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POSTAL REGULATORY COMMISSION
WASHINGTON, D.C. 20268–0001

PERIODIC REPORTING (PROPOSAL TEN)	Docket No. RM2020-2

RESPONSES OF THE UNITED STATES POSTAL SERVICE
TO QUESTIONS 1-5 OF CHAIRMAN'S INFORMATION REQUEST NO. 3
(March 18, 2020)

The United States Postal Service hereby provides its responses to the above listed questions of Chairman's Information Request No. 3, issued March 5, 2020. The questions are stated verbatim and followed by the response.

Respectfully submitted,

UNITED STATES POSTAL SERVICE

By its attorney:

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Eric P. Koetting

475 L'Enfant Plaza West, S.W.
Washington, D.C. 20260-1137
(202) 277-6333
eric.p.koetting@usps.gov
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RESPONSE OF THE UNITED STATES POSTAL SERVICE TO CHAIRMAN'S INFORMATION REQUEST NO. 3

1. Please refer to Chairman's Information Request (CHIR) No. 2, question 7 and the Postal Service's responses to question 7.[1] In response to question 7.c., the Postal Service states that "[a]ll values in the Zone of Tolerance (as well as those outside the Zone of Tolerance) are used to estimate the models underlying the postmaster cost variabilities. This includes offices that may be likely to move up an EAS grade, as well as offices that may be likely to move down an EAS grade."

Additionally, please refer to Library Reference USPS-RM2020-2/1 – Public Material Relating to Proposal Ten, Folder: Calculate Variabilities, Files: Calculate Variability for 20 and 21.sas and Calculate Variability for 20 and 21 (Text Document), which relate to the computation of Postmaster cost variability for EAS grades EAS-20 and EAS-21.

a. Please confirm that in the text file of the SAS program indicated above, the classifications of the Postmasters and the cost computations performed from line 835, ("*** Identify EAS Grade for Variability Calculation ***") to line 876 ("b_low_cost b_high_cost s_low_cocst s_high_cost b_cost s_cost s_theta n=count"), only include the population of Postmasters in the EAS-20 grade, *i.e.*, apart from using the minimum salary for the EAS-21 grade in the computations, the classification of the Postmasters excludes any post office in the EAS-21 grade. If not confirmed, please explain.

b. If confirmed, please explain why post offices that are likely to move down from the EAS-21 grade to the EAS-20 grade are excluded from the calculation of Postmaster cost variabilities for EAS-20 and EAS-21.

RESPONSE:

a. Confirmed. Both EAS-20 and EAS-21 offices are used to estimate the models underlying the postmaster cost variabilities (see lines 795 through 819 in the text file of the SAS program referenced above). But only EAS-20 offices are used to calculate the EAS-20 variability. Specifically, line 838 in the referenced SAS

[1] Chairman's Information Request No. 2, January 17, 2020, question 7.c. (CHIR No. 2); Responses of the United States Postal Service to Questions 1-7 of Chairman's Information Request No. 2, January 29, 2020, question 7.c. (Responses to CHIR No. 2).

program selects the EAS-20 offices (if easg = 3) for the purpose of calculating the EAS-20 variability.

b. There are a number of factors that went into the decision to use only EAS-20 offices (and the same method for other grades) in calculating the variability for that grade. First, in forming the baseline costs, the variability calculation uses the classification of post offices determined by the logistic model. When EAS-21 offices are included in the variability calculation, some of the EAS-21 offices are classified as EAS-20 offices by the model. This classification occurs because these offices have sufficiently small WSCs so that they are either in, or at, the lower Zone of Tolerance for EAS-21. According to their WSCs, they could be EAS-20 offices, and that is how the logit model designates them. The next step in the variability calculation is to increase the WSCs for all offices in the lower EAS grade. When that occurs, some of the designated EAS-20 offices move up to the EAS-21 grade, thus adding to the change in cost responding to the change in WSC. The cost increase for the case when both groups are used exceeds the cost increase when just EAS-20 offices are used, and this tends to increase the calculated variability.

Second, when the EAS-21 offices are included in the calculation of the variability, the base cost for the variability calculation is increased. When only EAS-20 offices are included, the percentage change in cost required for calculating the variability is found by dividing the absolute change in cost by the pre-WSC-

increase level EAS-20 office costs. But when both EAS-20 and EAS-21 offices are included, the (now larger) change in cost is divided by the sum of the EAS-20 and EAS-21 base costs. A larger base cost means that a given absolute change in cost will result in a lower percentage change in cost, so including EAS-21 offices in the base will tend to reduce the variability.

Table 1 presents the variabilities for when both EAS grades are included, as well as the original variabilities based upon using just the lower EAS grade. The results in the table indicate that the increase in base costs for calculating the variability has a larger impact on the variability than the additional cost generated by the small number of additional offices that could move up an EAS grade. In all instances, the variability is lower when both grades are included in the calculations. Note that the difference in variabilities gets smaller for the higher grades. That is because, as EAS grades increase, there are relatively few offices in the next-higher-grade and the resulting base expansion is relatively small.

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Table 1

Calculated Variabilities Under Two Methods

EAS Grades	Including Lower Grade	Including Both Grades
18-18B	8.9%	4.2%
18B-20	6.9%	5.0%
20-21	6.5%	5.0%
21-22	2.9%	1.9%
22-24	6.1%	5.2%
24-26	11.9%	10.4%

Given that the goal of calculating the variability is to measure the percentage change in cost arising from a percentage change in WSCs, it is appropriate to perform the variability calculation using just the lower grade offices. This approach provides the preferred base for calculating the percentage increase in cost associated with a given percentage increase in WSCs, and thus the more reliable variability. Further materials associated with this response are provided as part of USPS-RM2020-2/2.

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2. Please refer to the Bradley Study, where Bradley states that in order to "account for the possibility that the variability could be applicable to a variety of circumstances, a sensitivity test was performed for a wide range of possible [Workshare Service Credit] [(]WSC[)] changes," which "started at 2.5 percent and was increased by 2.5 percentage point increments to the maximum value of 20 percent," and that "[t]he results of the sensitivity analysis support the use of a 10 percent WSC change as the benchmark for calculating Postmaster variabilities." Bradley Study at 42, 44.

a. Please confirm that the Postal Service assesses the stability of Postmaster cost variability over a range of WSC growth rates that it chose for the purpose of performing the sensitivity analysis, and not over a range of historically observed WSC growth rates (*see, e.g.*, *id.* at 42, Table 22). If not confirmed, please explain.

b. Please provide past examples of variability computation where the Postal Service based its choice of the percentage increase in the cost drivers on a sensitivity analysis in which alternative percentage changes in the cost driver have been considered.

c. Please provide past examples of variability computation where the Postal Service based the percentage change in the cost driver on the stability of the computed variability numbers over a defined growth range of the cost driver.

RESPONSE:

a. Partially Confirmed. Although the range of possible WSC changes considered in the sensitivity analysis exceeds the range of the most recent annual WSC changes, it does include many historically observed WSC growth rates, particularly for multi-year periods. The nature of the EAS compensation system is that costs increase as more Postmasters increase their EAS grade. Thus, it is typically the case that smaller WSC changes will lead to smaller variabilities, because they induce fewer Postmasters to change an EAS grade. To ensure a

fair investigation of the Postmaster cost responsiveness, a relatively large WSC change of 10 percent was selected as the initial benchmark, in order to provide enough of a WSC change so the responsiveness of Postmaster costs could be accurately measured. Then, to ensure that the 10 percent benchmark did not produce an atypical variability, the sensitivity analysis was performed over a large range of possible WSC changes. The sensitivity analysis demonstrated two results: (1) that smaller changes in WSCs lead to lower variabilities, and (2) that the estimated variabilities were stable over different WSC growth rates. This latter result indicated that selection of the specific benchmark WSC growth rate was not critical, as similar results are obtained for different growth rates.

It is also important to recognize that the methodology developed for calculating the Postmaster variability also supports calculating that variability for historically observed WSC growth rates. This can be demonstrated by calculating the variabilities associated with the historical growth rates produced in response to Chairman's Information Request, Question 6.[2] Table 2 presents those variabilities. As expected, the variabilities are lower than those calculated at the 10 percent benchmark but, with one exception, they are not dramatically

[2] Because the EAS-18B grade is new, there are no historical data available for this grade. Thus, the historical WSC growth rate for the old EAS-18 grade was used for both the EAS-18B grade and the new EAS-18 grade. Similarly, there are no historical data available for the EAS-24 grade, so the 2015 to 2019 average annual growth rate was used for that grade.

different. The largest reduction in variability is for grade EAS-24. Given the relatively small number of post offices in this grade and given current WSC distribution of those offices, the historical average annual WSC growth rate of 1.74 percent is not large enough to move any offices up to the EAS-26 grade. When no Postmasters change grade, there is no change in cost, and the resulting variability is zero. In effect, using the historical growth rate returns the variability for this grade to the value in the established methodology, which assumed it was zero. The other EAS grade that experiences a relatively large reduction in variability is EAS-20. The lower variability for that grade is caused by the fact that the historical average growth rate is quite low, at less than 1 percent a year.

Table 2

Variabilities Associated with Historical Average Annual Growth Rates

EAS Grade	Historical Growth Rate	Variability
18	1.40%	8.4%
18B	1.40%	5.3%
20	0.90%	3.0%
21	1.30%	2.4%
22	2.40%	4.9%
24	1.74%	0.0%

In terms of the impact of using the variabilities based upon historical growth rates on volume variable costs, the overall variability would fall to 5.18 percent from the 6.96 percent estimate produced by using the 10 percent WSC growth benchmark. Further materials associated with this response are provided as part of USPS-RM2020-2/2.

b. First, to clarify, the Postal Service did not base its choice of the percentage increase in WSC on a sensitivity analysis, as suggested by the question. The choice of the 10 percent benchmark growth rate was selected to ensure that a sufficiently large change in WSC was used to identify the response in Postmaster grade changes, leading to the change in cost. The sensitivity analysis was subsequently performed to investigate whether the 10 percent benchmark was reasonable, and to assess what impact different growth rates had on the calculated variability.

In previous variability calculations, the underlying cost generating process was continuous, as reflected by the fact that the dependent variable in the variability regressions was itself a continuous variable. With a continuous cost generating process, the size of the percentage change in the cost driver does not matter, because the calculated variability is the same for all-sized changes in the cost driver. The underlying cost generating process for Postmasters is different, in that it is a step-function and not continuous. Hence the need for an econometric method that employs a discrete dependent variable. As demonstrated in part a.,

above, the implication of this type of cost generating process is that the variability depends upon the size of the change in the cost driver, because that determines how many Postmasters shift an EAS-grade. That is why a new approach to calculating the variability is required.

c. First, to clarify, the Postal Service did not base the percentage change in the cost driver on the stability of the computed variability numbers over a defined growth range of the cost driver, as suggested by the question. The choice of the 10 percent benchmark growth rate was selected to ensure a sufficiently large change in WSC was used to identify the response in Postmaster grade changes, leading to the change in cost. The sensitivity analysis was subsequently performed to investigate whether the 10 percent benchmark was reasonable, and to assess what impact different growth rates had on the calculated variability.

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3. Please refer to the logistic probability function of WSCs described in the Bradley Study and its resulting estimation. *See id.* at 18, 29, Table 14.

a. Using EAS grades EAS-20 and EAS-21 as an example, please confirm that based on the estimation results shown in Table 14 of the Bradley Study the average salary, as a function of WSC, can be determined for the Postmasters pertaining to these two pay grades. Specifically, please confirm that the average salary is computed by first multiplying the minimum salary pertaining to the EAS-21 grade by the estimated probability function, then multiplying the minimum salary pertaining to the EAS-20 grade by one minus the probability function, and, finally, adding the two products together. If not confirmed, please explain.

b. If question 3.a. is confirmed, please also confirm that the point elasticity of the expected salary can be computed at any chosen value of WSC. If not confirmed, please explain.

c. If question 3.a. and 3.b. are confirmed, please explain whether computing the variability as described in questions 3.a. and 3.b., is or is not an acceptable alternative to the Postal Service's proposed method based on the classification of Postmasters.

RESPONSE:

a. Confirmed. The logistic-model-based average minimum salary for EAS grades EAS-20 and EAS-21 is found in three steps. The first step is taking the average probability (across all offices in both grades) of being an EAS-21 office and multiplying it by the EAS-21 minimum salary. The second step is taking the average probability of being an EAS-20 office (which is just one minus the average probability of being an EAS-21 office) and multiplying it by the EAS-20 minimum salary. The third step is summing the results of the first two steps. Table 3 provides the inputs necessary for calculating the average minimum salary.

Table 3

Calculating the Logit-Model Based Average Salary for Grades EAS-20 and EAS-21

Average Probability of Being an EAS-21 Office	EAS-21 Minimum Salary	Average Probability of Being an EAS-20 Office	EAS-20 Minimum Salary
0.3089	$71,000	0.6911	$65,300

The logit-model based average minimum salary is $67,060.80. The accuracy of this formulation can be checked by comparing the logistic-model-based average salary with the actual average salary across the office in the two EAS grades. That simple average is also $67,060.80.

b. Not Confirmed. The lack of an average salary was not the reason that an alternative approach to calculating a variability was developed. Rather, it was because of the discrete nature of cost changes for Postmasters. In other postal functions, increases in the cost driver generate associated increases in cost, whether they are additional hours worked or additional transportation capacity purchased. But for Postmasters, most increases in WSCs have no effect on cost. A cost change only occurs when there is a sufficient change in WSCs to move a postmaster up a grade. The outcome of changing a grade depends not only upon the size of the WSC increase, but also upon the post office's level of WSCs before the WSC increase. As a result, the changes in cost are discrete -- a Postmaster is paid either one minimum salary or another, and the cost surface

is a step function. To capture this discrete cost surface, a different type of econometric model was required; a logistic model which, based upon an office's WSC level, identifies the EAS level in which the office belongs. Because the underlying model for Postmasters is different (discrete rather than continuous) than the model appropriate for other postal functions, a different method of calculating a variability is also required.

For a traditional conditional cost surface, the variability is found by identifying the change in cost caused by a change in the cost driver, and multiplying that change by the ratio of the cost driver to cost, producing a percentage change. But the logistic model does not directly measure the change in cost associated with a change in WSC. It measures the change in probability that an office will move up an EAS grade as a result of an increase in WSC. But as explained above, only certain WSC increases will cause a cost response, so calculation of the cost variability must include identification of which WSC increases cause a cost increase, and which do not. To do that, the size of the WSC increase must be specified, and a discrete method must be used to calculate the variability.

That the traditional point elasticity formula is inapplicable can be seen through trying to apply it. In general form, the traditional elasticity formula is given by:

$$\varepsilon_{y,x} = \frac{\partial y}{\partial x}\frac{\bar{x}}{y(\bar{x})}.$$

For the logistic equation, the application of this formula yields:

$$\varepsilon_{\pi_i, WSC_i} = \frac{\partial \pi_i}{\partial WSC_i} \frac{\overline{WSC}}{\pi(\overline{WSC})} = \frac{\beta\, \pi_i}{1 + e^{\alpha + \beta\, WSC_i}} \frac{\overline{WSC}}{\pi(\overline{WSC})}$$

The mean WSC for EAS-20 and EAS-21 is 11,391.39. The probability of being an EAS-21 office at that WSC level is 0.0029744.[3] Combining these values with the regression coefficients in the elasticity formula produces a calculated elasticity of 3,964 percent, a nonsensical result. The elasticity is so large because the probabilities are sufficiently small that even a very small absolute increase in probability will translate into a material percentage increase. For example, suppose an office's WSCs increase by 10 from the mean value of 11,391.39 to a value of 11,491.39. This is a percentage increase in WSC of 0.08779 percent. The additional 10 WSCs raise the probability of the office being an EAS-21 office from 0.0029744 to 0.0030797, a change of only 0.0001053. In terms of the likelihood of the office becoming an EAS-21 office, the change is immaterial, but in percentage terms, it is an increase in the probability of 3.54068 percent. Dividing that percentage increase by the 0.08779 percentage increase in WSC produces an elasticity of 4,033 percent, which is quite close to the point elasticity of 3,964 percent. While a point elasticity can be calculated, this example demonstrates that it is not the elasticity of Postmaster cost with respect

[3] The probability is very small because 13,001 WSCs are required to become an EAS-21 office.

to a change in WSC. To accurately calculate that elasticity, one must identify how many offices will shift up an EAS grade due to the WSC increase, and then calculate the cost impact of that shift.

c. For the reasons provided in part b. above, the use of a point elasticity is not an acceptable alternative to the Postal Service's proposed method based on the classification of Postmasters.

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4. Please refer to CHIR No. 2, question 7 and Responses to CHIR No. 2, question 7. In response to question 7.d.ii., the Postal Service states that "[t]his set of three estimated logit models that include the offices in the EAS-21 and EAS-22 grades thus incorporate movements not only between EAS-21 and EAS-22, but also between EAS-20 and 22 as well as EAS-22 and EAS-24. To the extent changes in WSCs would lead to these latter types of grade changes, they would be captured by the relevant pairwise logit models and would influence the postmaster cost responsiveness in that way."

Please also refer to An Introduction to Categorical Data Analysis written by Alan Agresti.[4] Mr. Agesti states that "[s]oftware for multi[-]category logit models fits all the equations […] *simultaneously*. Estimates of the model parameters have smaller standard errors than when binary logistic regression software fits each component equation […] separately. For simultaneous fitting, the same parameter estimates occur for a pair of categories no matter which category is the baseline. The choice of the baseline category is arbitrary." *Id.* at 174.

a. Did the Postal Service estimate a multi-category logit model, along with separately estimating the binary logistic regression equations? If yes, please provide the estimation results that were obtained.

b. If question 4.a. is not confirmed, please explain why the Postal Service did not consider the multi-category logit model, which fits all the equations simultaneously and results in smaller standard errors than when the binary logistic regression equations are estimated separately.

RESPONSE:

a. Yes, the Postal Service estimated a polychotomous logit model. The results were submitted in Professor Bradley's report that accompanied the Postal Service's Reply Comments.[5]

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[4] *See* Alan Agresti, An Introduction to Categorical Data Analysis, Second Edition (2007), available at: *https://mregresion.files.wordpress.com/2012/08/agresti-introduction-to-categorical-data.pdf*.

[5] *See* "Evaluation of Comments Filed by the Public Representative in in Docket No. RM2020-2," attached to the Reply Comments of the United States Postal Service Regarding Proposal Ten (March 9, 2020) at 23.

b. The Postal Service did consider a polychotomous logit model. For an ordinal, discrete, dependent variable like EAS grades, the appropriate polychotomous model is the proportional odds model, also known as the cumulative logit model. This polychotomous model has two advantages. First, the associated estimator is efficient and, second, the estimated coefficients are relatively easy to interpret. But it also has a disadvantage; it assumes that the slope or adjustment coefficient is the same for all binary pairs. In the context of the Postmaster variability model, this means assuming the speed at which additional WSCs move a Postmaster up a grade is the same for all EAS grades. But, the fact that the EAS grade bands increase in size as the EAS grade increases invalidates this assumption. The choice between a single polychotomous logit model and a series of dichotomous logit models thus boils down to the relative importance of increased efficiency versus allowing for different speed of adjustment parameters.

The speed of adjustment parameter from the polychotomous logit model has a value of 0.0041.[6] Table 4 presents the transition coefficients from the dichotomous models.[7] Comparison of the coefficients from the dichotomous models with the single polychotomous coefficient of 0.0041 shows that there are

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[6] *Id*., at 25.

[7] *Id*., at Table 1, page 16.

significant divergences from the value of that coefficient. For example, the transition coefficient for jumping from the EAS-18 grade to the EAS-18B grade is 16.5 times the assumed common coefficient in the polychotomous model.

Table 4

Estimated Transition Coefficients from Logistic Models

EAS Grades	Coefficient	Std. Error	Wald Chi-Square
18 to 18B	0.0675	0.00660	106.2
18B to 20	0.00757	0.000425	317.7699
20 to 21	0.00349	0.000287	148.1936
21 to 22	0.00184	0.000193	91.0048
22 to 24	0.000544	0.000079	47.6234
24 to 26	0.000394	0.000132	8.88

.

At the same time, Table 4 also indicates that the estimated standard errors are quite small for the dichotomous logit coefficients, suggesting that the loss in efficiency is not a material problem. Efficiency is not a major problem for the dichotomous models, because the Postmaster data set is large, providing plenty of observations for each dichotomous model. Moreover, there is only one

coefficient to estimate. Based upon these factors, the appropriate approach is estimation of a series of dichotomous models.[8]

[8] If a lack of efficiency were a material problem in estimating the individual dichotomous regression parameters, there are other polychotomous approaches that could be applied, such as a partial proportional odds ratio model or abandoning the information contained in the ordering. However, a lack of efficiency is not a material problem for the dichotomous regression models, so these alternative polychotomous approaches are not needed.

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5. Please refer to the Direct Testimony of Nai-Chi Wang on behalf of United States Postal Service.[9] In Figure B, Wang presents the structure and components of post office function activities as well as the index of WSCs. *Id.* at 17.

a. Please confirm that the WSC index is obtained by:

i. Considering a defined list of post office activities,

ii. Defining quantitative indicators of the activities, referred to as workload factors and revenue units,

iii. Weighting the quantitative indicators of the activities with weights that were initially determined by the Expanded Postmaster Criteria System Task Force, and

iv. Summing the weighted values of the quantitative indicators of the activities.

If not confirmed, please explain.

b. Please confirm that the post office activities include both operating elements, such as the mail volume handled, as well as administrative elements. If not confirmed, please explain.

c. Please confirm that, because the WSC index includes revenue elements and factors other than mail volume (*e.g.*, prices that enter the revenue calculations), those non-volume related revenue elements and factors may also contribute to the changes in the WSC index. If not confirmed, please explain.

d. If question 5.c. is confirmed, please explain why salary components that are not determined by volume are excluded from the salary measures used to define the response variable in the logistic regression, but non-volume factors included in the WSC index are not controlled for in the regressions.

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[9] Docket No. R84-1, Direct Testimony of Nai-Chi Wang USPS T-12, November 10, 1983 (Wang Testimony).

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RESPONSE:

a. i-iv. Confirmed.

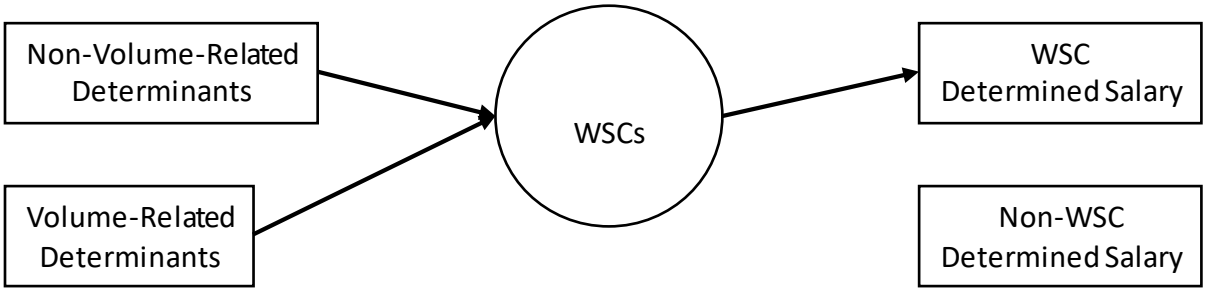
b. Confirmed.

c. Confirmed.

d. This question combines two issues that directly relate to the determination of the response in Postmaster costs to changes in volume, which is the fundamental causal linkage for determining the relevant attributable costs. The first issue is determining the implications for attributable costs of the existence of non-volume determinants of WSCs. The second issue is determining the implications for attributable costs of having non-WSC-determined parts of Postmaster compensation. This can be seen by posing this question another way: why do you exclude non-minimum salaries from the dependent variable in the logistic regressions while you (implicitly) allow non-volume determinants of WSCs to be included in the independent variable in those regressions? The complete answer is provided below, but the short answer is because the goal is to reflect the chain of causality from volume to cost, which is what must be measured to accurately calculate attributable costs.

The relationship among these various parts of the causal change from volume to cost is illustrated in the following diagram. Both volume-related and non-volume related factors determine a post office's WSCs, but those WSCs determine only a portion of the associated Postmaster's potential compensation. That

compensation can also be augmented by merit or seniority payments which are not related to WSCs.



The diagram makes clear why merit and seniority pay are not included in the dependent variable. WSCs have no causal relationship with those types of compensation. What is less clear is why total WSCs are used as the independent variable, including, implicitly, their non-volume related determinants. The answer is that the established methodology currently assumes proportionality between volume and WSCs, as the variability of WSCs with respect to volume has not yet been measured. Under this assumption, no attempt is made to separate out the potential impact of non-volume related WSC determinants. To the extent they are material, then the proportionality assumption overstates the true variability of WSCs with respect to volume. Measurement of the volume-to-WSC variability would effectively remove any influence of non-volume factors on WSCs in the causal chain.

This structure is parallel to the development of attributable costs for purchased highway transportation. Initial efforts focused on estimating the variability between cubic foot-miles and cost, while maintaining the assumption that changes in volume caused proportional responses in cubic foot-miles. This assumption was maintained even though it was known that there were non-volume determinants of cubic foot-miles, such as service standards. Then, in Docket No. RM2016-6, the variability of cubic foot-miles with respect to volume was estimated and the assumption of proportionality was replaced.

In the current rulemaking, the Postal Service is updating and refining the variability of Postmaster costs with respect to change in WSCs, while maintaining the assumption of proportionality between volume and WSCs. Once the WSC-to-cost variability is updated and refined, then a potential next step might be to investigate the variability of WSCs with respect to volume.