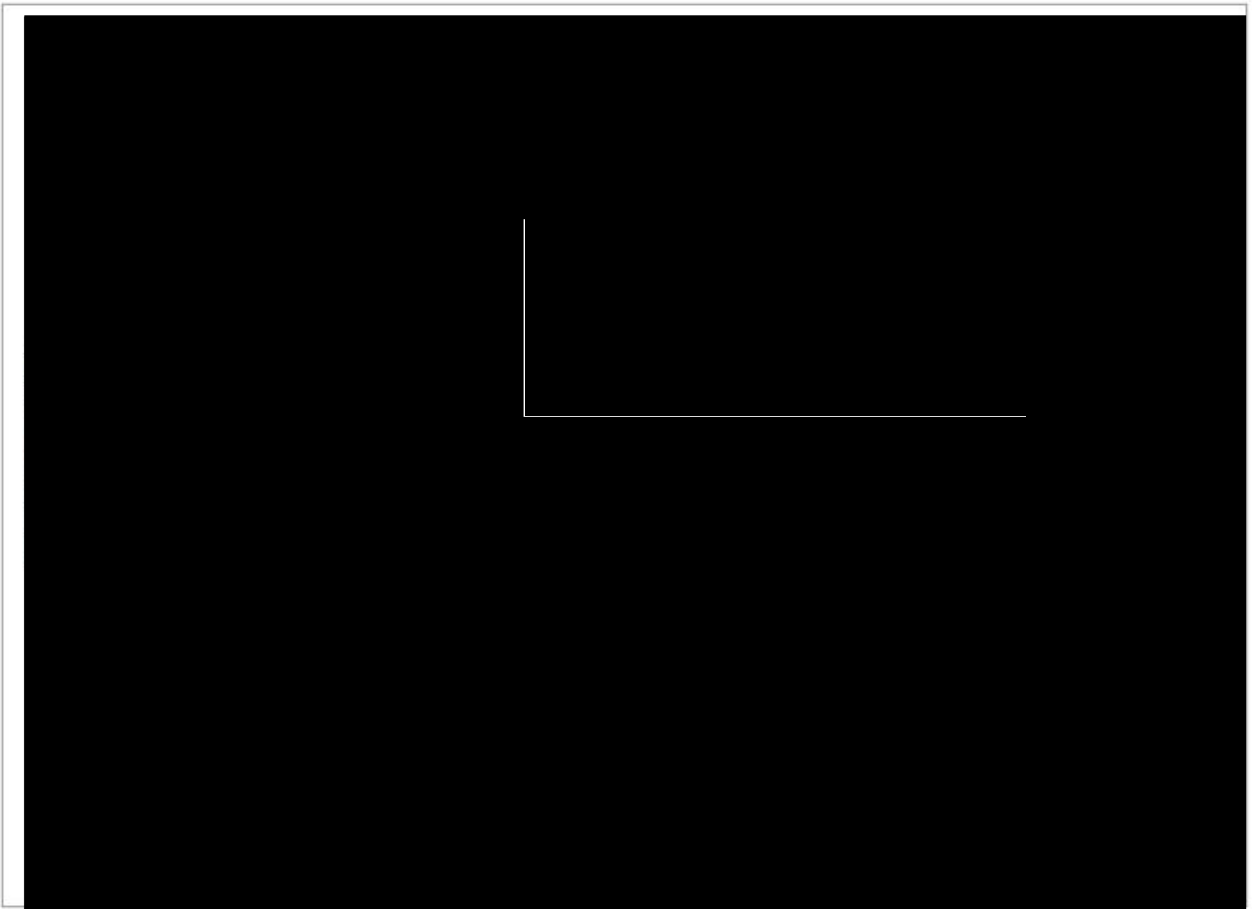
In this appendix, I provide an example to show that Mr. Clarke's regression technique remains dysfunctional even when example data acceptable to Mr. Clarke is used. Again, I emphasize that I do not agree with Mr. Clarke's characterization of my example data in my declaration, as I discussed earlier, but provide this set of data to focus the discussion on Mr. Clarke's regression technique rather than his comments about the characteristics of the example data I provided.

Figure A.1 below shows two sets of data, which when estimated using the Clarke Zero intercept technique and R^2_{Clarke}, would be estimated to have differing variable costs and R^2_{Clarke}. The first set of data is the original OUSA data that Mr. Clarke used in his zero intercept regression.

The second set of data is higher on the graph, but the slope and distance between any pair of points in the upper set of data is exactly the same as the slope and distance between analogous pairs of points in the lower set of data. Clearly, the change in costs associated with the change in revenue is the same for both sets of data, which is reflected in the standard OLS regression with an intercept. Both sets of data reflect an actual change in costs of 35.44 cents for a one dollar change in revenues. In addition, the standard R^2 ($R^2_{standard}$) depicts the exact same fit of the regression line to the data. $R^2_{standard} = 0.8024$.

The patterns in these two sets of data are identical. So any valid measure of the relationship between the change in the total costs for a one dollar change in the revenues of these two sets of data should be the same as well. A regression analysis of these same data using Mr. Clarke's inappropriate zero intercept technique and $R^2_{Clarke,}$ paints an entirely different picture. Using Mr. Clarke's zero intercept regression methods on the lower set of data (the actual OUSA data) produces his original findings, a slope of 0.6327. Alternatively for the upper set of data, Mr. Clarke's zero intercept regression model produces a slope of 0.8990, measuring a much higher 89.99 cent change in costs per dollar change in revenues. Mr. Clarke's zero intercept technique is clearly producing nonsensical results; it is incorrect for both the upper and lower set of data.

1   By forcing the intercept to zero, Mr. Clarke imposes a relationship on the data that does not

2   actually exist in the data. It biases the estimates of the relationships between the change in

3   revenues and the change in costs. Mr. Clarke's regression method measures the change in total

4   costs associated with a one dollar increase in revenues as being different for data sets where that

5   relationship is exactly the same. As discussed in the body of this declaration, it will also

6   measure the change in total costs associated with a one unit increase in revenues as being same

7   for data sets where that relationship is completely different.

23   Figure A.1

LEVY DECLARATION IN SUPPORT OF PLAINTIFF ORACLE'S REPLY IN SUPPORT OF MOTION NO.
1 TO EXCLUDE TESTIMONY OF DEFENDANTS' EXPERT STEPHEN CLARKE