

MPA et al.-RT-1

**BEFORE THE
POSTAL RATE COMMISSION
WASHINGTON, DC 20268-0001**

**Postal Rate and Fee Changes,
2006**

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)

Docket No. R2006-1

**REBUTTAL TESTIMONY OF ANTOINETTE CROWDER
ON BEHALF OF
MAGAZINE PUBLISHERS OF AMERICA, INC.,
ADVO, INC., ALLIANCE OF NONPROFIT MAILERS,
AMERICAN BUSINESS MEDIA, DOW JONES & CO.,
THE MCGRAW-HILL COMPANIES, INC.,
MAIL ORDER ASSOCIATION OF AMERICA,
NATIONAL NEWSPAPER ASSOCIATION,
SATURATION MAILERS COALITION
AND TIME WARNER INC.**

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testimony to:

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1 **I. INTRODUCTION, PURPOSE AND SUMMARY**

2 **A. Introduction And Purpose**

3 The purpose of this testimony is to rebut the testimony of OCA witness J.
4 Edward Smith (OCA-T-3) by demonstrating why the Commission should not
5 adopt any of the city carrier out-of-office cost models he presents. Dr. Smith
6 recommends two alternate city letter carrier out-of-office cost models, one based
7 on the USPS 2002 CCSTS data and one based on the DOIS data recently
8 provided in USPS LR L-160. However, neither is an improvement over the
9 Postal Service CCSTS model presented by Dr. Bradley in R2005-1 and used
10 again in this case as a basis for rate development of virtually all postal services
11 and products.

12 **B. Summary And Conclusions**

13 Dr. Smith offers 36 differing city letter carrier delivery (out-of-office)
14 models: 24 differing models from the 2002 City Carrier Street Time Survey
15 (CCSTS) data and 12 from the Delivery Operations Information System (DOIS)
16 data found in USPS LR L-160 (each model is developed in both unrestricted and
17 restricted form). He recommends that the Commission use either his preferred
18 CCSTS model or his preferred DOIS model. Although his two recommended
19 models differ considerably from each other, he does not actually select one over
20 the other.

21 I have reviewed Dr. Smith's testimony and conclude the following:

- 22 (1) Dr. Smith's analysis of the CCSTS data and analyses is superficial, with
23 very little in the way of new evaluation. He conducts no data review of his
24 own. He provides little in the way of a reasoned, conceptual structure for
25 explaining city carrier costs, as a basis for model specification,

1 econometric analysis, and model selection. He simply adopts Dr.
2 Bradley's quadratic model and changes in some of its variables or mix of
3 variables. His series of models represents a search for a model that lacks
4 what he calls "sign" problems and satisfies his *a priori* expectations of
5 results. With respect to econometric issues, his only attempt to deal with
6 the data multi-collinearity problem is to offer restricted versions of his full
7 quadratic models (by completely eliminating all cross-product variables).
8 And he has not made any serious attempt to deal with econometric
9 problems such as autocorrelation or heteroskedasticity.

10
11 (2) Dr. Smith does provide three new contributions to the subject of out-of-
12 office modeling. The first is his misguided discussion on the density
13 variable. The second is his "DPS case," where he changes Dr. Bradley's
14 "letter" and "flat" volume variables to a strictly DPS letter variable and a
15 variable that includes residual cased letters and flats. And, the third
16 contribution is to combine regular and parcel/accountable delivery time
17 into a total delivery time value and then regress that time against all
18 volume and control variables. The latter two approaches deserve further
19 investigation because they are consistent with operational reality.

20
21 (3) Dr. Smith is correct that the DOIS data, at least superficially, have great
22 appeal as a long-term panel data set. Unfortunately, they also have
23 serious deficiencies, including (a) lack of values for important explanatory
24 variables like collection and accountable mail and (b) lack of differentiation
25 between SPRs and large packages and among the various shapes for
26 Priority Mail. Additionally, little is yet known about the quality and
27 reliability of the data. These deficiencies mean:

- 28
- 29 ■ The DOIS-based models are clearly biased because critical,
30 explanatory volume variables are absent or incorrectly aggregated.
- 31
- 32 ■ There is no reasonable method for identifying the correct variabilities
33 for the volumes that are not included or separately defined in the DOIS
34 database: Priority Mail, SPRs, large packages, collection mail, and
35 accountable mail.
- 36
- 37 ■ DOIS data quality and reliability are completely unknown. Certain data
38 quality issues could include major problems such as errors-in-variables
39 (e.g., bias and inconsistency).
- 40

41 It is not yet known whether these deficiencies are fatal or can be
42 overcome.

43
44 (4) In addition to these DOIS-specific deficiencies, Dr. Smith's DOIS data and
45 models have the same major problems as the CCSTS data and models.
46 Data from both sources appear to be collinear and heteroskedastic. Also

1 autocorrelation within the time series portion of both data sets is a very
2 real possibility, as indicated by Dr. Smith's own analysis. And, like his
3 CCSTS modeling effort, Dr. Smith does not appear to have undertaken
4 any in-depth modeling specification or explanation for his DOIS models.
5 Rather, as before, his work appears to be a search for results that fit with
6 his pre-conceived notions.

7
8 (5) As with the CCSTS data and models, I agree with Dr. Smith's numerous
9 comments that much work remains to be done on the DOIS data and
10 models. Whether this work is warranted depends, of course, on whether
11 the potentially fatal deficiencies identified in (3) and (4) above can be
12 surmounted.

13
14 (6) Because of the superficiality of his CCSTS and DOIS analyses, Dr.
15 Smith's two alternate (and disparate) recommended models should be
16 rejected by the Commission. He provides no evidence that any of his
17 results are an improvement over the USPS model used in this case.

18
19 **C. Organization Of The Remainder Of This Testimony**

20 There are three remaining sections to this testimony. Section II addresses
21 Dr. Smith's comments on the CCSTS data and USPS-proposed model using
22 those data. It also briefly discusses Dr. Smith's efforts to use the CCCSTS data
23 to develop alternative models. Section III discusses Dr. Smith's proposal to use
24 the DOIS data and his efforts to use that data to develop alternative models.
25 Section IV explains that the major problems that Dr. Smith claims afflict the
26 CCSTS data and models also afflict the DOIS data and models.

1 **II. DR. SMITH’S COMMENTS ON CCSTS DATA AND MODELING HAVE**
2 **SOME MERIT BUT ARE NOT BASED ON ANY IN-DEPTH ANALYSES**

3
4 **A. Dr. Smith’s Critique And Model Recommendation**

5 Dr. Smith offers a brief critique of the CCSTS data and the quadratic
6 models that USPS witness Bradley developed from them. Dr. Smith identifies
7 three over-arching issues with respect to the CCSTS data and model:¹

- 8 ■ Flaws in the CCSTS data, identified in the Commission’s analysis in its
9 R2005-1 Opinion and Recommended Decision.
- 10
11 ■ Multi-collinearity among the explanatory variables, evidenced by certain
12 coefficients with the wrong signs and/or with very high Variance Inflation
13 Factors (VIFs), and marginal cost results that are not expected on an *a*
14 *priori* basis.²
- 15
16 ■ *Ad-hoc* specification of the model, including the use of density as an
17 explanatory variable.

18
19 He states that he believes that it is not clear that “meaningful conclusions” can be
20 obtained from the use of the CCSTS data principally because of the “significant
21 multicollinearity problems.”³

22 Despite those serious problems, however, he presents 24 different models
23 (each in unrestricted and restricted form) using Dr. Bradley’s quadratic model
24 specification, with some variation in the explanatory variables used, and using
25 the very same CCSTS data used by Dr. Bradley. Of his 24-model effort, he
26 states:

27 “The analysis effort has illustrated the problems of collinearity associated
28 with the appearance of unexpected signs and high VIF values. . . .

¹ OCA-T-3, pages 3-8.

² The wrong sign means that the coefficient for an explanatory variable is positive when expected to be negative, or vice versa.

³ OCA-T-3, page 3, lines 8-10.

1 Whether the effort was also hampered by an inadequate model is
2 unknown. However, given the problems of the underlying database as
3 evidenced by the types of results obtained it appears that the Carrier Cost
4 analysis presented in Docket No. R2005-1 is flawed and that additional
5 analysis is needed. Pending additional analysis, I recommend the use of
6 the unrestricted variability case of CC5.” (OCA-T-3, page 15, lines 3-9)

7
8 He recommends his CC5 full quadratic model (as the regular delivery
9 model) because: “the restricted version of CC5 appears to be slightly better than
10 witness Bradley’s case, based solely on the breakout between DPS and other
11 letters. However, the full quadratic version of equation 5 is more general and is
12 the equation recommended.”⁴ The full quadratic model he prefers contains
13 separate variables for DPS letters, cased letters and flats (included as one
14 variable), and sequenced volume. It also excludes Dr. Bradley’s density variable,
15 which Dr. Smith concludes is inappropriate.

16 **B. Dr. Smith’s Analysis Is Superficial And Incomplete**

17 **(1) Dr. Smith Has Not Independently Reviewed The CCSTS**
18 **Data Base**

19
20 In actuality, although Dr. Smith has had access to the CCSTS data
21 since it was introduced in R2005-1,⁵ he does not appear to have performed an
22 independent evaluation of the CCSTS data or any serious modeling. With
23 respect to review or testing of the CCSTS database, he has simply relied upon
24 the Commission’s R2005-1 analysis.⁶ But, even so, he has not attempted to
25 perform any independent data culling, cleaning, segmentation, outlier analysis, or

⁴OCA-T-3, page 14, lines 17-20.

⁵ Response to USPS/OCA-T3-21.

⁶ Responses to ADVO/OCA-T3-1, 2, 24(c).

1 any other database modifications in an attempt to improve the data quality or
2 understand the information contained in the data.

3 With respect to his modeling effort, he has simply adopted Dr. Bradley's
4 quadratic structural specification and, for each of his alternatives, deleted and/or
5 made changes in the original variables or mix of variables, searching for a model
6 that avoids what he calls "sign" problems and also satisfies his *a priori*
7 expectations of results. By his own admission, he clearly has not developed an
8 appropriate conceptual structure to determine the most important cost causal
9 variables and how these variables should be combined to explain city carrier
10 street costs in particular model specifications. Further, lacking that structure, he
11 has been unable to test specified models through using the appropriate statistical
12 indicators to determine if model results comport with expected city carrier cost
13 behavior.⁷ Thus, despite the amount of calendar time that he has had available,
14 he has not run any really new or useful specifications.⁸

⁷ See Dr. Smith's responses to ADV0/OCA-T3-15(e) and 24 where he states that he has not developed either an appropriate economic specification for a city delivery cost model or even yet developed suggestions for one. Further, several of his CCSTS model alternatives reflect concerns on the impact of the differences between the CCSTS and DOIS data rather than specific attempts to develop an improved CCSTS model. Thus, he runs CCSTS models with and without collection volume, with SPRs separate from larger packages and then SPRs and packages combined together; with all "delivery" time and volumes combined vs. separate "regular delivery" and "parcel/accountable" delivery models. Response to ADV0/OCA-T3-12. See also Section II (and, in particular, Section II.B) below.

⁸ Response to ADV0/OCA-T3-3. In that response, Dr. Smith lists one minor model modification involving the use of a "small packages" dummy variable, apparently in an effort to deal with the negative SPR variabilities. See also responses to USPS/OCA-T3-14 and -15 where he states that he did not estimate fixed effects or route-level models because he depended upon the documentation in R2005-1. Further, he states that given the limited time available for analysis, he could not have preformed such a review. (See also MPA/ANM/OCA-T3-25 where he states generally that he did not try any other functional forms.)

1 With respect to the problem of autocorrelation, he has correctly raised the
2 issue but left it unresolved.⁹ He does not even refer to the heteroskedasticity
3 issue mentioned by Dr. Bradley in R2005-1¹⁰ but reports heteroskedasticity-
4 consistent (HC) standard errors (and t-statistics) for his recommended model.
5 Dr. Smith does not, however, report the same statistics for any of his other
6 CCSTS models. Thus, he cannot correctly rely on those statistics to evaluate his
7 other models.¹¹

8 With respect to the multi-collinearity issue, his only attempt to deal with
9 this problem is simply to offer restricted versions of his full quadratic models.
10 Effectively, these restrictions assign zero values to all cross-product variables in
11 all his model versions. Of course, to the extent that these variables are collinear
12 with the remaining model variables, coefficient estimates for all his restricted
13 models are biased. It is true that dropping variables from models reduces the
14 multi-collinearity problem and can increase the efficiency (reduce the variance) of
15 the remaining coefficient estimates. But, such a procedure should be employed
16 with care and requires much more careful examination and judgment of model
17 results than Dr. Smith appears to have exercised.

18 Finally, because he does not appear to have attempted to understand
19 what the CCSTS data are telling him, he has interpreted various model results by

⁹ On page 22 (lines 17-19), he states that he attempted a variety of possible adjustments to correct for autocorrelation but none yielded satisfactory results. However, in response to USPS/OCA-T3-19, he could not make a list of the attempted adjustments and had discarded the results of those attempts since they had minimal consequence and since Dr. Bradley had not discussed the subject.

¹⁰ R2005-1, USPS-T-14, pages 33-34.

¹¹ See also response to MPA/ANM/OCA-T3-4 and 5.

1 relying on pre-conceived notions rather than determining how well they explain
2 and fit the data.¹² Economic principles should always be used to select and
3 structure explanatory variables. Once these steps are accomplished, models
4 can be specified and the corresponding econometric results generated and
5 evaluated using the appropriate set of diagnostic tools (t-values, variance
6 inflation factors, etc.).

7 **(2) Dr. Smith's Analysis Of The Density Variable Is Incorrect**

8 Dr. Smith introduces the misguided notion that the density variable is an
9 output rather than an input to the city carrier cost modeling process. However,
10 this notion is wrong. Density is a key explanatory variable in a city carrier
11 delivery model. It is required to control for cost effects from variations in
12 distances among delivery points. Eliminating this variable will automatically bias
13 coefficients for all volume variables.

14 Dr. Smith appears to believe that the density variable is endogenous to
15 the city carrier street time cost minimization process that he claims is crucial to
16 recognize in model development.¹³ So, although he ran model versions that
17 included Dr. Bradley's density variable, he simply discarded these versions from
18 any further consideration when determining which models to recommend.

19 However, Dr. Smith ignores operational realities. There are three principal
20 workload variables affecting city carrier costs: volumes, possible delivery points

¹² See, e.g., OCA-T-3, page 3 (lines 7-8) and response to USPS/OCA-T3-5.

¹³ OCA-T-3, page 6 (lines 9-11). When asked, he is unable to provide an unequivocal definition of how he construes the term density as an "output" of city carrier zip-day models rather than an input. He states "We do not have a measure of the density on a route, which might be different from the overall density in the ZIP code." See responses to USPS/OCA-T3-26 and ADVO/OCA-T3-7.

1 and square mileage describing a delivery unit's service territory. The latter by
2 definition is ZIP-code square miles. Postal managers reconfigure and add routes
3 as necessary to minimize costs, subject to any operational constraints (daily
4 carrier hours for example). In this route restructuring, they are responding to
5 changes in these three primary variables.

6 The density variable as used by Dr. Bradley is just a combination of two of
7 the primary workload variables: ZIP-code possible deliveries divided by ZIP-code
8 square miles. Higher densities, so defined, lead to more delivery point
9 "crowding" per square mile of service territory and therefore reduce average
10 distances carriers need to travel between any two contiguous delivery points. So
11 for any given number of delivery points, higher densities should lead to lower
12 overall run times, on average, and therefore lower total regular delivery times.
13 This is in fact what Dr. Bradley's preferred restricted quadratic model for regular
14 delivery time indicates.

15 Further, postal managers change the number of routes to minimize total
16 delivery time and balance workloads among carriers in response to changes in
17 density, volume and possible deliveries. In other words, the re-optimization
18 effect from changes in any of these variables is correctly subsumed within the
19 three fundamental workload variables that Dr. Bradley includes in his analysis.
20 The models are complete in this respect.

21 Clearly, changing the models to reflect instead some nebulous concept of
22 density as a response to optimization rather than an input to optimization, as Dr.

1 Smith proposes, would mis-specify the cost effects from the three fundamental
2 input variables.

3 **(3) Dr. Smith's Other CCSTS Modeling Contributions**
4 **Should Be Explored**
5

6 Besides his misguided recommendation to eliminate the density
7 variable, Dr. Smith offers two other new modeling contributions. His second is
8 his "DPS case" set of regressions. In these, he changes Dr. Bradley's "letter"
9 and "flat" volume variables to a strictly DPS letter variable and a variable that
10 includes residual cased letters and flats. This approach should be further
11 explored because it is based on actual carrier operations.

12 His third contribution is to sum regular and parcel/accountable delivery
13 time into total delivery time and regress this variable against all explanatory
14 variables, including collections and accountable volumes (rather than separating
15 the analysis into a "regular delivery" model and a "parcel/accountable" model).
16 This approach also bears further investigation. In particular, it comports with
17 operational reality by explaining all delivery costs as a function of all volume
18 variables and the necessary control variables (possible deliveries and density).

1 **C. Dr. Smith’s Testimony On CCSTS And His Model**
2 **Recommendation Should Be Rejected**
3

4 In sum, it appears that Dr. Smith either did not have the time or did not
5 take the time to look into any of these data and modeling features. By his own
6 admission, Dr. Smith has provided no evidence that his CCSTS model
7 recommendation is any better than Dr. Bradley’s model. Instead, with respect to
8 all 24 CCSTS models he presents, he agrees that all are inadequate or possibly
9 inadequate. His CCSTS model recommendation should also be disregarded as
10 inadequate.¹⁴

11 However, he describes issues that surround the CCSTS models and
12 explains why there is a need for a more complete analysis of all the city carrier
13 data and models. Indeed, to his credit, much of Dr. Smith’s testimony
14 demonstrates that he recognizes that he has provided only a superficial analysis
15 and that much necessary investigation of the 2002 CCSTS data, its 2004 update
16 and modeling efforts using both data sets has been left undone:

- 17 ▪ “My testimony on the methodology of the original City Carrier cost model . . .
18 concludes that additional improvements in the estimation of City Carrier
19 volume variability and data availability are needed.” (OCA-T-3, page 2, lines
20 11-16)
21
22 ▪ “. . . it is not clear that meaningful conclusions can be obtained.” (Id., page 3,
23 lines 9-10)
24
25 ▪ “Further specification or explanation of an economic model would be
26 appropriate.” (page 8, lines 23-24) “Future work could consider whether
27 some type of economic model, involving minimization of costs subject to
28 some type of constraint could be developed. I have not yet used or examined
29 all of the variables which could be considered, and whether currently unused

¹⁴ OCA-T-3, page 15 (lines 5-6) and response to ADVO/OCA-T3-15. Dr. Smith admits that he has not yet developed the appropriate economic specification for the city carrier out-of-office model. (See footnote 7 above.) Thus, he recommends his CCSTS model without even establishing his own criteria prior to making his selection.

1 variables could be combined with alternative models is an interesting issue.”
2 (Id., page 21, lines 7-11)

- 3
- 4 ▪ “Depending on further research and development of postal delivery economic
5 analysis it is possible that additional variables may be found to be
6 appropriate.” (Response to ADV0/OCA-T3-10(b)). . . [W]e need more
7 consideration of the underlying theoretical justification of the modeling effort
8 as well as additional consideration of statistical and econometric issues.”
9 (Response to ADV0/OCA-T3-15)
 - 10
 - 11 ▪ “However, given the problems of the underlying database as evidenced by
12 the types of results obtained it appears that the Carrier Cost analysis
13 presented in Docket No. R2005-1 is flawed and that additional analysis is
14 needed.” (OCA-T-3, page 15, lines 6-8)
 - 15
 - 16 ▪ “An area for future research will be autocorrelation issues.” (Id., page 22, lines
17 18-19)
 - 18
 - 19 ▪ “In performing the modeling effort I considered a wide variety of alternatives
20 to the equation proffered by witness Bradley in the modeling of City Carrier
21 activities. These efforts frequently encountered sign problems, probably due
22 to the underlying deficiencies of the database. Collinearity of the database is
23 a problem, apparently making the application of a full quadratic model very
24 difficult. In consideration of restricted quadratic models, one frequently
25 obtains relationships among the costs that, on an a priori basis, do not appear
26 to be reasonable. Accordingly, I advocate that the Commission view Carrier
27 Cost volume variability as an open question: improvement is needed.” (Id.,
28 page 23, lines 7-15)
 - 29
 - 30 ▪ “The estimation of econometric models using ZIP Code-Day data is
31 consistent with optimization taking place at the ZIP Code level. Whether a
32 better or different model could be developed and how such a model would be
33 estimated has not been determined.” (Response to USPS/OCA-T3-15(e))
 - 34

35 All of these statements highlight the need for much more exploration of city
36 carrier costing data and modeling issues. In that respect, I agree with Dr. Smith’s
37 call for more investigatory work.

1 **III. THE DOIS DATA AND MODELS PRESENTED BY DR. SMITH ARE**
2 **NOT AN IMPROVEMENT OVER THE CCSTS DATA AND MODELS**

3

4 **A. The DOIS Data Analysis And Modeling Are In The Beginning**
5 **Stages**

6

7 The OCA has developed a considerable interest in being able to use data

8 from the ongoing USPS Delivery Operations Information System (DOIS). This

9 interest is understandable since DOIS apparently has daily information on zip

10 codes and city routes, covers the vast majority of delivery zones and city carrier

11 routes, has been in existence now for several years, and is continually updated.

12 It provides an opportunity to use an extensive cross-sectional and time-series

13 panel without having to burden data collectors or carriers with considerable

14 sampling and testing. Such a database seems attractive and should be carefully

15 investigated.¹⁵

16 According to Dr. Smith, the OCA requested DOIS data for 125 zip codes

17 over 16 quarters. However, he has had the DOIS data only since July 21 of this

18 year and, between then and when the OCA direct case was filed, there simply

19 has been insufficient time to do any conclusive analysis:

20 “The database has only been available for a short time, and significantly
21 more time would be required for a thorough analysis. Due to the limited
22 amount of time, I have been able to apply minimal quality control
23 procedures and have not yet made full use of all the data.” (OCA-T-3,
24 page 16, lines 7-10)

25

¹⁵ There is little on the record now concerning DOIS. For example, there is no information on the type of city carrier routes included in DOIS (e.g., letter, special purpose, or both), how the DOIS data collection has changed over time, DOIS standardization and quality control procedures, or how to interpret zero time or volume data for a zip-route-day not a holiday or Sunday. See responses to ADVO/OCA-T3-33-35, 37-40. Also, there is little information in the record concerning how DOIS route-day time and volume variables are now, and have been in the past, measured, collected, defined, standardized or handled for quality control. Responses to ADVO/OCA-T3-45, 47, 53.

1 Still, he offers twelve quadratic-equation models using the DOIS data (in
2 both unrestricted and restricted form). These models are specified generally in
3 the same structural form as the CCSTS models he presents (full and restricted
4 quadratic containing volume, possible delivery point and, sometimes, density
5 variables). However there is one major difference in the modeling approach. In
6 the DOIS models, Dr. Smith uses total carrier street time as the independent
7 variable, while in his CCSTS models he uses regular carrier street time, as
8 defined by Dr. Bradley in his own CCSTS models.¹⁶ Further, in many of his
9 DOIS models, similar to his CCSTS models, Dr. Smith finds “sign problems” or
10 marginal costs that do not fit his *a priori* expectations.

11 **B. The DOIS Data Have Serious (Perhaps Fatal) Deficiencies**

12 Despite the value of having long-term panel data like DOIS, the database
13 is deficient in several respects:

- 14 ■ There is no differentiation between SPRs and large packages, which
15 clearly are handled differently by city carriers.
- 16
- 17 ■ Priority Mail is a single volume variable within DOIS although it is, in fact,
18 composed of mixed shapes.¹⁷
- 19
- 20 ■ Collection volume data are lacking.¹⁸
- 21
- 22 ■ Accountable volume data are lacking.¹⁹

¹⁶ Regular carrier street time in the CCSTS includes only the time during which the carrier is servicing a delivery sections. It excludes drive time between the route and the delivery office, drive time among delivery sections, and other miscellaneous time.

¹⁷ Dr. Smith recognizes this problem. See response to ADVO/OCA-T3-21.

¹⁸ Dr. Smith downplays this deficiency by noting that the CCSTS collection volume variable is representative of the 2002 time period and therefore cannot reflect a more recent Postal Service offering called “It’s a Pickup,” whereby customers can request that city carriers pick up packages on their regular delivery routes. So, he simply states that “. . . the collection volume variability developed by witness Bradley appears now to be irrelevant.” (OCA-T-3, pages 21-22, quote from page 22 (lines 1-3)) I disagree with this comment. At least Dr. Bradley’s analysis accounts for the cost of regular collection volumes.

1
2 ▪ There is no information on the quality of the data or on the quality controls
3 applied to the data (both dependent and independent variables). In total,
4 Dr. Smith’s own preliminary quality control procedures eliminated over
5 33% of the route-day observations and that does not bode well for the
6 quality of the data.²⁰

7
8 These deficiencies mean that the DOIS model results are incomplete,
9 biased, and unsuitable for developing marginal cost and volume variability
10 estimates. First, because collection and accountable volumes are missing, the
11 marginal costs and variabilities for these volumes cannot be estimated from a
12 DOIS model. This shortcoming also means that the estimated coefficients for the
13 included volume variables are over-inflated because of positive correlation
14 between the missing and included volume variables.²¹ Second, by lumping
15 together priority mail, large packages, and SPRs into one variable, Dr. Smith
16 ignores shape-related and handling differences among these mail categories.
17 He acknowledges that the coefficient estimates related to the resulting summed
18 volume variable must be an “average” of cost effects and therefore biased.²²
19 This bias means that not only will estimated marginal costs and variabilities for

¹⁹ In response to ADVO/OCA-T3-22, Dr. Smith attempts to minimize this problem by stating that there are relatively small amounts of accountable volume. However, accountable volume, when present, involves considerable carrier time (compared to other types of volumes) and may be particularly concentrated on certain types of routes.

²⁰ This is calculated from Table 3 of OCA-T-3 (.334 = 1 - 492,097/739,396). A majority of the route-day observations were apparently discarded due to zero delivery time or observations where ZIP codes did not match. And, if I understand his response correctly, roughly 36% of the route-day observations that were used in the models were corrected in some way through his quality control procedures. (.358 = 176,390/492,097) Response to MPA/ANM/OCA-T3-10.

²¹ Apparently, Dr. Smith agrees that the marginal cost and volume variability estimates for letters, flats and sequenced mail from the DOIS models are overstated due to the influence of the missing volume variables. See response to ADVO/OCA-T3-20.

²² See response to ADVO/OCA-T3-21.

1 SPRs, large packages, and priority mail from his model be distorted, but also that
2 the coefficients for the remaining volume variables (letter, flat, sequence mail) will
3 be further biased to the extent that the summed pieces correlate with the
4 disaggregated volumes.²³

5 Third, because the DOIS data include all city carrier street time, the DOIS
6 volume variabilities calculated by Dr. Smith are relative to this total time.
7 Therefore, proper procedure requires volume variable costs to be calculated by
8 multiplying total city carrier street costs by the indicated variabilities from his
9 recommended DOIS model. However, the missing volume variabilities for
10 collection and accountable mail and consequent overstatement of the remaining
11 volume variabilities mean direct application of this procedure is incorrect.²⁴

12 Fourth, there are potentially other data quality/reliability issues that have
13 not even been identified. For example, Dr. Smith's handling of missing volume
14 data has potentially created a well-known bias and inconsistency problem called
15 errors-in-variables.²⁵ Until all substantive data quality issues have been explored

²³ In other words, coefficients for the included volume variables will be biased from two sources: the missing collection and accountable volumes, and the summing together of small parcel, large parcel and priority pieces into one variable.

²⁴ There is some confusion on this subject. In response to USPS/OCA-T3-1, Dr. Smith states that the DOIS model variabilities should be applied to street time minus travel time. However this calculation seems incorrect since DOIS out-of-office time likely includes travel time. In a clarifying response to USPS/OCA-T3-24, he revised that to street time on regular routes, reduced by time for the accountables portion. In his response to USPS/OCA-T3-25, he also recommended that 100 percent of the accountables time be attributable to accountables volume because such time is incremental to accountables.

²⁵ When there was a volume or delivery point variable with no value, Dr. Smith set it to zero. (Responses to MPA/ANM/OCA-T3-6-10) Dr. Smith admits that he lacked sufficient time to do extensive quality checks, but in response to MPA/ANM/OCA-T3-9, he glosses over his treatment by stating: "It is well known that with substantial amounts of data various data errors do not preclude obtaining regressors that are unbiased." However, Dr. Smith is incorrect on this matter. This is an example of the well-known error-in-variables problem that afflicts models with random errors in explanatory variables. Specifically when there are such errors, estimates for coefficients

1 and corrective actions taken as necessary, DOIS model results will remain
2 suspect.²⁶

3

4 **IV. THE CCSTS AND DOIS DATA AND MODELS HAVE THE SAME**
5 **MAJOR PROBLEMS**

6

7 Dr. Smith criticizes the CCSTS data as subject to data quality issues.

8 Further, he claims that such data are collinear and therefore cause sign problems
9 and unexpected marginal cost relationships in the resultant models. He also
10 criticizes the CCSTS models as being “ad hoc” and requiring better specification
11 and explanation.

12 However, Dr. Smith extends his criticism to the DOIS database as well.

13 He admits that the CCSTS and DOIS databases might each have an auto-
14 correlation problem. He also implies in his reporting of model results that each of
15 the data sets are heteroskedastic.²⁷ He also admits to collinearity in the DOIS
16 data as well in discussing “sign problems” and unexpected marginal cost
17 relationships estimated from his DOIS models.

(regressors) will be biased because of correlation between the observed (uncorrected) independent variable and the random error term explaining variations in the dependent variable. See Pindyck and Rubinfeld, *Econometric Models and Economic Forecasts*, Third Edition, McGraw-Hill, 1991, pages 159 –161.

²⁶ In response to ADV0/OCA-T-3, Dr. Smith states that he did perform some data cleaning and testing on the DOIS data: a number of data points were eliminated to remove duplication and cases with delivery time equal to zero. For missing data other than delivery time, he set missing values to zero rather than eliminating the observations. He tested for outliers but did not retain the test.

²⁷ Dr. Smith calculated heteroskedasticity-consistent (HC) t-values for his recommended models and presents these in Tables 2 and 4 in his testimony. However, he fails to report HC t-values for all other non-recommended CCSTS and DOIS models. Also see responses to MPA/ANM/OCA-T3-4 and 5.

1 Although I see many of the same problems in both the CCSTS and DOIS
2 data that Dr. Smith recounts, it is clear that the DOIS data and models contain
3 several additional problems that might prove fatal. At a minimum, future use of
4 the DOIS data for city carrier modeling requires the addition of collection and
5 accountable volumes, and disaggregation of parcel volumes into large and small
6 parcel components. Without these changes, all DOIS city carrier models will
7 remain tainted.

8 Further, in regard to Dr. Smith's DOIS models, I see no major effort yet in
9 specification or explanation. Rather, I see a search for results that fit with pre-
10 conceived notions. The best evidence of this is the fact that his recommended
11 CCSTS and DOIS models are very different because they are both essentially
12 chosen on the basis of statistics and expectations rather than on the basis of
13 operational concept:

- 14 ▪ The recommended CCSTS model is a full quadratic with separate DPS
15 letter and residual cased letter and flat variables. It has an SPR
16 volume variable, a collection mail volume variable, a total possible
17 deliveries variable, and does not have a density variable. And, it
18 explains only "regular delivery time," as defined by the USPS in
19 R2005-1.
20
- 21 ▪ The recommended DOIS model is also a full quadratic. But its letter
22 variable is total DPS plus cased letters. It does not have collection and
23 accountable mail volume variables and has a "parcels" variable that
24 includes SPRs, packages, and Priority Mail. It also has no density
25 variable and, instead of a total possible deliveries variable, there are
26 four possible deliveries variables by delivery type. Finally, it explains
27 all city carrier out-of-office time.
28

1 From a conceptual viewpoint, the “either/or” recommendation of these two
2 disparate models simply does not make sense.²⁸ Most telling is Dr. Smith’s
3 comment in response to ADVO/OCA-T3-15(e) stating that he has not yet
4 developed suggestions as to how to correctly model the city delivery function
5 (apparently regardless of the which database is used)²⁹ and his admission that
6 he has just begun his modeling effort with the DOIS data:

7 “Turning [to] the DOIS analysis, I have made some progress in
8 demonstrating that the database can generate a better analysis. . . . I have
9 not yet determined whether additional conclusions can be developed from
10 the database, but further analysis of the DOIS database is an area of
11 inquiry that seems promising. . . .” (OCA-T-3, page 23, lines 16-23)

12
13 There is no way Dr. Smith can claim that his preliminary DOIS results can
14 be better than the results the Postal Service provides in this case (or even better
15 than the CCSTS results he also recommends). Therefore I recommend that the
16 Commission reject both of Dr. Smith’s recommended models and accept the
17 results that the Postal Service has proposed for this case.

²⁸ In response to ADVO/OCA-T3-15(c), Dr. Smith states that his particular cost model concept included the separate DPS letter variable, although that feature is not included in his recommended DOIS model.

²⁹ See also his response to ADVO/OCA-T3-24 where he states that he has not had sufficient time to develop an appropriate economic specification for a city delivery cost model.

1 **AUTOBIOGRAPHICAL SKETCH**

2 My name is Antoinette Crowder. I am a principal with Eagle Analytics
3 LLC, an economic and financial consulting firm located in Alexandria, Virginia. I
4 specialize in regulatory policy, economics, and finance, particularly with respect
5 to Postal Services. I have been involved in this type of consulting for over thirty-
6 three years. Over all that time, I have been involved in a variety of projects
7 dealing with costing, pricing, market and demand studies, economic and financial
8 analyses, survey design, and research on numerous regulatory and policy
9 issues. These activities have concerned the electric power, gas,
10 communications, and postal/publishing industries. I have prepared or assisted in
11 preparing numerous filings at various federal and state regulatory agencies on
12 behalf of numerous clients. In addition, I have provided overseas consulting
13 activities, providing financial, economic and regulatory assistance to multi-
14 national organizations, international firms, and national governments.

15 I have been involved in postal ratemaking and policy issues since the
16 beginning of the R77-1 rate case. My work has included analysis of revenue
17 requirement, cost attribution and distribution, subclass rate structure and
18 discounts, institutional cost allocation, service-quality measurement, demand and
19 market assessment, and mail classification issues.

20 I have testified before the Postal Rate Commission in nine proceedings
21 and have contributed to development of other testimony presented to the
22 Commission. In Docket R84-1, I contributed to the mail processing peak-load
23 and second-class intra-SCF discount testimony. In Docket R87-1, I contributed

1 to testimony on city carrier-out-of-office costs and third-class/fourth-class Bound
2 Printed Matter drop-ship discounts, and I also prepared and presented rebuttal
3 testimony on third-class presort discounts. In Dockets C89-3/MC89-1, I helped
4 prepare and presented direct testimony on the proposed local saturation
5 subclass. In Docket R90-1, I assisted in preparation of city carrier out-of-office
6 cost and institutional cost coverage testimony and prepared and presented
7 rebuttal testimony on third-class rates. In the R90-1 Remand, on behalf of a
8 third-class mailer's group, I presented two pieces of rebuttal testimony in Docket
9 R94-1 and rebuttal testimony in MC95-1. In Docket R97-1, I presented testimony
10 in response to Presiding Officer's Notice of Inquiry No. 3 on city delivery carrier
11 load time costs and rebuttal testimony on carrier costs and rate design issues. In
12 Docket R2000-1, on behalf of several mailers and mailing groups, I presented
13 testimony on city delivery carrier costs. I also presented rebuttal in that docket
14 concerning ECR rates. In R2005-a, I presented rebuttal on ECR rates.

15 Over the course of my 30-year involvement in postal ratemaking matters, I
16 have had numerous opportunities to observe postal operations and analyze their
17 cost aspects. I have also become familiar with economic costing and pricing
18 concepts, both generally and as applied to postal ratemaking.

19 My education includes a B.S. in Biology from the University of Virginia, an
20 M.S. in Biology from George Mason University, and additional course work in
21 economics, statistics, and mathematics.