OCA-RT-4
Docket No. R2000-1

REBUTTAL TESTIMONY IN

RESPONSE TO NOTICE OF INQUIRY NO. 4

OF

J. EDWARD SMITH

ON BEHALF OF

THE OFFICE OF THE CONSUMER ADVOCATE

AUGUST 21, 2000

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UNITED STATES OF AMERICA
Before The
POSTAL RATE COMMISSION
WASHINGTON, D.C. 20268-0001

Postal Rate and Fee Changes, 2000)

Docket No. R2000-1

REBUTTAL TESTIMONY
IN RESPONSE TO
NOTICE OF INQUIRY
NO. 4
OF
J. EDWARD SMITH

1   I.   <u>STATEMENT OF QUALIFICATIONS</u>

2   My name is J. Edward Smith, and I an econometrician with the Office of the

3   Consumer Advocate of the Postal Rate Commission. I have previously provided a

4   Statement of Qualifications in my Direct Testimony OCA-T-4 in this case.

1   II.   PURPOSE AND SCOPE OF TESTIMONY

2   I am testifying in response to the Notice of Inquiry No. 4 Concerning Mail

3   Processing Variability Models, issued August 2, 2000. The Notice seeks input from

4   participants on the comparison of four models: the facilities-based fixed effects model

5   presented by Dr. Bozzo in his direct testimony, USPS-T-15, and denoted by the

6   Commission in the Notice as "Model A"; a time-based fixed effects model with time as

7   the dummy variable to estimate the fixed effects, denoted as "Model B" in the Notice of

8   Inquiry; a random effects model, one of which was generated by the Panel command

9   by Dr. Bozzo and presented in his testimony; and a pooled model, one of which was

10   generated by the Panel command by Dr. Bozzo and presented in his testimony. The

11   question to be addressed is which model (if any) is superior for estimating the volume

12   variability of labor.

13   More specifically, the Notice poses questions relating to whether statistical

14   testing of the Commission denoted Models A and B using null hypothesis tests

15   establishes their statistical superiority over the models nested within them (Notice, part

16   b). It also asks whether Models A and B are nested within one another and if there are

17   statistical grounds for preferring one model over the other (Notice, part c). The Notice

18   also requests a discussion of whether passing the statistical tests establishes that

19   either Model A or B yields a valid estimate of the volume variability (Notice, parts d and

20   e). Finally, it further seeks discussion of whether a rejected model might nevertheless

21   provide a better estimate than another model (Notice, part f).

1   For the reasons set forth below, my testimony today does not include statistical

2   analysis of the models presented. I do not discuss the relative merits of Models A and

3   B with respect to each other or the relative merits of the models nested within these two

4   models prescribed by the Commission, except to note that on a theoretical basis neither

5   Model A nor Model B is nested within the other.

6

7   III.   IN MY DIRECT TESTIMONY I DISCUSSED THE DEFICIENCIES IN THE
8   MODELS PRESENTED.

9   In my direct testimony I discussed the deficiencies associated with Dr. Bozzo's

10 models. I believe that the econometric relationships propounded by Dr. Bozzo are

11 basically incorrect from a theoretical viewpoint, regardless of whatever statistical

12 properties are propounded as being achieved. If a hypothesized economic relationship

13 is incorrect, the fact that the relationship can be estimated with a high degree of

14 accuracy and precision is irrelevant.

15   The Notice also posits as Model B an equation not presented by Dr. Bozzo but

16 which relies for its underpinnings upon the variables found in Dr. Bozzo's model. Model

17 B, regardless of its statistical properties, is based thus upon an incorrect theoretical

18 framework and should be rejected as having inadequate theoretical support.

19   A.   The Analysis Presented by Dr. Bozzo Continues to have Many of the
20   Errors Identified by the Commission in the Work Previously Presented by
21   Dr. Bradley.

22
23   The major problems in Dr. Bradley's work identified by the Commission were

24 associated with the accuracy of the underlying database, the theoretical structure of the

1   modeling effort, and the appropriate estimation approach. Since these problems are

2   carried over into Dr. Bozzo's work, his equations are also wrong. Accordingly, the

3   adoption of any of Dr. Bozzo's equations is inappropriate.

4   B.   The Underlying Database Continues to be a Problem, as it was in Dr.
5   Bradley's Direct Testimony in Docket No. R97-1.

6
7   There does not appear to be a high degree of quality control at the field level in

8   the collection of the data. Neither Dr. Bozzo nor Dr. Bradley mentioned any data

9   collection controls associated with the initial collection of the data or implemented

10 during or immediately following the on-site data collection in order to assure accuracy.

11 Instead, both Dr. Bradley and Dr. Bozzo focused on statistical analysis to eliminate data

12 errors.   However, statistical scrubs can eliminate correct data, can fail to eliminate

13 incorrect data, and provide no first-hand experience or insight as to why data items are

14 recorded in the form reported.

15   C.   The Underlying Theoretical Assumptions of the Study are Poorly Specified.

16
17   In Docket No. R97-1, the Commission found a number of theoretical problems

18 with Dr. Bradley 's study; many of the problems have carried over to Dr. Bozzo's work.

19 The use of the proportionality assumption in an attempt to use total pieces handled or

20 total pieces fed as a measure of output is wrong; the two variables grow faster than

21 First Handled Pieces (FHP).[1]

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[1]   Direct testimony of witness Neels, UPS-T-1 at 60, lines 5-8.

1   The equations are incorrectly specified; some variables that are treated as

2   exogenous should be treated as endogenous. In the case of the manual ratio, the

3   Commission in Docket No. R97-1 discussed the problem, but the problem has been

4   carried over into Dr. Bozzo's work.

5   Both Dr. Bradley and, subsequently, Dr. Bozzo have incorrectly assumed that

6   mail-processing facilities are fixed in number.[2] The Postal Service adds mail-

7   processing facilities and renovates and expands existing facilities on an ongoing basis.

8   A reasonable conclusion from the evidence is that the number of facilities varies with

9   volume. However, this issue has been inadequately addressed. If the number of

10   facilities varies with volume, then witness Bozzo's elasticities are flawed because they

11   do not correctly represent the variability of mail processing labor.[3] Both Dr. Bradley and

12   Dr. Bozzo fail to model variations in mail processing costs in response to sustained

13   volume increases at the system level.

14   D.   Dr. Bradley's Analysis was Short Run, as is Dr. Bozzo's Work.

15   Economists define the long run as the period of time over which all inputs are

16   variable. By treating capital, the manual ratio, and facilities as predetermined or

17   exogenous, Dr. Bozzo fails to model mail processing costs as a function of capital,

18   labor, and other relevant inputs. Accordingly, the analysis is short run. By failing to

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[2]   The number and size of facilities is discussed in the *Appendices to Opinion and Recommended Decision*, Volume 2, Docket No. R97-1, May 11, 1998, Appendix F at 21.

[3]   *Ibid.*

1   explicitly model capacity utilization, he eliminates a key variable that affects labor

2   demand and theoretically biases his model to be one of short-run analysis.

3   The Commission has highlighted the problems associated with a short-run

4   analysis:

5   The cyclical nature of mail volume over a rate cycle implies that the relationship
6   between input use and mail volume across adjacent accounting periods will
7   primarily reflect seasonal variation in mail volume. On the other hand, staffing
8   levels and therefore hours would be set to reflect sustained annual or rate cycle
9   volume levels. Therefore, large changes in volume across accounting periods
10   can occur with little change in labor hours across accounting periods. [4]

11
12

13   E.   Dr. Bozzo does not Use the Correct Theoretical Econometric Model.

14
15   Dr. Bozzo assumes that the modeling effort should be conducted at the activity

16   level, and that mail-processing activities should be modeled independently of each

17   other. However, both assumptions are of dubious validity; neither has been tested, and

18   both assumptions appear to be wrong. Accordingly, none of the equations developed

19   by Dr. Bozzo provide a correct analysis of mail processing costs.

20   Dr. Bozzo has also estimated a conditional labor demand model; the relevant

21   model, which should have been estimated, is a labor demand model. Dr. Bozzo has

22   modeled capital as exogenous even though it is clearly endogenous and is

23   simultaneously determined as a part of the labor and sorting plans.

24   Finally, the modeling should have been performed on a long-run basis, focused

25   on the facility expansion path. The conditional labor demand function presented by Dr.

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[4]   *Appendices to Opinion and Recommended Decision*, Volume 2, Docket No. R97-1, May 11, 1998,
Appendix F at 13.

1   Bozzo is not such a solution, being predetermined on the basis of capital and being of a

2   conditional nature.

3   IV.   THE DEFICIENCIES IN THE MODELS MEAN THAT THERE IS AN
4   INADEQUATE BASIS FOR CONCLUDING THAT ANY MODEL IS CORRECT.

5   I conclude that none of the models presented by Dr. Bozzo, or which could be

6   based on his approach as is Model B, are correct, and believe that adoption of any of

7   them would be inappropriate. Important issues focused on the variables, data, and

8   level of modeling (activity level, facility level, or system level) need to be resolved. In

9   seeking a "least bad" solution for my direct testimony, I focused on the "between

10   model", and Dr. Neels focused on models at the system level, corrected to eliminate the

11   proportionality assumptions. None of the models presented in this case are in close

12   agreement with their alternatives (e.g., none of them serve as a basis to "split the

13   difference"). Accordingly, at this time all models need to be rejected.

14   I have previously advocated and I continue to advise that the Commission

15   recommend the formation of a working group in order to resolve these technical issues

16   and bring the modeling effort to closure.

17

18   V.   CONCLUSION

19

20   As indicated, Dr. Bozzo's model is fatally flawed, and because Model B is based

21   upon Dr. Bozzo's underlying assumptions, I do not recommend adoption of a time-

22   based version as reflected in Model B.

1   The modeling effort needs to be modified.   Correct variables for output

2   (measured in terms of pieces of mail processed, not pieces handled or fed), capacity

3   utilization, and capital (measured in terms of the processing operation with which it is

4   associated) and other variables are needed.   Capital, capacity utilization, and the

5   manual ratio need to be treated as endogenous in a simultaneous equations system in

6   order to allow for the long-run nature of the process.   The analysis needs to be

7   conducted at the plant or system level, not the unit activity level.   If the analysis were

8   conducted at the unit level, then there would need to be a modeling of the

9   interrelationships of activities.   The appropriate variables should be used in estimating

10   labor demand, not conditional labor demand.   The analysis should give careful

11   consideration to the fixed effects approach correctly modeled for facilities and time.