BEFORE THE
POSTAL RATE COMMISSION
WASHINGTON, D.C. 20268–0001

POSTAL RATE AND FEE CHANGES, 1997

Docket No. R97–1

RESPONSE OF UNITED STATES POSTAL SERVICE WITNESS BRADLEY TO INTERROGATORIES OF NEWSPAPER ASSOCIATION OF AMERICA (NAA/USPS-T14-1-15)

The United States Postal Service hereby provides responses of witness Bradley to the following interrogatories of Newspaper Association of America: NAA/USPS-T14-1-15, filed on July 30, 1997.

Each interrogatory is stated verbatim and is followed by the response.

Respectfully submitted,

UNITED STATES POSTAL SERVICE

By its attorneys:

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August 13, 1997

Response of United States Postal Service Witness Bradley
to
Interrogatories of NAA

NAA/USPS-T14-1. Please refer to page 14 of your written testimony where you discuss the selection of a time trend variable to represent technological change.

a. Please provide all supporting data and analyses that demonstrate that an exponential time trend appropriately reflects technological change in postal service processing operations.

b. Please identify all other statistical approaches that you considered before selecting a time trend methodology, and explain why each was rejected.

NAA/USPS-T14-1 Response:

a. As I indicated in my testimony on page 14, the use of a time trend (in this case an "exponential" trend because of the log form of the model) is the standard econometric approach to capturing autonomous time effects like technological change. The analysis required to determine the appropriateness of this specification is an investigation of the statistical significance of its estimated coefficient. As Tables 7, 8, and 9 reveal, the time trend is generally significant and its inclusion is appropriate and necessary.

b. As indicated on page 15 of my testimony, I went beyond the simple exponential trend in three ways:

1. I allowed for the possibility of a non-linear (in the logs) time trend.

2. I allowed for a segmented trend.

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3. I incorporated the manual ratio variable in the equations for letter and flat activities.

None of these alternatives to the simple trend was rejected and all are included in my testimony. Finally, when I estimated the equations on annual data, I did not use a time trend. As I state on page 75 of my testimony:

> In addition, each site will have no more than nine observations and many sites will have fewer. This small number of observations makes it impossible to estimate a reliable segmented trend. Instead, I used year-specific dummy variables, entering one for each year from Fiscal Year 1989 through Fiscal Year 1996.

This approach was not adopted because the annual results were not adopted, as indicated at page 76 of my testimony:

> The results based upon the annual data generally support the results from the AP data in the sense of replicating the pattern and magnitude of the estimated variabilities. The annual results are not preferred, however, because they are based upon substantially less data than the accounting period data and thus do not embody an effective way to capture non-volume time-related effects.

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NAA/USPS-T14-2. Please refer to pages 16-7 (sic) of your written testimony where you discuss your choice of the "manual ratio" as a non-volumetric explanatory variable.

a. Please provide the correlation of each manual ratio variable with the total volumes processed on mechanized and automated equipment.

b. Please explain why, in your opinion, the coefficient on this manual ratio variable reflects only "non-volume" changes in mail processing labor hours.

NAA/USPS-T14-2 Response:

a. For this interrogatory, I assume that you are referring to piece-handlings as volume.

Correlations Between the Manual Ratio Variables and the Total Volumes Processed on Mechanized & Automated Equipment		
	Manual Letter Ratio	Manual Flat Ratio
OCR Volume	-0.0562	-0.1663
BCS Volume	-0.3299	-0.4056
LSM Volume	0.2678	0.0077
FSM Volume	0.0838	-0.0705

b. The manual ratio variable is included in the equations to capture possible variations in the conditions in mail processing activities associated with the automation of the letter and flat mail streams. These conditions, are not associated with variations in

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volume, per se, but with a modification in the way that volume is processed. For example as I point out on page 17 of my testimony:

> If the diversion of mail from manual activities to automated activities causes the quality of the remaining mail to fall, then the hours required to sort a given volume of mail will rise. This means that a decrease in the manual ratio would cause an increase in the hours associated with any level of piece handlings. (footnote omitted).

The manual ratio variable is intended to capture changes in the operating environment that occur due to changing mail processing methods, not changes in volume. It is for this reason that if reflects non-volume effects.

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NAA/USPS-T14-3. Please refer to page 47 of your written testimony where you discuss your choice of a generalized seasonality model with 12 dummy variables.

a. Please explain fully whether or not the seasonal dummy variables include any volumetric effects.

b. Please provide econometric results shown in Tables 7, 8 ,9 and 10 when the seasonal dummy variables are excluded.

NAA/USPS-T14-3 Response:

a. I interpret the term "volumetric effects" to refer to volume variability or the effect on hours of a sustained increase in volume. The seasonal dummies do not include volumetric effects. Rather, they account for the seasonal variations in hours and volume that occur because of the seasonal patterns in mailings. If they were excluded, the estimated volume variabilities would be mismeasured because they would be inadvertently capturing seasonal effects.

b. I have not performed the exercises that you describe. Moreover, given the well known seasonal patterns in Postal Service volumes and given the importance of the seasonal dummies for controlling for seasonal effects, I would suggest that doing so would be inappropriate. If you wish to perform these exercises, they could be done with modifications to the programs provided in my Workpapers WP-1 through WP-3.

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NAA/USPS-T14-4 Please refer to Tables 7, 8, 9 and 10 of your written testimony.

a. Please explain the proper interpretation of the positive sign on Time Trend 2 coefficients in Table 7, 8, 9, and 10.

b. Please provide the correlation between the post-9301 time trend variable and the volume variables used in these equations. Please indicate whether multicollinearity exists between these variables.

c. Please provide the econometric results shown in Tables 7, 8, 9, and 10 when both time trend variables are excluded.

d. Please provide the econometric results show in Tables 7, 8 , 9, and 10 when the Time Trend 2 is excluded.

NAA/USPS-T14-4 Response:

a. As I state on page 61 of my testimony, the positive sign on the Time Trend 2 coefficients implies that there was an autonomous increase in hours for the 1993-1996 period.

b. I have not calculated any such correlations in the course of my analysis and do not need to. It is the very fact that mail volumes follow a trend that requires the inclusion of the time trend. If a trend term was not included, the estimation of the volume variability would be confounded with the effects of the autonomous trend. Multicollinearity is not a problem because there is sufficient non-trend variation in

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volume to permit separate identification of the volume effect and the autonomous time trend.

c. I have not estimated the models without the time trends and would suggest that it is not appropriate to do so. Not only is it well known the mail processing variables have trends, the econometric results indicate that the trends are important explanatory variables and should not be omitted.

d. I have not estimated the models without the time trends and would suggest that it is not appropriate to do so. Not only is it well known the mail processing variables have trends, the econometric results indicate that the trends are important explanatory variables and should not be omitted.

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NAA/USPS-T14-5. Please refer to page 55, lines 6 to 8 of your written testimony. Please explain fully why the second order terms containing volume are not included in the elasticity calculation.

NAA/USPS-T14-5 Response:

The elasticity is the percentage change in hours for a given percentage change in piece handlings. For a mean centered translog equation, this elasticity is found by taking the derivative of the estimated equation with respect to piece handlings and evaluating that derivative at the mean values for the right-hand-side variables. When this is done, the higher order terms drop from the calculation. More formally, consider a mean-centered translog equation:

$$\ln y - \ln \bar{y} = \alpha + \beta_1 (\ln x - \ln \bar{x}) + \beta_2 (\ln x - \ln \bar{x})^2$$

The elasticity is given by:

$$\frac{\partial \ln y}{\partial \ln x} = \beta_1 + 2\beta_2 (\ln \bar{x} - \ln \bar{x})$$

$$= \beta_1$$

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NAA/USPS-T14-6. At page 55, lines 13-14, you conclude that you "find very little support for the Postal Service's old assumption of proportionality between costs and volume."

a. Please confirm that your equations show little support for the assumption of proportionality between labor hours and volume within each sorting activity. If you disagree with the characterization, please explain specifically what you can concluded from your analysis.

b. Please confirm that you have not analyzed the relationship between total mail processing labor costs or labor hours and volume across all processing options. If you cannot confirm, please explain.

NAA/USPS-T14-6 Response:

a. Confirmed.

b. Confirmed for my testimony. However, in previous research I analyzed total facility cost and volumes across processing operations and found evidence that the overall variability is less than one. See, Michael D. Bradley and Donald M. Baron, "Measuring Performance in A Multi-product Firm: An Application to the U.S. Postal Service," Operations Research. Vol.41, No. 3, May-June 1993.

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NAA/USPS-T14-7 Please provide any statistical, econometric or other types of analyses or studies performed by either the Postal Service or its contractors that evaluate the relationship between mail processing costs or labor hours and volume. (For example, are overtime costs higher during periods of high volume?)

NAA/USPS-T14-7 Response:

Studies and analyses of the relationship between mail processing costs or labor hours and volume performed by the Postal Service or its contractors are provided in Library Reference H-224, Materials Provided in Response to NAA/USPS-T14-7.

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NAA/USPS-T14-8. Please provide all analyses and studies performed by the Postal Service that address the issue of whether higher cost processing activities, such as mechanized equipment and manual sortation, are used more than proportionately during periods of higher volume.

NAA/USPS-T14-8 Response:

I response to my inquiries, the Postal Service informed me that it could not locate any studies performed by the Postal Service that address the issue of whether higher cost processing activities, such as mechanized equipment and manual sortation, are used more than proportionately during periods of higher volume.

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NAA/USPS-T14-9. Please provide specific definitions of the terms "elasticity" and used in Tables 7, 8, 9, and 10 and the term "variability" used in Table 13. Please explain the relationship between the two terms.

NAA/USPS-T14-9 Response:

The elasticity is the percentage change in hours for a given percentage change in piece handlings. As I state on page 5 of my testimony:

> In postal costing, this elasticity is often called the "volume variability" of cost although it is formally the variability of cost with respect to movements in the cost driver. To avoid confusion, I maintain that convention here and use the terms "volume variability" and "cost elasticity" interchangeably throughout my testimony.

Thus, variability and elasticity are the same thing.

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NAA/USPS-T14-10. Please refer to Table 14 of your written testimony.

a. Please explain the proper interpretation of the positive sign on the time trend coefficient shown in Table 14 (the two-way panel model).

b. Please provide the correlation between the volume variable and the time trend in these equations and identify whether collinearity between volume and the time trend posed a problem when estimating the coefficients of these variables.

NAA/USPS-T14-10 Response:

a. A positive time trend would imply an autonomous increase in hours.

b. I have not calculated any such correlations in the course of my analysis and do not need to. It is the very fact that mail volumes follow a trend that requires the inclusion of the time trend. If a trend term was not included, the estimation of the volume variability would be confounded with the effects of the autonomous trend. Multicollinearity is not a problem because there is sufficient non-trend variation in volume to permit separate identification of the volume effect and the autonomous time trend.

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NAA/USPS-T14-11. Please refer to your written testimony at page 75. You selected year-specific dummy variables for the regression analysis using annual data. Please explain whether or not the annual dummy variables incorporate volumetric effects.

NAA/USPS-T14-11 Response:

Annual dummy variables capture autonomous time-related effects. They do not incorporate volume effects.

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NAA/USPS-T14-12. Please refer to your written testimony at page 55, lines 17-18 and page 56, lines 1-3. You conclude that "[c]ertain [mail processing] functions, like setting up mail processing equipment or tying down a manual case are done for each sorting activity and are not sensitive to the amount of volume sorted."

a. In your opinion, are these costs "fixed" in the short run, the long run or both? Please explain your response fully.

b. In your opinion, is the amount of mail processing equipment used by the Postal Service related to the expected volume of mail to be processed? Please explain fully.

NAA/USPS-T14-12 Response:

a. These costs are not fixed in either the short run or the long run. Fixed costs represent costs that must be paid regardless of how much the firm produces or whether it produces at all. In contrast, if the Postal Service ceased operations at a facility, costs such as setting up mail processing equipment would not have to be paid. However, I do consider these costs to be unresponsive to volume in the sense that increases in volume generate only small additional amounts of these costs.

b. Yes. It is my understanding that the Postal Service purchases equipment, in part, based upon how much volume it expects to receive.

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NAA/USPS-T14-13. Please refer to your written testimony at page 56, lines 7-10. Please provide all analyses and studies performed by the Postal Service indicate that changes in the volume of mail, rather than technological changes, have improved mail processing productivity.

NAA/USPS-T14-13 Response:

I response to my inquiries, the Postal Service informed me that it could not locate any studies performed by the Postal Service that investigate whether changes in the volume of mail, rather than technological changes, have improved mail processing productivity.

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NAA/USPS-T14-14. Please refer to your written testimony at page 57, line 22 and page 58, lines 1-4.

a. Please specify the range of volume over which your assertion that piece productivity rises as volume rises applies. Please provide all supporting analyses and studies performed by the Postal Service.

b. Please evaluate the likely impact of marginal increases in mail volume when mail volume exceeds the range specified in (a) above on marginal piece productivity and labor costs in "gateway" activities.

NAA/USPS-T14-14 Response:

a. The range of volume that I had in mind is the normal range of operating volumes in Postal Service facilities.

b. I would expect that a marginal increase in mail volume would cause an increase in the labor costs in gateway activities and would increase the piece productivity in those activities, even if mail volume exceeds the normal operation range.

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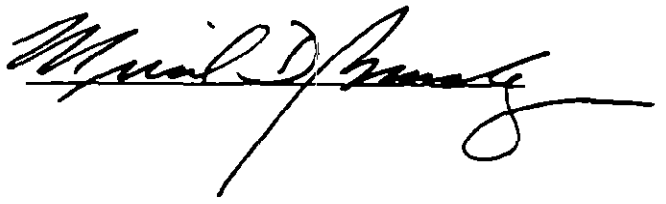
NAA/USPS-T14-15. Please refer to your written testimony at page 58, lines 15-17: Please provide all analyses and studies performed by the Postal Service indicating that labor hours required for "backstop" activities over the long term are not proportionately related to mail volume.

NAA/USPS-T14-15 Response:

In response to my inquiries, the Postal Service informed me that it could not locate any studies performed by the Postal Service that investigate the long term relationship between labor hours required for "backstop" activities and mail volume.

DECLARATION

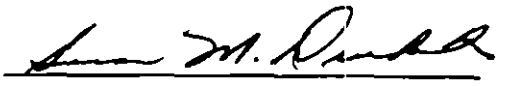
I, Michael D. Bradley, declare under penalty of perjury that the foregoing answers are true and correct, to the best of my knowledge, information, and belief.



Dated: August 13, 1997

CERTIFICATE OF SERVICE

I hereby certify that I have this day served the foregoing document upon all participants of record in this proceeding in accordance with section 12 of the Rules of Practice.



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