

BEFORE THE
POSTAL REGULATORY COMMISSION
WASHINGTON, D.C. 20268-0001

PERIODIC REPORTING
(PROPOSAL ONE)

Docket No. RM2022-3

**RESPONSES OF THE UNITED STATES POSTAL SERVICE
TO QUESTIONS 1-6 OF CHAIRMAN'S INFORMATION REQUEST NO. 3
(February 22, 2022)**

The United States Postal Service hereby provides its responses to the above listed questions of Chairman's Information Request No. 3, issued February 15, 2022.

The questions are stated verbatim and followed by the response.

Respectfully submitted,

UNITED STATES POSTAL SERVICE

By its attorney:

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1. Please refer to the Bradley Study that states, "the dependent variable in the top-down equation will be the amount of street time incurred by all carriers in an individual ZIP Code on a given day." Bradley Study at 44.
 - a. Please confirm that, due to the construction of this dependent variable, it possesses a lower bound of 0 hours.
 - b. If 1.a. is confirmed, please explain how the Postal Service's Top-Down Model accounts for this bound when estimating its proposed quadratic regression.
 - c. If 1.a. is confirmed, considering this bound, please provide further justification, beyond what was provided in the Bradley Study on pages 48 to 50, as to why a quadratic equation is the best functional form for this analysis. Specifically, please reflect on its appropriateness given its potential to predict street times below the abovementioned lower bound.
 - d. If 1.a. is not confirmed, please explain the lower bound of this variable and any relevance it has to the choice of the functional form.

RESPONSE:

- a. Confirmed
- b. It is not clear what the statement "accounts for the bound when estimating the proposed quadratic equation" is referring to in this context. The existence of a theoretical lower bound on the dependent variable is not a problem, *per se*, when estimating an econometric equation. Many, if not most, economic variables take on only positive values and this does not preclude estimating econometric equations that explain their movement. A problem arises when the data are censored, meaning there are many observations for which the dependent variable would take on a negative value, but only a zero value is reported or available. Censoring is not an issue for the top-down model. Only 13 of the 70,056 observations have zero values for street-time and these observations all occurred on just two days, July 13, 2019 and September 21,

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2019. These were both days with no delivery activity due to severe weather in New Orleans and Houston, respectively. In sum, there is no clustering of observations at zero street hours, and censoring is not an issue for the top-down model.

c. The quadratic form is appropriate for a number of reasons. First, a quadratic estimation equation is a flexible functional form. Sometimes engineering or institutional information can provide guidance in selecting an explicit functional form for an econometric equation. When that information is available, a corresponding explicit functional form can be specified for the equation. Such information has not been, and is not currently, available for city carrier street time and there is no technological guidance for specifying an explicit functional form. In such cases, it is appropriate to use a flexible functional form to approximate the unknown functional form. A flexible quadratic function is based upon a second-order Taylor expansion around the unknown form and this specification has proved to be appropriate for city carrier street time activities.

Second, another advantage of the quadratic functional form being flexible is that it places no restrictions on the first and second order derivatives. Thus, it is agnostic, *a priori*, about the degree of density economies that cause the street time variabilities to be less than one hundred percent. It does not impose any restrictions on the estimated variabilities. Third, unlike some other functional forms, like the translog, the quadratic functional form is robust to the existence of zero values for volumes, which occur with some regularity for certain types of mail like sequenced mail or FSS mail. All observations from all ZIP Codes can therefore be used in the estimation of the quadratic equation. Finally, the

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quadratic functional form has been used successfully in previous studies of carrier street time, both for the Postal Service and other posts.

That the quadratic top-down model could predict street times below the abovementioned lower bound does not reduce its appropriateness for estimating city carrier street time variabilities. The purpose of the top-down model is to produce the variabilities necessary for attributing city carrier street time. With a flexible functional form, it is appropriate to calculate the variabilities at the mean values for the explanatory variables, as that is where the estimation is most accurate. That is the method used for calculating variabilities with the quadratic top-down model, and the predicted values for street time for observations far from the mean are neither included in, nor relevant for, the calculation of the variabilities.

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2. Please refer to Table 30 from the Bradley Study at 114 and Library Reference USPS-RM2022-3-1, January 5, 2022, folder "Directory 4 Public Impact Workbooks," Excel file "CS06&7-Public-FY21-TopDown.xlsx," tab "7.0.1." Please describe how the Postal Service defines relay in "Travel To/From Route and Relay" and "SPR RELAY (TRANS TO LTR)," and provide separate thorough descriptions of the carrier actions included in each of these activities.

RESPONSE:

Relay activities, which are defined by MODS operations 735 and 736, involve transporting and depositing mail to one or more suitable relay points, such as collection or relay boxes appropriately located on the route, where a letter route carrier can obtain it and, subsequently, deliver it. Typically, the SPR carrier transports and deposits the mail in a green relay box from which the letter route carrier later extracts it for delivery. Because these hours are caused by mail delivered on letter routes and not by SPR delivered volumes, they are appropriately attributed to letter route costs.

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3. Please refer to the Bradley Study statement that “[f]or example, the current deviation parcel / accountable variability of 51.9 percent would seemingly be larger than the top-down deviation parcel / accountable variability of 7.3 percent. But such an inference would be erroneous because it does not account for the fact that the 51.9 percent variability is multiplied by a FY 2021 cost pool of \$979 million, whereas the 7.3 percent variability is multiplied by a FY 2021 cost pool of \$12.9 billion. The former variability leads to volume variable letter route street time costs for deviation parcels / accountables of \$508 million, but the latter variability leads to \$943 million volume variable letter route street time cost for that cost pool. So, the top-down variability is actually larger, in terms of producing volume variable costs, than the existing variability.” Bradley Study at 114-15. Please provide more explanation of the example by indicating the sources of the dollar amounts that appear in the example.
- a. Please identify the source of the \$943 million cost referenced above.
 - b. Please indicate the exact location in the submitted documents where the updated variability is multiplied by the \$12.9 billion cost pool to determine the volume variable cost.

RESPONSE:

a.& b. The cited passage was intended more as an illustrative example of the implications of the relative sizes of the current deviation parcel, and the new, top-down cost pools, without requiring digging into the details of the somewhat complex city carrier cost workbook. However, it is possible to illustrate the same point with the exact numbers from that workbook, and to provide the required citations. There are two calculations being compared in the example, the calculation of the deviation parcel/accountable volume variable cost under the current cost pool structure and the calculation of the deviation parcel/accountable volume variable cost with the top-down model. The first calculation, for the current cost pool structure, follows the following formula:

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$$VVC_{C,PA} = \varepsilon_{C,PA} * C_{C,PA}$$

In this equation, $VVC_{C,PA}$, is the volume variable cost for deviation parcels and accountables in the current methodology, $\varepsilon_{C,PA}$ is the variability for deviation parcels and accountables in the current methodology, and $C_{C,PA}$ is the size of the deviation parcel and accountable cost pool under the current methodology. The value for the deviation parcel and accountable cost pool in the current methodology is \$975.992 million and can be found in cell F58 in Tab 7.0.6.10 in CS06&7-Public-FY21.xlsx, which is available in USPS-FY21-32 in Docket No. ACR2021. The current variability for deviation parcels and accountables of 0.5186 is the sum of variability for deviation parcels (0.3390) and accountables (0.1796). They can be found in cells D32 and D31 in Tab 7.0.4.1 in the same workbook. Multiplying the variability times the cost pool amount produces a volume variable cost of \$506.150 million, which can be found in cell F56 in Tab 7.0.6.10.

The second calculation follows the following formula:

$$VVC_{TD,PA} = \varepsilon_{TD,PA} * C_{TD}$$

In this equation, $VVC_{TD,PA}$, is the volume variable cost for deviation parcels and accountables in the top-down methodology, $\varepsilon_{TD,PA}$ is the variability for deviation parcels and accountables in the top-down methodology, and C_{PA} is the size of the top-down cost pool. The value for the deviation parcel and accountable variability in the top-down methodology of 0.0728 is found in cell D17 on Tab 7.0.4.2 in CS06&7-Public-FY21-TopDown.xlsx, which is available in USPS-RM2022-3-1 in this docket. The amount for

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the top-down cost pool is \$12,920.263 million which can be found in cell D28 in Tab 7.0.4.2 in the same workbook. Multiplying the two numbers provides the volume variable cost for deviation parcel and accountables in the top-down methodology of \$940.595 million, which can be found in cell J56 in Tab 7.0.6.5.

Because of differences in the sizes of the cost pools, the current deviation and parcel variability of 0.5186 produces a volume variable cost of \$506.2 million whereas the top-down variability of 0.0728 produces a volume variable cost of \$940.6 million.

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4. Please refer to the Bradley Study statement that, “[u]pon investigation the Postal Service determined that the main differentiating factor of City Carrier Street time costs is indeed ZIP codes that receive [Flats Sequencing System (FSS)] Processing, which was one of the two stratification criteria identified in the First Status Report. The second potential stratification criteria identified in that Report, the Accountable time per ZIP code, appears to merely conflate the strata definitions and to result in an unreliable dataset for analysis. FSS ZIP codes overall have a higher number of routes, hours, mail volumes, and therefore likely have higher Accountable mail volume. As such, the Postal Service reduced the number of strata from four to two, zones that receive FSS processing and those that do not, and selected a new sample accordingly.”¹
- a. Please explain the nature of the investigation referenced above, specifically the purpose and the methods of the investigation.
 - b. Please explain the rationale for stating that the accountable time per ZIP Code “appears to merely conflate the strata definitions and to result in an unreliable dataset for analysis. FSS ZIP codes overall have a higher number of routes, hours, mail volumes, and therefore likely have higher Accountable mail volume.” Bradley Study at 6. Please explain the evidence of this claim and describe any methods employed to substantiate this claim.
 - c. Please refer to the First Status Report that states, “[p]revious research on estimating city carrier street time costs showed that costs for FSS ZIP Codes are materially different from costs for non-FSS zones.” First Status Report at 2.
 - i. Please explain the rationale for the above conclusion.
 - ii. Please provide the evidence of this claim and describe any methods employed to substantiate this claim.
 - d. Please confirm that this indicator was chosen as a stratification criterion because FSS ZIP Codes have higher number of routes, hours, and mail volumes.
 - i. If confirmed, please clarify the other ZIP Codes in comparison to which the expression “higher number of routes, hours, mail volumes” is employed. Please explain in detail why ZIP Codes that

¹ Bradley Study at 6-7. The Bradley Study cites the Postal Service’s First Status Report. Docket No. PI2017-1, First Status Report of the United States Postal Service in Response to Order No. 4869, April 19, 2019, at 1 (First Status Report).

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receive FSS processing have high number of routes, hours, and mail volumes.

- ii. If not confirmed, please clarify the reasons why ZIP Codes that receive FSS processing were chosen as a stratification criterion.

RESPONSE:

a. The investigation was designed to evaluate the characteristics of the data collected in the first sampling plan. The investigation entailed examining the collected data and evaluating the reasonableness of descriptive statistics for key variables. The results of the analysis were described in the Postal Service's Second Status Report:²

As explained in the First Status Report, the Postal Service collected data from the last three months of calendar year 2018 (first Postal Quarter of FY 2019) in order to investigate the validity of the first sampling plan. Subsequent to filing the First Status report, the Postal Service investigated the collected data and found results which moved it to reconsider its original sampling plan. The results of that analysis suggested that data obtained under the proposed sampling plan would not provide a reliable basis for capturing the true cost generating process for city carriers on regular letter routes. In particular, the daily ZIP Code averages were 38.7 hours for office time and 146.6 hours for street time, with an average number of routes per ZIP Code of 20.5. The problem may not be obvious at the ZIP Code, but if the daily hours per route are calculated, the issue emerges.

In the October through November data, the average daily office hours per route were 1.87, and the average daily street hours per route were 7.14. Together, these office and street times implied an average of 9.02 daily hours per route, which is well above the Postal Service standard of 8 hours per route per day. While there may be individual ZIP Codes that average 9 hours

² See, Second Status Report of The United States Postal Service In Response To Order No. 4869, Docket No. PI2017-1, July 31, 2019, at 3.

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per day per route, such a value is not reasonable for the center of the distribution of hours per route per day. To ensure that the high average time per route was not an artifact of a seasonal peak in hours, the daily averages were calculated for just the October 2018 data. That exercise produced an average of 8.98 daily hours per route for October, confirming the high-hours result is not caused by a holiday peak. Consequently, the Postal Service investigated modifying its sampling plan. (Footnotes omitted).

b. Volumes, by type, are positively correlated across ZIP codes. That is, a ZIP Code that receives a high volume of DPS will also be a ZIP Code that receives a high volume of other types of mail. Examination of city carrier volume data reveals that FSS ZIPs have higher volumes of all types of mail, including accountable, than non-FSS ZIPs. The table below illustrates the stark contrast in the means of the volume variables between FSS and non-FSS ZIP Codes from the analysis dataset. The SAS program, log and listing files used to generate this table are attached to this response.

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**Table: Comparison of Means between FSS and non-FSS ZIP Codes in the
Analysis Dataset Used in the Top-Down Model**

Variable	FSS	Non-FSS	% Difference
DPS	28,372.8	15,703.1	80.7%
Cased	6,090.5	5,165.4	17.9%
Sequenced	3,930.7	1,674.0	134.8%
FSS	3,609.6	0.0	n/a
In-Receptacle Parcels	766.7	452.4	69.5%
Deviation Parcels	508.5	311.7	63.2%
Accountables	45.5	28.2	61.3%
Delivery Points	11,685.4	8,189.5	42.7%
Routes	20.2	12.4	62.7%

Consequently, stratifying by the number of accountables identified not only high-accountable ZIP Codes, but also FSS ZIP Codes. As explained in the response to subpart a, above, the four-way stratification produce a data set that did not reflect actual operational practice, and the stratification approach was revised.

c.(i) The rationale for the conclusion that costs for FSS ZIP Codes are materially different from costs for non-FSS zones comes from an empirical analysis of city carrier street times.

c.(ii) The initial source of evidence was produced in Docket No. RM2015-7, in which a variability equation for city carrier delivery time was estimated. During the process of estimating that equation, an empirical test was performed that demonstrated

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that costs for FSS ZIP Codes are materially different from costs for non-FSS ZIP Codes.

This test was performed by incorporating a characteristic variable that separately identified the FSS zones:³

Another issue that bears investigation is the relatively high marginal time for FSS mail. While operations experts recognize that adding the additional FSS bundle to the carrier workload can increase street time, the difference between the FSS marginal time and the other marginal times is striking. This difference raises the possibility that FSS ZIP Codes are different from non-FSS ZIP Codes for reasons other than the presence of FSS mail. If so, then the coefficients on the FSS variables could be picking up something other than its pure cost-causing effect and its marginal time could be overstated.

The normal way to proceed with this investigation would be to separately estimate the regular delivery equation for FSS and non-FSS ZIP Code days. However, there is a problem with this approach because of the relatively small number of FSS ZIP Code days. With just 967 observations for FSS zones, multicollinearity becomes a serious problem. Even with the reduced-variable model, twelve of twenty-seven estimated coefficients have low t-statistics in an FSS-only model. This suggests that inferences drawn on this model would be inaccurate and/or that a different (and simpler) model would have to be estimated for FSS zones because of multicollinearity. Neither of these inferences are appealing. An alternative approach is to include a "categorical" or "dummy" variable for FSS zones. This variable takes the form:

³ See, Report on City Carrier Street Time, USPS-RM2015/1, Docket No. RM2015-7, December 11, 2014 at 76.

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$$\delta = \begin{cases} 1 & \text{if } FSS > 0 \\ 0 & \text{if } FSS = 0 \end{cases}$$

This variable will capture any effects associated with FSS zones that are not caused by the FSS volumes in those zones. It also can be estimated on all 3,485 observations so multicollinearity should not be a problem

Estimation of the equation including the FSS categorical variable revealed that its coefficient was statistically significant, indicating cost in FSS zones are different from those in non-FSS zones.

Additional evidence was provided in Docket No. PI2017-1. During that docket, inclusion of categorical variable for FSS Zones again produced a statistically significant coefficients and separate street time equations were estimated for FSS and non-FSS zones, producing different marginal delivery times across ZIP Code types.⁴

d.(i) Confirmed. The ZIP Codes used for comparison with the FSS ZIP Codes were the non-FSS ZIP Codes. The deployment of FSS machines was not done randomly. Specifically, the machines were deployed in zones that had high levels of flats volume. Because volumes, by type, are correlated across ZIP Codes, ZIPs that

⁴ See, Report on Research Into the Ability of a Top-Down Model To Accurately Estimate City Carrier Street Time Variabilities, Docket No. PI2017-1, August 18, 2017 at 6 and 25.

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received FSS machines, were large, high volume ZIP codes with high numbers of routes, hours and volumes.

d.(ii) Not applicable.

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5. Please refer to the Bradley Study's description of the Delivery Data Set stating, "[b]ecause of the COVID-19 pandemic, the monthly 2020 volume and street hour data are distorted and do not reflect ongoing operational practice. During much of the year, the Postal Service was not able to follow normal street time procedures. Consequently, data from [calendar year] 2019 remain the most relevant to estimate the variabilities of street time." Bradley Study at 5 n.9. Please also refer to the Bradley Study's description of the Collection Volume Data Set stating, "[i]n the course of their delivery activities, letter carriers also collect mail from customers' receptacles. The amount of volume collected is material, so it is important to include some measure of this collected volume to avoid omitted variables bias. In order to have a complete set of volume variables for the top-down model, the Postal Service undertook a special study to measure the volume collected by letter carriers from customers' receptacles on regular letter routes. Collection points with barcodes from the Collection Point Management System (CPMS) like blue boxes, wall units, firms, or mail chutes were not included in the study. Carriers from over one thousand ZIP Codes participated in the collection volume study in a two-week period in January and February 2021." Bradley Study at 24-25 (footnotes omitted).
- a. Please explain why the Delivery Data Set consists of calendar year 2019 data rather than fiscal year 2019 data. Please explain whether, for the purpose of estimating street time variabilities, it may be more appropriate to use data from calendar year 2019 or fiscal year 2019.
 - b. Please confirm that during January and February 2021, when data for the Collection Volume Data Set was collected, the Postal Service followed normal street time procedures in collecting mail from customers' receptacles.
 - i. If confirmed, please explain the reasons why the COVID-19 pandemic did not affect collection procedures in January and February 2021, given that it caused distortions in volume and street hour data.
 - ii. If not confirmed, please explain in which ways street time procedures for collecting mail from customers' receptacles deviated from the norm during January and February 2021, due to the COVID-19 pandemic. In the response, please explain why, despite the deviation from the norm during January and February 2021, the Postal Service considered it appropriate to use collection volume data from this period to estimate street time variabilities.

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RESPONSE:

a. In Order 4869, the Commission specified the structure of the data set the Postal Service was to collect for analyzing the top-down model:⁵

Accordingly, the Commission directs the Postal Service to provide an expanded dataset of city carrier delivery data. The dataset shall include data for each of the 12 consecutive calendar months, for 1 randomly drawn regular workweek from the expanded set of ZIP-Code-days served by regular city carriers,

A reasonable interpretation of the Commission's order is that the Postal Service should collect data on 12 consecutive months in a calendar year. As long as the data set used to estimate street time variabilities covers 12 consecutive months, there is no particular advantage from using calendar year or fiscal year data. Either type of data will allow investigation of seasonal effects.

b.(i) Confirmed that the Postal Service followed normal street time procedures in collecting mail from customers' receptacles during the study. Collection from receptacles does not require customer interaction and therefore did not require altered operations.

b.(ii) Not applicable.

⁵ See, Order 4869, Docket No. PI2017-1, November 2, 2018 at 16.

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6. Please refer to the Bradley Study's description of the Collection Volume Data Set's methodology for recording total volume of mail collected from customers' receptacles that states "[a]n actual piece count was required if there was less than one inch of mail. When there was more than one inch of mail, carriers had the option using one of two methods." *Id.* at 26 (footnote omitted). Please also refer to the Bradley Study that states, "[t]he primary explanatory variables included in the top-down equation are the volumes handled by city carriers." *Id.* at 45.
- a. Please confirm that mail collected from customers' receptacles is a primary explanatory variable in the calculation of street time variabilities.
 - i. If confirmed, please explain whether the conversion standards could lead to measurement error bias due to measurement error in an explanatory variable.⁶ In the response, please indicate the expected effects of the measurement errors on the calculated variabilities.
 - ii. If not confirmed, please provide the list of primary explanatory variable in the calculation of street time variabilities. In the response, please explain whether any of these primary explanatory variables are possibly subject to measurement error. For the variables that are subject to measurement error, if any, please explain the likely impact of the measurement errors on the calculated street time variabilities.
 - b. For each of the two conversion standards, please provide any research that the Postal Service has conducted on the accuracy of these standards in estimating volumes and their conclusions.

⁶ In mail processing variability studies, the Commission has previously stated that "[m]easurement of the variables that are to be used as explanatory terms in the estimated variability models (TPF or FHP) [Total Pieces Fed and First Handled Pieces, respectively, which are measures of volume] must be substantially free of error. The Commission has warned since Docket No. R97-1 that the consequences that follow from using an explanatory variable measured with a substantial level of error can be severe." Docket No. R2006-1, Opinion and Recommended Decision Vol. 1, February 26, 2007, ¶ 3030. See *also* Docket No. RM2020-13, Reply Comments of the United States Postal Service Regarding Proposal Six, December 8, 2020, PDF file "Bozzo.Reply.Report.pdf," at 5.

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RESPONSE:

a.(i) Confirmed. In any field study, such as the collection volume study, there is always the possibility of measurement errors. However, the existence of such errors does not necessarily imply that a material bias exists in the resulting variabilities. In general, measurement error can lead to what is known as “attenuation” bias.

Measurement error in an explanatory variable in an econometric equation will show up in the equation's error term, causing the explanatory variable to be correlated with the error term. This correlation causes the potential bias in the estimated coefficient and this bias typically reduces the size of the estimated coefficient on the affected variable.

However, the size and materiality of the potential bias depends upon two things, the amount of variation in the underlying variable (σ_x^2) and the amount of variation in the “noise” or measurement error (σ_e^2). The formula is given by:⁷

$$\frac{\sigma_x^2}{\sigma_x^2 + \sigma_e^2}$$

When there is substantial variation in the underlying variable and a small amount of measurement error, then the bias will be minimal. In the case of collection volume, the variation in the measured collection volume per ZIP Code day is substantial with a range from zero pieces per day to over 3,900 pieces per day. In addition, unlike in mail

⁷ See, Wooldridge, Jeffery M. *Introductory Econometrics, A Modern Approach*, 6th ed., Cengage Learning, Boston, MA, 2016 at 291.

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processing, there is no evidence of substantial measurement error in the collection volume study. In fact, the use of the linear measurement system used in the current collection volume study follows the approach used in the Collection Volume Study performed in Docket No. RM2015-7, which was approved by the Commission.⁸

Moreover, unlike in mail processing, where TPF or FHP was the sole measure of volume, serving as the cost driver, collection volume is just one of seven different volume cost drivers. Its importance, as a result, is substantially reduced, as compared to mail processing. Additionally, there is no concern that potential measurement error in collection volumes could infect the estimated coefficients for the other volume variables because there is little or no relationship in the top-down equation between the collection volumes and the other volumes. This was demonstrated in the response to Chairman's Information Request No.2, Question 4, which showed that removing the collection volume variable from the top-down equation had minimal impact on the other marginal times and variabilities.

a.(ii) Not applicable.

b. No formal research has been conducted, to our knowledge. The measurement procedures are the same as those for a national Collection Point

⁸ See, Report on City Carrier Street Time, USPS-RM2015/1, Docket No. RM2015-7, December 11, 2014 at 30.

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Management System (CPMS) study. As outlined in the Postal Operations Manual (POM), Section 313, and in Handbook M-39 Management of Delivery Services, Section 234.3, a national CPMS study is used to determine the eligibility for the movement of a street letter collection box, and relies on accurate piece counts using these same measurements.