

ORDER NO. 5405

UNITED STATES OF AMERICA  
POSTAL REGULATORY COMMISSION  
WASHINGTON, DC 20268-0001

Before Commissioners:

Robert G. Taub, Chairman;  
Michael Kubayanda, Vice Chairman;  
Mark Acton;  
Ann C. Fisher; and  
Ashley E. Poling

Periodic Reporting  
(Proposal One)

Docket No. RM2019-6

ORDER ON ANALYTICAL PRINCIPLES USED IN PERIODIC REPORTING  
(PROPOSAL ONE)

(Issued January 14, 2020)

I. INTRODUCTION

On June 21, 2019, the Postal Service filed a petition pursuant to 39 C.F.R. § 3050.11, requesting that the Commission initiate a rulemaking proceeding to consider changes to the analytical methods approved for use in periodic reporting.<sup>1</sup> Proposal One seeks to revise the cost attribution procedures for Special Purpose Routes (SPRs) used in the Cost and Revenue Analysis (CRA) report. Proposal One is based on a new study of SPR costs that uses operational carrier data to reflect the current structure of

---

<sup>1</sup> Petition of the United States Postal Service for the Initiation of a Proceeding to Consider Proposed Changes in Analytical Principles (Proposal One), June 21, 2019, at 1 (Petition). The proposal is attached to the Petition (Proposal One).

SPR activities.<sup>2</sup> In support of its proposal, the Postal Service filed public and non-public library references.<sup>3</sup>

For the reasons discussed below, the Commission approves Proposal One with the following modifications. For regular delivery and Sunday/holiday delivery, the Commission approves variabilities estimated from the econometric equations in the restricted quadratic functional form, instead of the full quadratic form initially proposed by the Postal Service. For collection, the Commission approves the variabilities estimated from the econometric model proposed by the Postal Service but applies a different criterion when determining the theoretical maximum of the average number of mailpieces per box in a finance number/day.

## II. PROCEDURAL HISTORY

On June 25, 2019, the Commission issued a notice initiating this proceeding, providing for the submission of comments, and appointing a Public Representative.<sup>4</sup> The Postal Service provided responses to seven Chairman's Information Requests

---

<sup>2</sup> The Petition is supported by a report provided by Professor Michael D. Bradley, Department of Economics, the George Washington University, "A New Study of Special Purpose Route Carrier Costs," June 21, 2019 (Proposed Study).

<sup>3</sup> See Notice of Filing of USPS-RM2019-6/1 and USPS-RM2019-6/NP1 and Application for Nonpublic Treatment, June 21, 2019.

<sup>4</sup> Notice of Proposed Rulemaking on Analytical Principles used in Periodic Reporting (Proposal One), June 25, 2019 (Order No. 5133).

<sup>5</sup> The Postal Service filed additional public and non-public library references with these responses.

The Association of Postal Commerce (PostCom)<sup>6</sup> and the Greeting Card Association (GCA)<sup>7</sup> each filed comments on August 20, 2019. The Public Representative filed comments on August 21, 2019.<sup>8</sup>

On August 23, 2019, the Commission issued Order No. 5208, allowing reply comments.<sup>9</sup> The Postal Service filed reply comments on August 27, 2019.<sup>10</sup> The Public

---

<sup>5</sup> Chairman's Information Request No. 1, July 12, 2019 (CHIR No. 1); Responses of the United States Postal Service to Questions 1-8 of Chairman's Information Request No. 1, July 22, 2019 (Responses to CHIR No. 1); Chairman's Information Request No. 2, July 19, 2019 (CHIR No. 2); Responses of the United States Postal Service to Questions 1-6 of Chairman's Information Request No. 2, July 26, 2019 (Responses to CHIR No. 2); Supplemental Response of the United States Postal Service to Question 4 of Chairman's Information Request No. 2, July 31, 2019 (Supplemental Response); Chairman's Information Request No. 3, August 2, 2019 (CHIR No. 3); Responses of the United States Postal Service to Questions 1-12 of Chairman's Information Request No. 3, August 12, 2019 (Responses to CHIR No. 3); Chairman's Information Request No. 4, August 7, 2019 (CHIR No. 4); Responses of the United States Postal Service to Questions 1-9 of Chairman's Information Request No. 4, August 15, 2019 (Responses to CHIR No. 4); Chairman's Information Request No. 5, August 27, 2019 (CHIR No. 5); Responses of the United States Postal Service to Questions 1-7 of Chairman's Information Request No. 5, September 4, 2019 (Responses to CHIR No. 5); Chairman's Information Request No. 6, September 12, 2019 (CHIR No. 6); Responses of the United States Postal Service to Questions 1-2 of Chairman's Information Request No. 6, September 17, 2019 (Responses to CHIR No. 6); Chairman's Information Request No. 7, October 3, 2019 (CHIR No. 7); Responses of the United States Postal Service to Questions 1-3 of Chairman's Information Request No. 7, October 7, 2019 (Responses to CHIR No. 7); Library Reference USPS-RM2019-2/3, October 7, 2019. The Postal Service filed a motion for late acceptance of CHIR No. 1. See Motion of the United States Postal Service for Late Acceptance of Responses to Chairman's Information Request No. 1, July 22, 2019. The Postal Service's motion for late acceptance is granted.

<sup>6</sup> Comments of the Association for Postal Commerce, August 20, 2019 (PostCom Comments).

<sup>7</sup> Comments of the Greeting Card Association, August 20, 2019 (GCA Comments).

<sup>8</sup> Public Representative Comments on Proposed Change in Periodic Reporting, August 21, 2019 (PR Comments). The Public Representative filed an accompanying motion for late acceptance. See Public Representative Motion for Late Acceptance of Comments, August 21, 2019. The Public Representative's motion for late acceptance is granted.

<sup>9</sup> Order Allowing for Reply Comments, August 23, 2019 (Order No. 5208).

<sup>10</sup> Reply Comments of the United States Postal Service to the Initial Comments of the Public Representative, August 27, 2019 (Postal Service Reply Comments).

Representative filed reply comments on August 30, 2019.<sup>11</sup> The Public Representative filed a motion to file an erratum to his comments on September 3, 2019.<sup>12</sup>

On September 5, 2019, the Postal Service filed a motion for leave to reply to the Public Representative's reply comments.<sup>13</sup> Appended to the motion was the Postal Service's proposed response to the Public Representative's reply comments.<sup>14</sup>

On September 6, 2019, the Commission issued Order No. 5222 granting the Postal Service's Motion for Leave to Respond and accepting the Postal Service's Response to PR Reply Comments into the record.<sup>15</sup>

### III. BACKGROUND

The existing methodology for SPR street time costing was developed in Docket No. R97-1, using a special study conducted in 1996.<sup>16</sup> That study used survey data, including data from the Special Purpose Route Survey,<sup>17</sup> to develop major class distribution keys and estimate the proportions of time that the SPR carriers "spent driving between stops, at stops, and travelling to and from the route."<sup>18</sup> The survey data

---

<sup>11</sup> Public Representative Reply Comments on Proposed Change in Periodic Reporting, August 30, 2019 (PR Reply Comments).

<sup>12</sup> Public Representative Motion to File Erratum, September 3, 2019.

<sup>13</sup> Motion of the United States Postal Service for Leave to Respond to Pleading of the Public Representative, September 5, 2019 (Motion for Leave to Respond).

<sup>14</sup> Response of the United States Postal Service to Public Representative Pleading, September 5, 2019 (Response to PR Reply Comments).

<sup>15</sup> Order Granting Motion for Leave to Respond, September 6, 2019 (Order No. 5222).

<sup>16</sup> Petition, Proposal One at 1; Proposed Study at 1-2. See Docket No. R97-1, Direct Testimony of Michael A. Nelson on behalf of the United States Postal Service, July 10, 1997, at 2-8 (Docket No. R97-1 Nelson Testimony); see also Docket No. R97-1 Nelson Testimony, Exhibits USPS-19B and USPS-19C.

<sup>17</sup> Docket No. R97-1 Nelson Testimony at 3; *id.* Exhibit 19B at 1-2.

<sup>18</sup> Docket No. R97-1, Opinion and Recommended Decision, Volume 1, May 11, 1998, at ¶ 3327 (Docket No. R97-1 Opinion); Proposed Study at 1.

was edited, weighted, and then applied in an econometric analysis to update the variability estimates and compute “the time spent at delivery stops.”<sup>19</sup>

This methodology is currently used for calculations in the Cost Segment (CS) 7 worksheets of the Cost and Revenue Analysis (CRA).<sup>20</sup> The input SPR data for these worksheets include accrued street time percentages for three separate activities (drive time, time at stops, and travel/support time), cost distribution factors, and a set of variabilities that are based upon the Docket No. R97-1 costing model.<sup>21</sup>

In recent years, the Commission and interested parties have expressed concerns that the existing SPR costing model has become outdated. The United Parcel Service (UPS) has been particularly critical of the methodology, noting that it employs “decades-old variability assumptions.”<sup>22</sup> UPS has also argued that the current methodology neither “reflect[s] the changing composition of Special Purpose Routes” nor “account[s] for differences in the mail mix during peak season.”<sup>23</sup> The Postal Service has acknowledged that both “the vintage of [the underlying] special studies [and] the rapid growth in parcel volume, [have] raised the priority to update [the SPR] cost models.”<sup>24</sup>

---

<sup>19</sup> Docket No. R97-1 Nelson Testimony at 4, 7; *id.* Exhibits USPS-19B at 2-4 and USPS-19C at 1; Docket No. R97-1 Opinion at ¶ 3327.

<sup>20</sup> Docket No. R97-1 Opinion at ¶ 3327.

<sup>21</sup> Proposed Study at 1; Library Reference USPS-RM2019-6/NP1, file “Prop.1.SPR.NP1.Other.Files,” subfolder “Directory 4 – Impact Analysis,” Excel file “CS06&7-NP-FY18.xlsx,” tab “Input SPR.” See also Docket No. ACR2018, Library Reference USPS-FY18-32, December 28, 2018, file “USPS-FY18-32.Files” subfolder “B Workpapers,” Excel file “CS06&7-Public-FY18.xlsx,” tab “Input SPR.”

<sup>22</sup> Docket No. ACR2016, Initial Comments of United Parcel Service, Inc. on United States Postal Service’s Annual Compliance Report for Fiscal Year 2016, February 2, 2017, at 7 (Docket No. ACR2016 UPS Comments).

<sup>23</sup> Docket No. ACR2016 UPS Comment at 6; Docket No. ACR2018, Initial Comments of United Parcel Service, Inc. on United States Postal Service’s Annual Compliance Report for Fiscal Year 2018, February 19, 2019, at 8.

<sup>24</sup> Docket No. RM2015-7, Response of the United States Postal Service to Commission Order No. 2792, February 16, 2016, at 16 (Docket No. RM2015-7 Response to Order No. 2792); Docket No. ACR2016 UPS Comments at 6-8.

In a public inquiry docket opened in 2017, the Commission sought an update on the Postal Service's progress "in reviewing the SPR cost model for street time" to better "assign the costs of Sunday delivery hours and parcel routes."<sup>25</sup> In that docket, the Postal Service reported that it had "turned its attention away from attempting a special field study" and was exclusively "pursuing the use of operational data" to update SPR costs.<sup>26</sup> However, the Postal Service encountered an immediate obstacle to this operational-data-based approach. To construct the dataset for the new SPR costing study, the Postal Service needed to match "the volumes delivered by SPR carriers with times associated with these deliveries" using two different databases: Product and Tracking Reporting (PTR) and Time and Attendance Collection System (TACS).<sup>27</sup>

In Docket No. RM2018-5, the Postal Service utilized both databases, and the Commission approved the use of "TACS workhours to create cost control totals" and "PTR scan data...for distributing city carrier Sunday/holiday costs."<sup>28</sup> Under that proposal, the Postal Service began attributing 100 percent of Sunday and holiday costs and distributed them to products using the PTR data.<sup>29</sup>

---

<sup>25</sup> Docket No. PI2017-1, Notice and Order Establishing Docket Concerning City Carrier Special Purpose and Letter Route Costs and to Seek Public Comment, May 31, 2017, at 2, 3 (citing Order No. 2792 at 66) (Order No. 3926).

<sup>26</sup> Docket No. PI2017-1, Responses of the United States Postal Service to Questions 1-7 of Chairman's Information Request No. 1, question 4, June 30, 2017; Responses of the United States Postal Service to Questions 1-20 of Chairman's Information Request No. 4, question 3, November 28, 2017.

<sup>27</sup> Docket No. PI2017-1, Responses of the United States Postal Service to Questions 1-10 of Chairman's Information Request No. 2, question 1, July 25, 2017.

<sup>28</sup> Docket No. RM2018-5, Order Approving in Part Proposal Two, January 8, 2019, at 8, 14 n.35, 15 (Order No. 4972).

<sup>29</sup> Docket No. RM2018-5, Petition of the United States Postal Service for the Initiation of a Proceeding to Consider Proposed Changes in Analytical Principles (Proposal Two), May 25, 2018, at n.6, 9.

#### IV. SUMMARY OF PROPOSAL ONE

##### A. Methodology

The Postal Service seeks to implement a new SPR costing study that better reflects current SPR activities and cost drivers. Petition, Proposal One at 2. The new study utilizes operational data from three sources: TACS, PTR, and the Collection Point Management System (CPMS).<sup>30</sup> The Postal Service uses these data to estimate separate econometric models for three newly developed SPR cost pools.<sup>31</sup> These cost pools reflect the following SPR operations: regular Monday through Saturday delivery, Sunday/holiday delivery, and collection.<sup>32</sup> In addition, to account for the seasonal peak in package volumes, the Postal Service estimates separate variability equations for peak and non-peak periods.<sup>33</sup> After estimating a series of econometric equations, the Postal Service computes variabilities and develops distribution keys for each cost pool.<sup>34</sup> The Postal Service then computes the overall variability, which is higher than the variability computed using the existing methodology.<sup>35</sup> The Postal Service explains that “[t]his increase is a result of a higher regular delivery variability offsetting a slightly lower collection variability and the estimation of an actual Sunday variability in place of the assumption of 100 percent variability.” Petition, Proposal One at 4.

##### B. Impact

As the Postal Service reports, Proposal One results in two primary cost shifts. First, costs for competitive mail products increase and costs for market dominant

---

<sup>30</sup> Petition, Proposal One at 1-2; Proposed Study at 14-16.

<sup>31</sup> Petition, Proposal One at 3; Proposed Study at 28.

<sup>32</sup> Petition, Proposal One at 3; Proposed Study at 2-4, 7.

<sup>33</sup> Petition, Proposal One at 4. Proposed Study at 4.

<sup>34</sup> Petition, Proposal One at 4; Proposed Study at 7.

<sup>35</sup> *Id.*; Petition, Proposal One at 4.

products decrease.<sup>36</sup> Second, costs associated with packages increase and costs for letters and flats decrease. *Id.*

The Postal Service explains that these shifts occur “for a number of reasons.” Petition, Proposal One at 5. The Postal Service states that SPR activities have changed over time, shifting “from collection to delivery...as package volumes have increased.” *Id.* The Postal Service also notes that the new SPR costing study conducts an “explicit analysis” of peak season and Sunday delivery costs, which results in “a higher level of delivery cost attribution.” *Id.*

The Postal Service uses the 2018 ACR data to estimate the impact of Proposal One. The Postal Service reports that Proposal One would result in an increase of \$124.7 million in attributable costs for domestic competitive mail products and in a decrease of \$67.8 million in attributable costs for domestic market dominant mail products.<sup>37</sup> The overall impact on attributable costs for domestic products is an increase of approximately \$57.0 million. *Id.*

## V. COMMENTS

PostCom, GCA, and the Public Representative each filed initial comments in this docket. The Postal Service and the Public Representative each filed reply comments, and the Postal Service filed a second set of reply comments.

PostCom supports Proposal One but raises several general concerns. First, PostCom advocates for “strengthening the Commission rule” requiring the Postal Service to update obsolete cost studies. PostCom Comments at 2. PostCom suggests that the Commission should require the Postal Service to annually “demonstrate that any special studies older than 10 years are not obsolete.” *Id.* at 3. Second, PostCom states that the Commission should ensure that incremental costs “are properly estimated and attributed” by Proposal One. *Id.* Despite these concerns, PostCom

---

<sup>36</sup> Petition, Proposal One at 5-6; Proposed Study at 83-84.

<sup>37</sup> Petition, Proposal One, Excel file “SPR.Prop.1.Impact.xlsx,” cells “F33” and “F35.”

concludes that the “study is an improvement and should be adopted...as it represents a necessary and significant step forward for SPR costing.” *Id.*

GCA “strongly supports” the adoption of Proposal One. CGA Comments at 1. In GCA’s view, the current methodology has imposed “significant cost burdens on household mailers.” *Id.* at 2. GCA argues in favor of the “causation-focused, data-driven approach underlying Proposal One.” *Id.* at 4. GCA concludes that the Commission “should adopt” Proposal One. *Id.* at 5.

In his initial comments, the Public Representative commended the Postal Service for using operational data but expressed a number of concerns about Proposal One. He recommended that the Commission not approve Proposal One “until it can be shown that the parameter estimates of the variables comprising the volume variability estimate are jointly significant.” PR Comments at 2. Additionally, the Public Representative questioned the Postal Service’s decision to eliminate some observations that exceed what the Postal Service determined as the “theoretical maximum” volume for collection boxes. *Id.* at 22. He argued that “dropping legitimate observations [would result] in biased estimates.” *Id.* Finally, the Public Representative recommended that “the Commission reject moving Sunday Delivery hours for full-time carriers to Regular Delivery, and reject moving relay hours in the SPR Regular Delivery model to the regular, non-SPR, city carrier model.” *Id.* at 2.

The Postal Service discusses each of these concerns in its reply comments. The Postal Service provided a testing method for the joint significance of the coefficients involving volume for the regular delivery, Sunday delivery, and collection models. Postal Service Reply Comments at 2-6. Applying the testing method, the Postal Service concludes that there is “strong evidence to reject the hypothesis that the volume coefficients are jointly equal to zero,” and that this addresses the Public Representative’s concerns. *Id.* at 4-6.

The Postal Service claims that the Public Representative’s concern that the deletion of observations “with a recorded collection box [volume] that exceeds the theoretical maximum” creates bias in the collection model stems “from a

misunderstanding of the Postal Service approach to analyzing the collection data.” *Id.* at 6. The Postal Service notes that it “does not take the approach described by the Public Representative of eliminating any such observation...Rather, it deletes just those observations for which the total amount of recorded volume exceeds the theoretical maximum for all collection boxes in the finance number.” *Id.* (emphasis in original). The Postal Service contends that its approach “is a much more stringent criterion [than] suggested by the Public Representative, and was used to find those observations which had clear data problems and were not legitimate volume counts.” *Id.* at 7.

Finally, the Postal Service addresses the Public Representative’s concerns regarding the movement of relay workhours and some peak Sunday/holiday workhours into the regular delivery SPR cost pool. *Id.* at 8-9. The Postal Service clarifies that the relay hours are already part of the “letter route carrier costs [per] the established methodology” and the Postal Service does not propose any additional changes within Proposal One. *Id.* at 9. Discussing the movement of a portion of Sunday/holiday hours, the Postal Service explains that “[t]hese hours are clocked by full-time carriers who are delivering out of their regular units...and who are delivering the same mix of mail that they deliver on Mondays through Saturdays.” *Id.* at 8-9.

The Public Representative’s reply comments accept the transfer of relay costs but reiterate his concern about the exclusion of observations from the analysis, and, specifically, point out that there are collection boxes, such as large and jumbo that can hold more than 825 mailpieces on the same day. PR Reply Comments at 4-5. The Public Representative suggests that “further examination” is required regarding these issues, as well as the share of Sunday workhours clocked by regular SPR carriers. *Id.* at 7-9, 11. He also states that the Postal Service’s analysis incorrectly “turns all missing data points and all data points recorded with an ‘X’ to be zero.” *Id.* at 6. The Public Representative recommends that the Commission “ask the Postal Service to examine whether there is another, more reliable, dataset of collection volume, time and other causal factors that it might use, and/or whether the existing dataset was based on electronic scans made by the carrier which can be corrected.” *Id.* at 7. In addition, the

Public Representative brings attention to the high multicollinearity<sup>38</sup> in the Postal Service's proposed full quadratic delivery model, "which may result in non-operationally based changes in volume variability in subsequent estimates." *Id.* at 3. The Public Representative suggests that "the Commission consider further investigation of the issue of variability instability over time" due to multicollinearity among the explanatory variables, particularly the square and cross-terms. *Id.* at 3-4, 11.

The Postal Service's reply to these comments contests the Public Representative's concerns regarding the theoretical maximum volume for collection boxes, missing volume data in the National CPMS density test and the proposed movement of some Sunday workhours into a regular cost pool. The Postal Service avers that "96.4 percent of [collection] boxes are not subject to the Public Representative's concern" because these are regular boxes that hold 825 mailpieces at a maximum. Response to PR Reply Comments at 3-5. The Postal Service, however, suggests an alternative approach to determine the theoretical maximum volume per collection box in a finance number/day. *Id.* at 5. The Postal Service proposes to compute "[a] weighted average maximum volume per box...by multiplying each of the [three] box size proportions by the respective maximum volume for that size." *Id.* The Postal Service contests the Public Representative's assessment regarding missing observations in the National CPMS density test. *Id.* at 6-8. The Postal Service states that "[c]orrectly calculating the proportions that the Public Representative presented creates a very different picture of missing volumes." *Id.* at 7. The Postal Service's analysis of the National CPMS density test finds "a very small proportion of missing volume observations...in line with what would be expected in a field study...."<sup>39</sup> As to

---

<sup>38</sup> High (although not perfect) correlation between two or more independent (explanatory) variables is called multicollinearity. See Jeffrey M. Wooldridge, *Introductory Econometrics: A Modern Approach* at 95 (5th ed. 2013). As discussed in details in Section VI.C.2 and the Appendix, high multicollinearity threatens stability and precision of the estimated variabilities over time.

<sup>39</sup> *Id.* at 7-8 (footnote omitted). In the collection model analysis dataset used for Proposal One, the proportion of swept boxes with missing volume for at least one day is 1.53 percent for Saturdays and 1.65 percent for week days (Monday through Friday). *Id.* at 8 and Attachment.

the Public Representative's concern regarding the movement of Sunday workhours, the Postal Service argues that the Public Representative's workhour concerns are "misplaced" because these volumes are "handled using regular delivery methods," and are actually part of the regular delivery cost pool. *Id.* at 9.

## VI. COMMISSION ANALYSIS

### A. Overview

As part of its review of the new SPR costing study and in response to the comments, the Commission specifically examines the following topics: the need for an updated SPR costing model using operational data, the new proposed cost pools, the relevance and reliability of the data used for the analysis, and the quality and reliability of the econometric models the Postal Service developed to estimate the SPR variabilities. See Sections VI.B through VI.E.

As discussed further below, the Commission finds that the new SPR costing study reflects how SPR activities have changed in the more than 20 years since the special study underlying the existing methodology was conducted. The Commission finds that the new SPR costing study is an improvement in part because it utilizes operational data, where available, in lieu of survey data, which is likely to enhance the quality of the methodology. The Commission also finds it appropriate that the Postal Service developed new cost pools to reflect operational realities of SPR activities. The Commission modifies the criterion for excluding data from the collection model dataset to improve accuracy of the theoretical maximum volume for collection boxes. Finally, the Commission finds the applied econometric models to be an improvement, but modifies the specification of delivery equations to mitigate very high multicollinearity.

### B. The Need for an Updated SPR Costing Model Utilizing Operational Data

The existing SPR costing model is based on a special study that relied on survey data. Proposed Study at 1. The Docket No. R97-1 special study surveyed carriers and

supervisors from a sample of special purpose routes and analyzed the data from 459 completed survey forms. *Id.* The new SPR costing study, in contrast, “is based upon a census of SPR locations” and relies “upon data taken from ongoing Postal Service operational data sources.” *Id.* at 4, 13.

The Commission agrees with the Postal Service and other commenters, who note that there have been substantial changes in the structure and carrier activities of SPRs since the Docket No. R97-1 special study that provides the basis for the existing SPR costing model.<sup>40</sup> These changes include growth in package volumes, introduction of Sunday delivery, and the differential wages among the SPR carriers.<sup>41</sup> In addition, the application of recent operational data from the Postal Service’s databases is beneficial because this data may capture other, less identifiable, operational changes that occurred since the existing study was performed more than 20 years ago.<sup>42</sup>

The new SPR costing study reflects changes in operational realities through newly defined cost pools for the SPR carrier costs and utilization of operational (mostly census) data, instead of survey data, in its analysis. For the reasons described below, the Commission concludes that both of these methodological modifications are appropriate.

The Commission concurs with the Postal Service and other commenters that the use of operational data instead of survey data should improve data quality and contribute to the precision of the Postal Service estimates.<sup>43</sup> Furthermore, the Commission agrees with the Postal Service’s assertion that the use of census data eliminates the “representativeness” issue of the collected data. Proposed Study at 13.

---

<sup>40</sup> Petition, Proposal One at 1-2; Proposed Study at 1-2; GCA Comments at 1-2; PostCom Comments at 2-3.

<sup>41</sup> Petition, Proposal One at 1-2; Proposed Study at 2-3; GCA Comments at 1-4; PostCom Comments at 2-3.

<sup>42</sup> Petition, Proposal one at 2-3; Proposed Study at 3-4; PR Comments at 2, 23; GCA Comments at 2, 4; PostCom Comments at 2-3.

<sup>43</sup> Proposed Study at 13; GCA Comments at 4; PostCom Comments at 1; PR Comments at 5.

Several commenters note that the current SPR model relies on 20-year-old data and assert that the model should have been re-examined at an earlier time.<sup>44</sup> The Commission agrees, but acknowledges the complexity of using operational data from multiple databases when developing datasets suitable for econometric analysis. Proposed Study at 14-16, 26-27. The Commission appreciates the Postal Service efforts, but encourages the Postal Service to update the SPR costing study and re-estimate variabilities using current data either every 5-10 years or upon any major operational changes.

### C. Use of New Data to Reflect Operational Changes

#### 1. Defining the New Cost Pools

The Postal Service develops three new cost pools for SPR carrier costs: one for regular delivery, one for Sunday/holiday delivery, and one for collection. Proposed Study at 6-7. Each of these cost pools include both office and street time because “SPR carriers often make multiple runs in a single day, [which makes it] difficult to precisely identify separate street and office operations.”<sup>45</sup> These three new cost pools will replace the three cost pools currently used in CS 7 SPR carrier activity functions: driving time, time at stop, and travel/support time.<sup>46</sup>

The Commission finds that the development of new cost pools is appropriate because it better reflects the current structure of SPR activities. The Docket No. R97-1 cost pools study could not consider Sunday delivery because it did not exist at that time. Sunday delivery is different in nature from regular Monday to Saturday delivery because

---

<sup>44</sup> GCA Comments at 1; PostCom Comments at 2.

<sup>45</sup> *Id.* at 7; Responses to CHIR No. 2, question 5.

<sup>46</sup> Proposed Study at 1; Docket No. ACR2018, Library Reference USPS-FY18-32, December 28, 2018, file “USPS-FY18-32.Files,” subfolder “B Workpapers,” Excel file “CS06&7-Public-FY18.xlsx,” tabs “Input SPR” and “7.0.5.”

it is primarily driven by package volume.<sup>47</sup> On Sundays and holidays, the Postal Service delivers packages from “hubs,” “specifically chosen to facilitate Sunday delivery” through dynamic routing, instead of the regular letter route system. Proposed Study at 5, 65.

The Commission agrees with GCA that recognizing the different cost characteristics of Sunday delivery is a significant methodological improvement. GCA Comments at 4. The Commission also supports the Postal Service’s argument that SPR activities have been significantly affected by its package volume growth, which together with Sunday/holiday delivery, “shifted [the SPR activities] toward delivery and away from collection.” Proposed Study at 2. For these reasons, the Commission supports the use of these three newly defined cost pools.

The Postal Service estimates the time associated with activities within each of the three new cost pools using the Labor Distribution Codes (LDCs). *Id.* at 6. Generally, the hours associated with the SPR activities are captured in either LDC 23, LDC 24, or LDC 27. *Id.* at 6, 74. LDC 23 is for regular Monday through Saturday delivery, LDC 24 is for Sunday/holiday delivery, and LDC 27 is for collection. *Id.* However, the Postal Service notes certain “complexities... that preclude using simple organization by LDC.” *Id.* at 74. First, not all LDC hours fit into the provided classification.<sup>48</sup> Second, SPR hours for relays, differences in carrier wages, and changes in delivery schedules during the peak season result in further complications.<sup>49</sup>

The Commission agrees with the Postal Service that in Proposal One, it is appropriate to use the LDCs to form cost pools and assign TACS hours to them, but

---

<sup>47</sup> Proposed Study at 5; see also FAQ – Sunday Holiday Package Delivery – About USPS home, [https://about.usps.com/news/electronic-press-kits/holidaynews/2014/pdf/hc2014\\_faqs.pdf](https://about.usps.com/news/electronic-press-kits/holidaynews/2014/pdf/hc2014_faqs.pdf).

<sup>48</sup> Not all LDC 23 hours are incurred on Monday through Saturday and not all LDC 24 hours are incurred on Sundays. *Id.*

<sup>49</sup> *Id.* at 74-75. The Postal Service specifically states that in December, mail typically delivered on Monday through Saturday is delivered on Sunday due to the volume peak, SPR hours for relays are incurred for mail delivered on letter routes, and not all SPR carriers earn the same wage (e.g., City Carrier Associates earn much lower wages than full-time carriers). *Id.* at 74-75, 78-79.

with a careful consideration of all related complexities. *Id.* at 74-82. For example, there are some instances where LDC 24 activities are not performed on Sunday or LDC 23 activities are not regular SPR activities. *Id.* at 74-75. The Commission's review of Management Operating Data System (MODS) codes shows that LDC 24 hours, defined by MODS operations 725 and 726, include street and office time for Amazon customized delivery of groceries, which takes place not only on Sundays and holidays, but 7 days a week.<sup>50</sup> Similarly, LDC 23 hours include street and office relay hours, defined by MODS operations 735 and 736, which the Postal Service removes "from the total annual TACS hours" and "assign[s them] to the letter route cost pool."<sup>51</sup> The Commission concludes that the Postal Service's careful consideration of the complexities and corresponding adjustments allow for a more accurate distribution of TACS hours between the cost pools. *Id.* at 74-80.

## 2. Analysis Datasets for Regular and Sunday Delivery Models

In Proposal One, the datasets for regular and Sunday/holiday delivery models include data on delivered volume and delivery characteristics from the PTR system matched with the associated workhours from TACS. *Id.* at 17. The Postal Service uses the clock rings in TACS associated with each carrier's employee ID to "map out a carrier's day" and obtain the time of the day associated with the SPR activities based on the carrier's clock rings to the relevant LDC.<sup>52</sup> *Id.* at 17-19. The Postal Service then compares the employee ID and clock ring date/time from TACS with the employee ID and delivery data/time from PTR. By doing so, the Postal Service can determine the mailpieces (by mail class, delivery mode, and delivery type) that were delivered by a

---

<sup>50</sup> Handbook M-32, Management Operating Data System (MODS), September 2018, at 193. See Docket No. ACR2018, Library Reference USPS-FY18-7, December 28, 2018, file "USPS-FY18-7.FilesPDF," subfolder "USPS-FY18-7," PDF file "M-32 MODS Handbook.pdf."

<sup>51</sup> Proposed Study at 75.

<sup>52</sup> How the Postal Service accounts for the complexities when forming cost pools for the SPR activities is discussed Section VI.A.1 of this Order. See *also* Proposed Study at 74-80.

particular carrier on that day. *Id.* at 21. Once the PTR volumes are linked to TACS hours, the Postal Service can discern each mailpiece ID (from PTR) and the finance number identifying its SPR location (from TACS), so that the key variables are available for each record in the constructed dataset. *Id.* at 8, 23.

The Commission finds that the Postal Service thoroughly examines data from multiple databases during the complicated matching and linking process. *Id.* at 17-26. Based on the review of the methodology that the Postal Service applies to match and link data from TACS and PTR, the Commission concludes that this methodology satisfies the best practices in data analysis and the resulting dataset is reliable.

For delivery models in Proposal One, the Postal Service uses the data sample from the constructed dataset. Specifically, it extracts data for the third week of each of the four months:<sup>53</sup> June, September, and December of 2017 and March of 2018. *Id.* at 23-24. The Postal Service selected these four months to ensure that the sampled data are from all four quarters, spread evenly throughout the year and covers the peak period.<sup>54</sup> The Postal Service analyzed its weekly hours data and concluded that there is a 5-week peak period that runs from the end of November through the end of December.<sup>55</sup> This sample included four Sundays, three of which are during the non-peak (non-holiday) period and one of which was during a peak period, a week before Christmas.<sup>56</sup> The Postal Service avers that resource constraints limit its data sample size and that constructing the analysis datasets for the selected 4 weeks still required “downloading and processing over 250 million records.” Proposed Study at 24. The

---

<sup>53</sup> The Postal Service explains its choice to select data for the third week of each of these four months because there were no holidays during these weeks for any of the months. *Id.* at 24.

<sup>54</sup> *Id.* at 24; Responses to CHIR No. 1, question 3.

<sup>55</sup> Proposed Study at 75-76; Responses to CHIR No. 2, question 3a.

<sup>56</sup> The following non-peak Sundays were selected for Sunday delivery model: June 18, 2017; September 17, 2017 and March 18, 2018. December 17, 2017 was selected as a December peak Sunday. See Library Reference USPS-RM2019-6/1, file “SPR.Prop.1.Fldr.1.Public.Files,” subfolders “Public Folder,” and “Directory 1 Analysis Data Sets,” SAS data files “june\_sunana.sas7bdat,” “sep\_sunana.sas7bdat,” “mar\_sunana.sas7bdat,” and “dec\_sunana.sas7bdat.”

Commission understands the Postal Service's resource limitations and agrees that this approach is reasonable for regular delivery. However, the Commission is concerned that the dataset, which includes data for only one Sunday during the December peak period, might not accurately reflect the increased hours needed during the peak season and therefore cannot fully capture the seasonal effects of the peak period.<sup>57</sup> See Section VI.D.2. In addition, Sunday/holiday delivery econometric equations estimated using the input data for only one Sunday exhibit very high multicollinearity, which threatens the precision of the computed variabilities. High multicollinearity can often be reduced by including additional observations. Although the Commission finds that variability estimates for the Sunday/holiday cost pool provide an improvement over the existing methodology, it recommends that, in the future, the Postal Service increase the dataset for Sunday/holiday delivery by adding data for at least one more Sunday. This will double the dataset size, which should provide a better reflection of Sunday/holiday delivery and allow for higher precision of the variability estimates. See Section VI.D.2.

### 3. Analysis Dataset for Collection Model

In Proposal One, to develop a dataset for the collection model, the Postal Service matches and links the CPMS data and TACS hours. Proposed Study at 27. The Postal Service's CPMS database includes an annual operational study, the National CPMS density test, which provides records of the volumes collected from collection points during a 2-week period and on two additional Saturdays.<sup>58</sup> The data included in the National CPMS density test is the aggregation (by CPMS collection point and date) of barcode scan records, "which include the collection point information and scan date-timestamp." Responses to CHIR No.5, question 2a.

---

<sup>57</sup> Sunday/holiday delivery model for the month of December includes 4,839 observations. Proposed Study at 70. The data are for 4,839 finance numbers, but for one day only.

<sup>58</sup> Proposed Study at 26; Responses to CHIR No. 4, question 1.

The 2017 National CPMS density test overlaps with the TACS data the Postal Service utilized for Proposal One for the third week of September 2017. Proposed Study at 27. The Postal Service states that this “overlap support[ed] constructing a full-week data set” for the analysis. *Id.* at 27. It is possible to create a unique identifier for each collection point using its point number and a 5-digit ZIP Code where the collection point is located. Those identifiers can then be used to link the data from the regular CPMS database and the National CPMS density test. Data for all individual collection points serviced by the SPR carriers are then aggregated by unit of observation (which is finance number/day) and linked to the TACS LDC 27 hours for these finance number/days. Proposed Study at 27. Again, for the similar reasons as noted in Section VI.B.1., the Commission finds that the matching process is appropriate and the methodology for constructing the collection model dataset by linking data from the regular CPMS database and the National CPMS density test is reasonable.

The Public Representative, however, questions the reliability of the National CPMS density test as a data source, arguing that it includes a quite significant percentage of “missing collection observations,” especially for Saturdays. PR Reply Comments at 6-7. The Postal Service responds that the Public Representative’s estimates of missing observations are inaccurate for a number of reasons. Response to PR Reply Comments at 6-8. The Commission agrees, but finds it important to perform a more detailed review of the National CPMS density test data to ensure reliability of its data.

The Commission’s analysis of all 2017 National CPMS density test data reveals that the percentage of missing volume records for collection points swept on Saturdays is small, ranging from 1.49 percent to 3.95 percent.<sup>59</sup> The percentage of missing volume records for collection points swept on Monday through Friday included in the

---

<sup>59</sup> These percentages are calculated using data for all collection points included in the 2017 National CPMS density test and swept on Saturdays. See Library Reference USPS-RM2019-6/NP1, file “Directory 1 – Operational Data,” subfolder “CPMS Data,” SAS data file “all\_points\_sat.”

National CPMS density test is even lower, between 0.54 percent and 1.07 percent.<sup>60</sup> The percentage of swept collection points with at least one missing volume record is also quite moderate: 5.99 percent for collections recorded on Saturdays, and 2.38 percent for collections recorded during weekdays.<sup>61</sup>

In addition, the Postal Service notes that some missing observations do not affect the analysis because Proposal One utilizes data for only 1 week (5 week days and 1 Saturday). Response to PR Reply Comments at 6-7; Proposed Study at 27. For example, the percentage of missing volume records on Saturday, September 9, 2017, is 3.95 percent, which is higher than other Saturdays.<sup>62</sup> However, this date is outside of the 1-week period selected for the analysis. Proposed Study at 26-27.

The Postal Service also correctly notes that it is important to eliminate “collection points, like post office lobby drops or mail chutes” prior to matching data from the regular CPMS database and the National CPMS density test because these points are “not serviced by SPR carriers.”<sup>63</sup> Analysis of the collection boxes serviced by SPR carriers<sup>64</sup> reveals that 2.37 percent of these collection boxes have missing volumes on at least one weekday over the ten-day period and 5.87 percent of collection boxes have missing volumes on at least one Saturday.<sup>65</sup> The percentage of collection boxes with

---

<sup>60</sup> These percentages are calculated using data for all collection points included in the 2017 National CPMS density test and swept on weekdays (Monday through Friday). See Library Reference USPS-RM2019-6/NP1, file “Directory 1 – Operational Data,” subfolder “CPMS Data,” SAS data file “all\_points\_m\_f.”

<sup>61</sup> See Library Reference USPS-RM2019-6/NP1, file “Directory 1 – Operational Data,” subfolder “CPMS Data,” SAS data files “all\_points\_sat” and “all\_points\_m\_f.”

<sup>62</sup> See Library Reference USPS-RM2019-6/NP1, file “Directory 1 – Operational Data,” subfolder “CPMS Data,” SAS data file “all\_points\_sat.”

<sup>63</sup> Proposed Study at 27. See *generally* Response to PR Reply Comments at 6-7.

<sup>64</sup> There are 10 types of such collection boxes. See *id.* Attachment.

<sup>65</sup> See Library Reference USPS-RM2019-6/NP1, file “Directory 1 – Operational Data,” subfolder “CPMS Data,” SAS data files “all\_points\_sat” and “all\_points\_m\_f.”

missing volume records on the days specifically included in the Proposal One analysis<sup>66</sup> is even smaller: 1.65 percent for weekdays and 1.53 percent for Saturdays. Response to PR Reply Comments at 8 and Attachment. The Commission observes that the percentage of missing volume records is relatively even across different size categories of collection boxes in the analysis dataset. See Table 1 below.

Therefore, the provided analyses of the National CPMS density test indicate that percentages of missing volume records are relatively small and spread evenly across days and types of collection points. The Commission concludes that existence of missing volume records do not create any material concern about the reliability of the National CPMS density test data.

**Table 1**  
**Missing Volume Records in the National CPMS Density Test for at Least One Day on the Days Selected for Proposal One (in %)**

Collection Box Size Category <sup>67</sup>	Monday-Friday	Saturday	Overall
Jumbo	2.63%	1.01%	1.84%
Large	1.60%	1.79%	1.69%
Regular	1.62%	1.55%	1.59%
All	1.65%	1.53%	1.60%

Source: PRC-LR-RM2019-6-1, file "Tables and Impact," Excel file "Tables.xlsx," tab "Table 1."

The National CPMS density test is "an operational study," that does not use census data; instead it approximates volumes based on a conversion chart and uses

---

<sup>66</sup> The data the Postal Service selected for Proposal One analysis are for one Saturday (September 16, 2017) and 5 week days (from September 18, 2017 until September 22, 2017). See Proposed Study at 27; Response to PR Reply Comments, Attachment.

<sup>67</sup> In Table 1, the percentages of missing volume records are provided by collection box size category. For the SPR collection analysis, the Postal Service includes 10 types of collection boxes serviced by the SPR carriers. They are identified in the National CPMS density test. See Response to PR Reply Comments at 6; *id.* Attachment. For the purposes of the analysis presented in Table 1, these collection boxes are aggregated by size of the box: regular, large and jumbo. See Response to PR Reply Comments at 4-6; Responses to CHIR No. 5, question 4a.

“best estimate[s],” and manual count.<sup>68</sup> For that reason, it is subject to data entry mistakes.<sup>69</sup> If the mail volume records in the National CPMS density test exceeded “a theoretical maximum volume for a collection box,” the Postal Service characterized them as “erroneous.”<sup>70</sup>

Considering that there are three size categories of collection boxes serviced by SPR carriers and included in the collection model dataset, the number of mailpieces that fit into the collection box differs by box category.<sup>71</sup> Using data from the National CPMS density test, the Commission estimated the average percentage of so called erroneous mail volume records (those that exceed the theoretical maximum), by collection box size category, on the days selected for Proposal One analysis. See Table 2. The Commission concludes that the percentages of erroneous mail volume records for collection points served by SPR carriers on the days selected for Proposal One study are relatively small (within 5 percent).<sup>72</sup> See Table 2.

---

<sup>68</sup> Response to CHIR No. 4, question 1c., PDF file “ChIR.4.Q1c.Density.Test.Material.pdf.” (Density Test Material). The Density Test Material includes “the procedures used in conducting the [September 2017] National CPMS Density Test, as well as the Service Talk that was given to employees participating in the Test.” Responses to CHIR No. 4, question 1c.

<sup>69</sup> Responses to CHIR No. 5, question 4c.

<sup>70</sup> Proposed Study at 73-74.

<sup>71</sup> As noted above, these size categories are jumbo, large and regular. Responses to CHIR No. 5, question 4a; Response to PR Reply Comments at 4-5.

<sup>72</sup> Relatively higher percentage of erroneous volume records for jumbo boxes is most likely a result of a higher capacity of these boxes: it can hold 2,475 mailpieces, while large and regular boxes can hold 1,650 and 825 mailpieces, respectively. Responses to CHIR No. 5, question 4a. If the recorded volume for a collection box exceeded the theoretical maximum amount only by one mailpiece, it would be already considered “erroneous.”

**Table 2**  
**“Erroneous” Mail Volume Records in the National CPMS Density Test on the Days Selected for Proposal One (in %)**

Collection Box Size Category	Monday-Friday	Saturday	Overall
Jumbo	4.13%	2.14%	3.17%
Large	2.78%	1.56%	2.24%
Regular	0.87%	0.16%	0.56%
All	1.01%	0.30%	0.67%

Source: PRC-LR-RM2019-6-1, file “Tables and Impact,” Excel file “Tables.xlsx,” tab “Table 2.”

The Commission therefore finds that the utilization of the National CPMS density test as a data source for the collection model is reasonable. The Commission also concludes that the analysis dataset for the collection model obtained by linking census data from the regular CPMS database and the operational study data from the National CPMS density test provides a reliable data source for collection model analysis.

#### 4. Collection Model: Cutoff Point for Erroneous Observations

For the collection model in Proposal One, the Postal Service introduces a “theoretical maximum” that acts as a cutoff point for the average number of mailpieces for a collection box in a finance number/day. Proposed Study at 73. The Postal Service explains that this is necessary because the underlying data source, the 2017 National CPMS density test, is subject to data entry mistakes. *Id.* To address this issue and eliminate erroneous observations from the analysis, prior to estimating the collection model, the Postal Service excludes from the analysis dataset any finance number/days (in other words, observations) that have the average number of mailpieces per box higher than 825 mailpieces. *Id.* This approach resulted in the elimination of 405 observations (or 2.5 percent of the initial observations). *Id.*

The Postal Service determines this “theoretical maximum” of mailpieces in a finance number/day based on the number of mailpieces that fit into a collection box of

the regular size.<sup>73</sup> The Commission agrees with the Public Representative that this approach does not account for collection boxes of other sizes, such as jumbo or large, that hold a higher number of mailpieces. Therefore, the proposed cutoff point might result in exclusion of legitimate observations.<sup>74</sup> The Commission supports and accepts the Postal Service's alternative approach to address the issue of erroneous observations: determining a cutoff point as a "weighted average maximum volume per box...calculated by multiplying each of the [three] box size proportions by the respective maximum volume for that size."<sup>75</sup> Under that approach, the cutoff point for excluding erroneous observations (finance number/days) increases from 825 to 894 mailpieces per collection box in a finance number/day. *Id.* This modification allows for retaining 23 additional legitimate observations in the collection model analysis dataset.<sup>76</sup> The Commission finds that the provided change has a minimum impact on collection variability, decreasing it by approximately 2 percentage points from approximately 24.2 to 22.0 percent.<sup>77</sup>

#### D. Econometric Models

##### 1. Specifying and Estimating the Models

The Postal Service develops separate econometric models in the quadratic functional form for all three newly defined cost pools (regular delivery, Sunday/holiday

---

<sup>73</sup> *Id.*; Response to PR Reply Comments at 5.

<sup>74</sup> PR Comments at 22; PR Reply Comments at 4-6.

<sup>75</sup> Response to PR Reply Comments at 5. The SPR carriers serve collection boxes of three different sizes: regular, large and jumbo. They hold 825, 1650 and 2475 mailpieces, respectively. *Id.* at 4-5; Responses to CHIR No. 5, question 4.

<sup>76</sup> Compare PRC-LR-RM2019-6-1, file "Collection Model," SAS output file "LDC 27 Impossible Program Output gt 894.lst" with Library Reference USPS-RM2019-6-1, file "SPR.Prop.1.Fldr.1.Public Files," subfolders "Public Folder," "Directory 4 Collection Programs and Results," "LDC 27 Results," SAS file "Collection.Full Quadratic.Drop Impossible.lst."

<sup>77</sup> Response to CHIR No. 5, question 4. The SAS files are provided in PRC-LR-RM2019-6-1, file "Collection Model."

delivery, and collection).<sup>78</sup> Proposed Study at 7-8, 12-13. The Commission has approved econometric models in the quadratic functional form in the past for both regular letter carrier<sup>79</sup> and SPR city carrier costing models.<sup>80</sup> For all three new models, the Postal Service chose finance number/day as the unit of observation. Proposed Study at 8-9. The Postal Service states that the finance number is the organizational unit in which the SPR carriers are managed and mail is assigned for delivery. Proposed Study at 8-9. Additionally, carrier responsibilities and the SPR volumes change on a daily basis. *Id.* at 9. The Postal Service explains that it also considered ZIP codes and routes as possible units of observation, but rejected them. Responses to CHIR No. 1, question 1. The Postal Service explains that, unlike regular letter carriers, SPR carriers are not organized by ZIP Code and do not have fixed routes assigned to them.<sup>81</sup> The Commission agrees that aggregating data by finance number/day for the purposes of econometric analysis is reasonable.

The dependent variable that the Postal Service uses for the econometric models for all three cost pools is the “total [carrier] time required to accomplish the work performed in the operation” related to the cost pool, *i.e.*, both direct time at the mailbox and the associated times.<sup>82</sup> Use of the time that carriers spend on operations and

---

<sup>78</sup> The Postal Service also tested cubic and translog functional forms, but rejected them. Proposed Study at 47-53.

<sup>79</sup> Letter routes service virtually all delivery points daily, except Sundays and holidays. They encompass over 95 percent of accrued street costs. See, *e.g.*, Rule 39 C.F.R. Section 3050.60(f) Report for FY 2018 (Summary Descriptions), July 1, 2019, file “SummaryDescriptionsFY2018,” subfolder “CRA.Summary.Description.FY18,” Word file “CS07-18.docx”, at 1.

<sup>80</sup> See Docket No. RM2015-7, Order Approving Analytical Principles Used in Periodic Reporting (Proposal Thirteen), October 29, 2015, at 10, 14 (Order No. 2792); Docket No. R97-1 Opinion at ¶ 3327; Docket No. R97-1 Nelson Testimony, Exhibit USPS-19C at 1.

<sup>81</sup> *Id.*; Proposed Study at 5-6.

<sup>82</sup> Proposed Study at 9; Responses to CHIR No. 3, question 1-2. The examples of the associated times include time for loading the vehicle, working in the office, or driving to the delivery points. Proposed Study at 9.

activities as a dependent variable in carrier costing econometric studies is a common practice.<sup>83</sup>

The primary cost drivers that the Postal Service uses as explanatory variables vary by model and include the delivered mail volume (for regular delivery and Sunday/holiday delivery models), the collected mail volume (for the collection model), and the number of collection box sweeps (for regular delivery and the collection model). Proposed Study at 9-12. The Postal Service includes the number of swept collection boxes in the regular delivery model to control for time the SPR carriers spend on collection activities while delivering mail. *Id.* at 10.

Regular delivery and Sunday/holiday delivery models also include other explanatory variables, which the Postal Service classifies as “characteristic” because they “capture the features that can cause the required time to vary for reasons other than variations in volume or other cost drivers.” *Id.* at 9. These characteristic variables are certain proportions for a given finance number/day (*i.e.*, the proportions of different types of delivery addresses and delivery methods, as well as shares of business or residential delivery points). *Id.* at 10-11. The Postal Service does not include any characteristic variables in its collection model to control for non-volume related variations in collection hours.<sup>84</sup> The Postal Service expresses a concern that the lack of such variables could result in overstated variability, but notes that it is currently unable to address the issue due to the lack of information on potential characteristic variables in the available databases.<sup>85</sup> The Commission supports the Postal Service’s choice of variables for all three models. The Commission suggests that, when the required input data become available, the Postal Service should consider re-estimating the collection model with characteristic variables.

---

<sup>83</sup> See Order No. 2792 at 42, 54, 56; Docket No. R97-1 Nelson Testimony, Exhibit 19C at 1.

<sup>84</sup> Proposed Study at 12; Responses to CHIR No. 6, question 2.

<sup>85</sup> Proposed Study at 12; Responses to CHIR No. 6, question 2.

In its econometric models, the Postal Service aims to account for the effect of the holiday peak season on package volumes and other seasonal variations in the SPR costs. Proposed Study at 4. To do so, for each cost pool, the Postal Service estimates separate econometric equations for the peak period and non-peak periods. The Postal Service uses data from the third week of December 2017 for the peak period and data from the third weeks of June 2017, September 2017, and March 2018 for the non-peak periods. *Id.* at 4, 24.

For regular delivery, the Postal Service develops eight econometric equations. These are separate monthly equations for four months and two types of SPR locations (regular and small). *Id.* at 29-31. The Postal Service maintains that regular locations “incur the majority of [SPR] hours and deliver the majority of volumes,” while small locations “report a small number of SPR hours and deliver a small number of packages.” *Id.* at 29. The Postal Service defines a regular location as a unit that incurs “at least 96 SPR hours across all LDCs over the six days from Monday through Saturday.” *Id.* The Postal Service’s analysis shows that regular locations deliver at least eight times more volume and incur at least seven times more hours than small locations.<sup>86</sup>

The Commission agrees with the Postal Service’s decision to estimate separate econometric equations for regular and small locations. The Commission also finds it important to account for peak and non-peak variation of the regular and Sunday/holiday delivery and appreciates the Postal Service’s efforts. As discussed in detail in Sections VI.D.2 through VII, the Commission approves the Postal Service’s variability models, but with a modification. For regular delivery, the Commission approves variabilities estimated from the eight separate monthly econometric equations for four months and two types of SPR locations as proposed by the Postal Service, but in the restricted quadratic functional form (instead of the full quadratic functional form). See Section VI.D.2. Similarly, for Sunday/holiday delivery, the Commission approves variabilities

---

<sup>86</sup> Proposed Study at 30; Responses to CHIR No. 1, question 4.

estimated from four monthly econometric equations in the restricted quadratic functional form. See Section VI.D.2. For collection, the Commission approves variabilities estimated from the econometric equation proposed by the Postal Service, but applies a modified criterion when determining a theoretical maximum of the average number of mailpieces per box in a finance number/day. See Section VI.C.4.

## 2. Delivery Models: Full Quadratic vs. Restricted Quadratic Form

The Postal Service estimates its preferred regular delivery model using econometric equations in the full quadratic functional form. These equations have a substantial number of explanatory variables, including the total delivered mail volume, different characteristic variables, and “cross products among these variables.”<sup>87</sup> Proposed Study at 40.

The Public Representative, however, expresses a concern that the full quadratic specification of the delivery models “contains a significant amount of multicollinearity, which may result in non-operationally based changes in volume variability in subsequent estimates.” PR Reply Comments at 3. In particular, the Public Representative argues that multicollinearity can result in “variability instability over time.” *Id.* at 3-4. The Commission shares this concern.

When multicollinearity is present, the “precision of estimation falls.”<sup>88</sup> Serious multicollinearity causes the estimated coefficients to “have an unsatisfactory low degree of precision.” Econometric Methods at 164. The Commission observes that multicollinearity has been a recurrent issue in the carrier costing models. It was present in both the current and previous regular city carrier letter route costing models, the

---

<sup>87</sup> In the full quadratic models, the number of right-hand side variables is 65 for regular delivery equations and 54 for Sunday/holiday delivery equations. See, e.g., Library Reference USPS-RM2019-6-1, file “SPR.Prop.1.Fldr.1.Public.Files,” subfolders “Public Folder,” “Directory 2 Regular Delivery Programs and Results,” “Full Quadratic Results,” SAS output file “Full Quadratic March Regular.lst” and Library Reference USPS-RM2019-6-1, file “SPR.Prop.1.Fldr.1.Public.Files,” subfolders “Public Folder,” “Directory 3 Sunday Delivery Programs and Results,” “Sunday Results,” SAS output file “Sunday LDC24 March.lst.”

<sup>88</sup> J. Johnston, *Econometric Methods*, McGraw-Hill at 160 (2nd ed. 1960) (*Econometric Methods*).

respective subjects of Docket Nos. RM2015-7 (Street Time Model) and R2005-1.<sup>89</sup> The Commission approved the Street Time Model because the level of multicollinearity was “modest.”<sup>90</sup> An alternative model proposed in that docket by UPS was not accepted, among other reasons, because of reliability concerns related to high multicollinearity. Order No. 2792 at 61. Serious multicollinearity has also been a major problem in the estimation of the top-down city carrier street time model (Top-Down Model) in Docket No. PI2017-1.<sup>91</sup> Discussing the Top-Down Model, the Postal Service identified multicollinearity as “serious,” “severe,” “potentially disqualifying,” and “almost certainly...a major problem.”<sup>92</sup> The Commission ordered the Postal Service to perform additional research and expand the dataset to mitigate serious multicollinearity in that docket.<sup>93</sup>

In the current proceeding, the Postal Service acknowledges the presence of multicollinearity, noting that it “is a likely issue.” Proposed Study at 39. To assess multicollinearity, researchers and statisticians usually use two formal and well-accepted measures: variance inflation factor (VIF) and Belsley, Ku, and Welsch’s Condition Index (CI).<sup>94</sup> The Commission’s analysis of multicollinearity provided in the Appendix to this order clearly illustrates that multicollinearity measures (Condition Indexes and Variance Inflation Factors) computed for the SPR full quadratic equations are consistently higher

---

<sup>89</sup> See, e.g., Order No. 2792 at 31, 43, 43 n.24

<sup>90</sup> Order No. 2792 at 31. See also Docket No. RM2015-7, Library Reference USPS-RM2015-7/1, Report on the City Carrier Street Time Study, December 11, 2014, at 69 (Docket No. RM2015-7, Street Time Study).

<sup>91</sup> Docket No. PI2017-1, Interim Order, November 2, 2018, at 8 (Order No. 4869). See also Docket No. PI2017-1, Notice of the United States Postal Service Regarding Status Report on Top-Down Carrier Street Time Equation, August 18, 2017, at 13, 18-21, 38-39 (Docket No. PI2017-1 Status Report).

<sup>92</sup> Docket No. PI2017-1 Status Report at 13, 18, 20-21, 36, 38; Order No. 4869 at 8.

<sup>93</sup> Order No. 2792 at 31; Order No. 4869 at 6, 12-15.

<sup>94</sup> Belsey, Kuh and Welsch’s Condition Index directly assesses the level of multicollinearity for the entire dataset of the predictor variables. The higher the Condition Index, the more severe multicollinearity is observed in an econometric model. Variance Inflation Factor (VIF) measures the degree to which each predictor variable is affected by multicollinearity. The higher the VIF, the more serious the effect of multicollinearity is on the variable. For more details see, e.g., John Fox, Applied Regression Analysis and Generalized Linear Models, Second Edition: Sage, 2008 at 320-321.

that the measures computed for the Street Time Model and the Top-Down Model. See Appendix, Table A1. The Commission finds that the SPR full quadratic models exhibit higher multicollinearity than these other city carrier models. See Appendix at 2.

The Postal Service has previously noted, and the Commission generally agreed, that multicollinearity is essentially a data problem.<sup>95</sup> For this reason, the Commission has previously recommended dealing with multicollinearity by including more data in the analysis.<sup>96</sup> In the current proceeding, however, adding more data to the dataset does not appear feasible due to the Postal Service's significant resource constraints.<sup>97</sup> To address the presence of multicollinearity, the Postal Service estimates alternative econometric equations, in the restricted quadratic form, that "include just the first and second order terms of the variables and only the cross products that involve volume." Proposed Study at 40. The Postal Service determines that multicollinearity is indeed lower in the restricted quadratic equations, and suggests that "much of the multicollinearity is a result of the many cross products associated with the characteristic variables" included in the full quadratic form equations. *Id.* at 41.

Despite the lower multicollinearity in the restricted quadratic model, the Postal Service continues to prefer the full quadratic form. *Id.* at 42. First, the Postal Service notes that because variabilities estimated from both models are "virtually the same," multicollinearity "is not biasing the estimated variabilities," although it "may be affecting some of the individual coefficients for some of the characteristic variables." *Id.* at 41. Second, the Postal Service maintains that high values of "Chi-Squared statistics testing the joint significance of the cross product terms among the characteristic variables" indicate that "cross products are significantly contributing to the explanatory power of the variability equations." *Id.* at 36, 42.

---

<sup>95</sup> See, e.g., Order No. 4869 at 12; Docket No. PI2017-1 Status Report at 14; Docket No. RM2017-5 Street Time Study at 68.

<sup>96</sup> See Order No. 4869 at 12-13; Order No. 2792, Appendix B at 4.

<sup>97</sup> Proposed Study at 23-24; Responses to CHIR No. 2, question 3a-c.

For the reasons described below, the Commission does not fully accept these arguments and concludes that the restricted quadratic specification is preferred to the full quadratic for both the regular and Sunday/holiday delivery models.

The Postal Service states that the additional cross product terms in the full quadratic equations increase “the ability of [their] right-hand-side variables to explain the variation in the dependent variable.” Responses to CHIR No. 5, question 7a. It is true that leaving out relevant variables or underspecifying the model may result in omitted variable bias, a problem that the Commission previously addressed.<sup>98</sup> In Proposal One, however, delivery models in the restricted quadratic form include the same cost drivers and characteristic variables as the delivery models in the full quadratic form. Proposed Study at 9-11, 40. In addition, the restricted quadratic form still includes cross terms with volume. In other words, both the full and the restricted models have the advantages of the quadratic functional model noted by the Postal Service. *Id.* at 13, 40. As the Postal Service notes, “[a] quadratic functional form allows for but does not pre-specify the existence of economies of density in delivery, which is the preeminent characteristic linking cost responses to volume changes. In addition, a quadratic functional form is robust to the existence of zero values for cost drivers or characteristic variables.” *Id.* at 13.

The Condition Indexes for the restricted quadratic models are, however, notably lower than for the full quadratic models.<sup>99</sup> See Table 3.

---

<sup>98</sup> Order No. 2792 at 23, 55, Appendix B; *see also* Jeffrey M. Wooldridge, *Introductory Econometrics: A Modern Approach* at 88 (5th ed. 2013).

<sup>99</sup> By citing the developers of the Condition Index measure, the Postal Service states that the Condition Index value greater than 30 “indicates moderate dependencies” among explanatory variables “and a value approaching 100 indicates strong dependencies.” Docket No. PI2017-1 Status Report at 21.

**Table 3**  
**Condition Indexes for the Restricted Quadratic Models Compared to the Full Quadratic Models<sup>100</sup>**

Month	March		June		September		December	
Sites	Regular	Small	Regular	Small	Regular	Small	Regular	Small
Full Model, Regular Delivery	136.52	90.54	126.52	87.97	107.48	85.42	383.85	201.56
Restricted Model, Regular Delivery	77.95	33.00	63.85	31.75	59.36	30.91	129.38	97.12
Full Model, Sunday Delivery	1163.35		497.87		280.81		2077.80	
Restricted Model, Sunday Delivery	179.32		118.10		92.20		213.99	

Source: PRC-LR-RM2019-6-1, file "Tables and Impact," Excel file "Tables.xlsx," tab "Table 3."

One of the major arguments that the Postal Service provides in support of the full quadratic functional form is the "joint significance of the cross product terms among the characteristic variables." Proposed Study at 36-42. The test for joint significance detects "whether a set of coefficients is different from zero" or, in other words, whether the variables, as a group, affect the dependent variable. However, this test "is never the best test for determining whether a single coefficient is different from zero," or statistically significant.<sup>101</sup>

The statistical significance of the individual coefficients is an important criterion for the quality of the econometric analysis ("regression fit").<sup>102</sup> In the current proceeding, the Postal Service acknowledges this when it rejects the cubic functional

---

<sup>100</sup> For more details, see Appendix, Tables A2 through A3.

<sup>101</sup> See Jeffrey M. Wooldridge, *Introductory Econometrics: A Modern Approach* at 149 (5th ed. 2013).

<sup>102</sup> To assess whether regression coefficients are statistically significant (statistically different from zero), the Postal Service performs a t-test. See, e.g., Jeffrey M. Wooldridge, *Introductory Econometrics: A Modern Approach* at 118-167 (5th ed. 2013).

form because of “a high percentage of insignificant coefficients.” Proposed Study at 49. However, as illustrated in the Appendix, regular and Sunday/holiday delivery equations estimated in full quadratic functional form have a consistently higher share of statistically insignificant individual coefficients than the respective delivery equations estimated in restricted quadratic functional form. See Appendix, Tables A4 through A5.

Finally, estimating the equations using either the full quadratic or restricted models produce variabilities that are “virtually” the same,” meaning that they are “nearly, or for all practical purposes, the same.”<sup>103</sup> See Table 4. This means that the exclusion of the cross product terms from delivery equations does not have any material impact on the estimated variabilities or volume variable hours. For example, the Postal Service reports that for regular delivery the total volume variable hours computed from the two models differ by 0.04 percent, “four-hundredths of one percent.” *Id.*

---

<sup>103</sup> Responses to CHIR No. 6, question 1 (quotations omitted).

**Table 4**  
**Variabilities Estimated from the Full Quadratic and the Restricted Quadratic Models for Regular Delivery and Sunday/Holiday Delivery**

Delivery Type	Model Specification	March	June	September	December
Regular Delivery	Full Quadratic	60.5%	56.9%	65.7%	80.9%
	Restricted Quadratic	60.3% <sup>104</sup>	57.5%	65.7%	81.1%
Sunday Delivery	Full Quadratic	91.7%	92.0%	90.6%	94.4%
	Restricted Quadratic	91.7%	92.4%	90.4%	94.2%

Source: PRC-LR-RM2019-6-1, file "Tables and Impact," Excel file "Tables.xlsx," tab "Table 4."

Based on the analysis presented above, the Commission concludes that the restricted quadratic model is preferable over the full quadratic model for both regular delivery and Sunday/holiday delivery. The reasons for this conclusion are threefold. First, econometric models in the restricted quadratic functional form exhibit less multicollinearity than econometric models in the full quadratic model. As shown above and in the attached Appendix, the computed Condition Indexes support this conclusion. Lower multicollinearity should ensure that the models can be used in the future to compute reliable variability estimates. Second, econometric equations estimated in the restricted quadratic functional form have a consistently higher share of statistically significant individual coefficients. Third, restricted delivery models have the advantages of the full delivery models, including the same quadratic functional form, cost drivers, and characteristic variables. The variabilities estimated from the models in two different functional forms are very close and result in very similar estimates of volume variable costs. For those reasons, the Commission accepts variabilities estimated from the restricted quadratic model for both regular and Sunday/holiday delivery.

The Commission remains concerned that all but one of the Sunday delivery restricted quadratic models still exhibit very high multicollinearity, to a degree the Postal

---

<sup>104</sup> The Commission noticed an error in the regular delivery variability for March reported by the Postal Service. Compare PRC-LR-RM2019-6-1, file "Tables and Impact," Excel file "Tables," tab "Table 4" with Proposed Study at 42, 70; Responses to CHIR No. 7, question 1.

Service has characterized as “well beyond” the “expected amount.”<sup>105</sup> The Commission observes that estimating one Sunday/holiday restricted quadratic delivery equation for non-peak months instead of three separate monthly restricted quadratic equations reduces multicollinearity. The Postal Service estimated an alternative restricted quadratic delivery model for Sunday delivery on LDC 24 hours (as the restricted model for Sunday delivery). This model includes two econometric equations: a “combined regression equation for the three non-peak months (Alternative Equation) and a separate regression equation for [the] peak month of December.” CHIR No. 7, question 2. The Alternative Equation has a Condition Index of 104.0 compared to the values of 179.3, 118.1, and 92.2 computed for three separate monthly equations.<sup>106</sup>

This result supports the Commission’s previous conclusion that expanding the dataset helps mitigate multicollinearity problems.<sup>107</sup> However, estimating two econometric equations, peak and non-peak, for Sunday/holiday delivery would not resolve multicollinearity concerns, but might capture seasonal effects less accurately and will result in lower variability for non-peak months compared to the variabilities estimated from the three monthly equations.<sup>108</sup> For those reasons, the Commission does not accept Sunday/holiday variabilities estimated from two econometric equations, peak and non-peak.

The Commission concludes that estimating Sunday/holiday variabilities from four monthly econometric equations in the restricted quadratic functional form is an improvement over the current methodology. The Commission suggests that, in the future, the Postal Service estimate each variability equation for Sunday/holiday delivery

---

<sup>105</sup> Order No. 4869 at 8 (quoting Docket No. PI2017-1 Status Report at 21).

<sup>106</sup> Proposed Study at 42, 70; Responses to CHIR No. 7, question 1-2.

<sup>107</sup> Order No. 4869 at 12-13. This is because additional data “should increase both the precision of the coefficient estimates and the variation in the independent (explanatory) variables.” Order No. 4869 at 12. Since in the new SPR costing study, the unit of observation is a finance number/day, combining data for three Sundays in the Alternative Equation increases the size of the dataset by roughly three times compared to the datasets used for each of the non-peak equations.

<sup>108</sup> Responses to CHIR No. 7, question 2; Responses to CHIR No. 1, question 5.

using more than one day. That approach should decrease the multicollinearity, increase stability, and improve accuracy of the estimated variabilities.

E. Impact of the Modified Proposal One and Other Considerations

Tables 5 through 7 provide the calculations for the regular delivery variability, Sunday/holiday variability, and the overall SPR variability based on the FY 2018 SPR data.

**Table 5**  
**Computing the Regular Delivery Variability (Restricted Quadratic Model)**

	Accrued Hours	Variability	Volume Variable Hours
January-April	2,999,392	60.29%	1,808,394
May-July	2,357,440	57.52%	1,356,023
August – Third Week of November	2,783,674	65.70%	1,828,874
Fourth Week of November - December	3,494,950	81.08%	2,833,565
Total	11,635,456	67.27%	7,826,856

Source: PRC-LR-RM2019-6-1, file "Tables and Impact," Excel file "Tables.xlsx," tab "Table 5."

**Table 6**  
**Computing the Sunday/Holiday Delivery Variability (Restricted Quadratic Model)**

Time Period	Accrued Hours	Variability	Volume Variable Hours
January – April	2,217,098	91.73%	2,033,700
May-July	1,683,412	92.39%	1,555,287
August –Third Week of November	2,245,387	90.45%	2,030,907
Fourth Week of November - December	1,020,511	94.23%	961,577
Total	7,166,408	91.84%	6,581,472

Source: PRC-LR-RM2019-6-1, file "Tables and Impact," Excel file "Tables.xlsx," tab "Table 6."

**Table 7**  
**Calculating the Overall SPR Variability**

Cost Pool	Cost	Variability	Volume Variable Cost
Regular Delivery	\$434,284,329	67.27%	\$292,131,297
Sunday/Holiday Delivery	\$173,261,266	91.84%	\$159,119,331
Collection	\$207,628,130	24.02%	\$49,874,353
Total	\$815,173,725	61.47%	\$501,124,981

Source: PRC-LR-RM2019-6-1, file "Tables and Impact," Excel file "Tables.xlsx," tab "Table 7."

The variabilities for regular and Sunday/holiday delivery estimated from the restricted quadratic model are slightly higher than the respective variabilities estimated from the full quadratic model (by approximately 0.13 and 0.03 percentage points, respectively).<sup>109</sup> The change in a theoretical maximum for average number of mailpieces per collection box in a finance number/day results in a slightly lower collection variability. The variability estimated using a cutoff point of 894 mailpieces is 24.02 percent, and is approximately 0.18 percentage points lower than the variability estimated using 825 mailpieces as a cutoff point.<sup>110</sup> The overall estimated variability is 61.47 percent, which is approximately 0.03 percentage points higher than the overall variability estimated by the Postal Service in the initial proposal.<sup>111</sup> For FY 2018, the newly estimated SPR variability is more than 5 percentage points higher than the current SPR variability (which is 56.3 percent). Petition, Proposal One at 4.

In FY 2018, the modified proposal would have resulted in an increase of \$125.4 million in attributable costs for domestic competitive mail products and services and in a decrease of \$68.2 million in attributable costs for domestic market dominant mail

---

<sup>109</sup> Compare Table 7 in this Order with Table 36, Proposed Study at 81.

<sup>110</sup> Compare PRC-LR-RM2019-6-1, file "Collection Model," SAS output file "LDC 27 Impossible Program Output gt 894.lst" with Library Reference USPS-RM2019-6/1, file "SPR.Prop.1.Fldr.1.Public Files," subfolders "Public Folder," "Directory 4 Collection Programs and Results," "LDC 27 Results," SAS output file "Collection.Full Quadratic.Drop Impossible.lst."

<sup>111</sup> Compare Table 7 in this Order with Table 36, Proposed Study at 81.

products.<sup>112</sup> The overall impact of the modified Proposal One on attributable costs for domestic mail is an increase of approximately \$57.2 million in FY 2018. *Id.* Table 8 shows the impact on the unit SPR costs for domestic market dominant classes of mail, products within the package services class, and total domestic competitive mail and services.<sup>113</sup> See Table 8. The Commission calculated this impact using the variabilities from Table 7 and the initial data from the worksheets that the Postal Service filed with the Petition.<sup>114</sup> The estimated impact does not reflect any methodological changes subsequent to the 2018 Annual Compliance Determination.<sup>115</sup>

---

<sup>112</sup> PRC-LR-RM2019-6-1, file "Tables and Impact," Excel file "Impact.FY2018.xlsx."

<sup>113</sup> Table 8 replaces Table 38 of the new SPR costing study. See Proposed Study at 85.

<sup>114</sup> See Petition, Proposal One, Excel file "spr.prop.1.impact" (Original Public Impact Analysis); Library Reference USPS-RM2019-6/NP1, file "prop.1.SPR.NP1.Other.Files," subfolder "Directory 4 – Impact Analysis," Excel file "Impact of New Study.FY2018.xlsx."

<sup>115</sup> See Responses to CHIR No. 4, question 6a, Excel file "PublicCostImpactVersion2-ChIR4Q6.xlsx" (Revised Public Impact Analysis). The Revised Public Impact Analysis reflects the methodology approved in Order No. 4972. See Supplemental Response, question 4b. See also Order No. 4972 at 15. According to this methodology, TACS workhours are used to develop Sunday and holiday city carrier costs, and these costs are then distributed to products based on the PTR scan data. *Id.* The Postal Service illustrates that methodological changes both associated with Proposal One and those approved after the FY 2018 ACD, would result in a slightly larger impact on attributable costs for both Competitive and Market Dominant mail products. Compare Revised Public Impact Analysis, cells "H37" and "H39" with Original Impact Analysis, cells "F33" and "F35."

**Table 8**  
**Unit SPR Costs Including Indirect Costs**

	Unit SPR Costs		Change in SPR Costs	
	Current	New	\$ Change	% Change
First Class Mail	\$0.0020	\$0.0011	-\$0.0008	-41.7%
USPS Marketing Mail	\$0.0004	\$0.0000	-\$0.0004	-90.8%
Periodicals	\$0.0011	\$0.0002	-\$0.0009	-80.3%
Bound Printed Matter Flats	\$0.0021	\$0.0017	-\$0.0004	-20.0%
Bound Printed Matter Parcels	\$0.0343	\$0.0587	\$0.0245	71.4%
Media/Library Mail	\$0.0482	\$0.0809	\$0.0328	68.0%
Total Package Services	\$0.0226	\$0.0378	\$0.0152	67.0%
Total Domestic Market Dominant Mail	\$0.0012	\$0.0007	-\$0.0005	-41.5%
Domestic Competitive Mail and Services	\$0.0818	\$0.1047	\$0.0229	28.0%

Source: PRC-LR-RM2019-6-1, file "Tables and Impact," Excel file "Impact.FY2018.xlsx," tab "Table 8."

Upon approval of Proposal One, the Postal Service intends to create "the costs for the Monday - Saturday delivery and collection cost pools," using an approach very similar to the one approved in Docket No. RM2017-9.<sup>116</sup> Rather than "aggregating [In-Office Cost System (IOCS)]-dollar-weighted tallies" to obtain the "SPR control total costs," as done under the current methodology, the Postal Service will use the TACS workhour data and general ledger dollars to directly calculate costs for each SPR cost pool, as well as the SPR relay costs.<sup>117</sup>

In addition, the Postal Service indicates that it modifies the methodology for estimating "product-specific costs attributed to Priority Mail Express for sweeping its specific collection boxes." Supplemental Response, question 4b. Currently, the Postal Service estimates such costs "based upon a small survey done for Docket No. R97-1." *Id.* The new SPR costing study does not rely on the data from Docket No. R97-1

---

<sup>116</sup> Supplemental Response, question 4b; Responses to CHIR No. 4, question 7. See Docket No. RM2017-9, Order on Analytical Principles Used in Periodic Reporting (Proposal Five), February 6, 2018, at 14 (Order No. 4399)

<sup>117</sup> Responses to CHIR No. 4, questions 6b, 7-8; Supplemental Response, question 4b. In IOCS, "the dollar-weights of SPR carrier tallies will be set to zero." Responses to CHIR No. 4, question 6b.

surveys; instead it uses “the proportion of Priority Mail Express collection boxes in the CPMS data.” *Id.* As a result, upon adoption of Proposal One the Postal Service will multiply this proportion (estimated at the end of the fiscal year) “by accrued collection cost” to compute the amount of product specific costs for Priority Mail Express. *Id.*

The Commission understands the reasons to revise the method for estimating Priority Mail Express product specific costs, but notes that this methodological change results in an additional \$2.7 million increase in attributable costs.<sup>118</sup> In the future, the Postal Service must include a complete list of methodological changes associated with the implementation of the proposal with the initial filings (even if the supporting workpapers are not available at that time). Doing so, will increase the transparency and efficiency of the Commission’s review of the proposal.

## VII. CONCLUSION

Based upon a review of the Postal Service’s filings, supporting workpapers, and comments, the Commission approves a modified version of Proposal One. Pursuant to 39 C.F.R § 3050.42, the Commission finds that the proposed analytical methodology, as modified by the Commission, significantly improves the quality, accuracy, and completeness of the Postal Service’s SPR costing models.

As explained above, the modified Proposal One will replace an over 20-year-old study, which is based on survey data, with a study based on current operational data. The new study captures significant, subsequent operational changes. For these reasons, the Commission finds that the modified Proposal One represents a clear improvement over the existing methodology and satisfies 39 C.F.R § 3050.42.

Furthermore, the Commission suggests that the Postal Service update the SPR costing study on a more frequent basis. Costing studies require regular evaluation to

---

<sup>118</sup> *Compare* Revised Public Impact Analysis, Supplemental Response, question 4b, Excel file “CS06\_7-Public-Prop1\_CHIR2q4 v2.xlsx,” tab “7.0.6,” cell “G57” with Docket No. ACR2018, Library Reference USPS-FY18-32, file “USPS-FY18-32.Files” subfolder “B Workpapers,” Excel file “CS06&7-Public-FY18.xlsx,” tab “7.0.6,” cell “E57.”

ensure that they accurately reflect the Postal Service's operational realities. The Commission recommends that the Postal Service reassess these models every 5-10 years or after any major operational changes.

In addition, to improve stability and ensure accuracy of the variability estimates, in the next revision of the SPR costing study, the Postal Service should expand the dataset for the Sunday/holiday delivery model by including data for additional days.

## VII. ORDERING PARAGRAPH

*It is ordered:*

For purposes of periodic reporting to the Commission, the changes in analytical principles proposed by the Postal Service in Proposal One are approved with modifications. For regular delivery and Sunday/holiday delivery, the Commission approves variabilities estimated from the econometric models in restricted quadratic functional form. For collection, the Commission approves variabilities estimated from the econometric equation proposed by the Postal Service, but with a modified criterion for determining the theoretical maximum of the average number of mailpieces per box in a finance number/day.

By the Commission.

Ruth Ann Abrams  
Acting Secretary

## Appendix: Analysis of Multicollinearity in City Carrier Costing Models

In the past, to formally assess the degree of the multicollinearity in the carrier costing models the Postal Service has applied both the Variance Inflation Factor (VIF) and the Condition Index.<sup>1</sup> A comparison between the VIF measures estimated for five city carrier econometric models clearly shows that the VIFs computed for the Proposal One models are considerably larger than the VIFs for both the Street Time Model and the Top-Down Model.<sup>2</sup> See Table A1 below.

For the full quadratic delivery models, only one monthly SPR equation (highlighted in “green”) has an average VIF lower than the Street Time Model’s VIF. Three other equations (highlighted in “blue”) have an average VIF that is higher than the Street Time Model’s VIF, but still lower than the Top-Down Model’s VIF. The other eight out of twelve delivery equations (highlighted in “red”) have higher VIFs than the Top-Down Model. For all SPR delivery equations, standard deviations are higher than in the Top-Down Model, which indicates a higher variation of the VIFs in each SPR econometric equation.<sup>3</sup>

---

<sup>1</sup> See Docket No. RM2015-7 Street Time Study at 70-75; Docket No. PI2017-1 Status Report at 18-19, 21, 25-28, 34-37.

<sup>2</sup> The higher the VIF, the more the corresponding variable is affected by multicollinearity. A popular rule-of-thumb cutoff value for the VIF is 10. See, e.g., Jeffrey M. Wooldridge, *Introductory Econometrics: A Modern Approach* at 98 (5th ed. 2013); Dawn Iacobucci, Matthew J. Schneider, Deidre L. Popovich, and Georgios A. Bakamitsos, “Mean Centering Helps Alleviate ‘Micro’ But Not ‘Macro’ Multicollinearity,” *Behavior Research Methods*, January 2016 at 1315. The VIF measures allow, therefore, for a variable-by-variable analysis of the multicollinearity, whereby, the degree to which each explanatory variable is affected by multicollinearity is judged relatively to all the other explanatory variables present on the right side of the regression model. Specifically, “[t]he square root of the VIF for [the observation] indicates how much larger the standard error of the regression coefficient for [that observation] is compared to what the standard error...would have been if it were uncorrelated with the other independent variables.” *Id.*

<sup>3</sup> Standard deviation is a well-accepted measure of the variability of the observations in the sample. See Jeffrey M. Wooldridge, *Introductory Econometrics: A Modern Approach* at 735-736 (5th ed. 2013).

**Table A1**  
**Summary Statistics for Variance Inflation Factor (VIF)s**  
**in the City Carrier Costing Models**

Carrier Model/Equations		Average VIF	Standard Deviation
SPR Full Quadratic Regular Delivery Model, Regular Sites	March	48.44	71.01
	June	35.84	51.95
	September	25.45	40.58
	December	169.34	237.50
SPR Full Quadratic Regular Delivery Model, Small Sites	March	25.61	34.41
	June	24.61	33.52
	September	18.15	29.86
	December	65.54	96.80
SPR Full Quadratic Sunday Delivery Model	March	520.79	792.71
	June	107.23	165.70
	September	77.32	112.11
	December	979.55	1847.79
Street Time Model (Regular Delivery)		22.81	21.51
Top-Down Model		26.66	23.40

Source: PRC-LR-RM2019-6-1, file "Tables and Impact," Excel file "Tables.xlsx," tab "Table A1."

The Condition Indexes (CIs) for the carrier costing models were computed as well. In the Street Time Model, the two highest CIs were 29.6 and 39.4, compared to a CI of 110.6 in the Top-Down Model.<sup>4</sup> The Postal Service cites the developers of the CI measure, for the proposition that a CI value greater than 30 "indicates moderate dependencies" among explanatory variables "and a value approaching 100 indicates strong dependencies."<sup>5</sup>

<sup>4</sup> Docket No. RM2015-7 Street Time Study at 75; Docket No. PI2017-1 Top-Down Model at 19, 25, 37.

<sup>5</sup> Docket No. PI2017-1 Status Report at 21.

The Commission observes that the CIs for the equations in the full quadratic form preferred by the Postal Service exceed the value of 100 in five out of the eight regular delivery equations and in all Sunday/holiday delivery equations.<sup>6</sup> See Table A2.

**Table A2**  
**Condition Indexes for the Full Quadratic Delivery Models in Proposal One<sup>7</sup>**

Month	March		June		September		December	
Sites	Regular	Small	Regular	Small	Regular	Small	Regular	Small
Regular Delivery	136.52	90.54	126.52	87.97	107.48	85.42	383.85	201.56
Sunday Delivery	1,163.35		497.87		280.81		2,077.80	

Source: PRC-LR-RM2019-6-1 file "Tables and Impact," Excel file "Tables.xlsx," tab "Table A2."

For the restricted quadratic models, however, the CIs are notably lower than for the full quadratic models. See Table A3.

**Table A3**  
**Condition Indexes (CI) for the Restricted Quadratic Delivery Models<sup>8</sup>**

Month	March		June		September		December	
Sites	Regular	Small	Regular	Small	Regular	Small	Regular	Small
Regular Delivery	77.95	33.00	63.85	31.75	59.36	30.91	129.38	97.12
Change in CI	-42.9%	-63.6%	-49.5%	-63.9%	-44.8%	-63.8%	-66.3%	-51.8%
Sunday Delivery	179.32		118.10		92.20		213.99	
Change in CI	-84.6%		-76.3%		-67.2%		-89.7%	

Source: PRC-LR-RM2019-6-1 file "Tables and Impact," Excel file "Tables.xlsx," tab "Table A3."

<sup>6</sup> Proposed Study at 40-42.

<sup>7</sup> The Condition Indexes that exceed 100 values are highlighted in "red."

<sup>8</sup> The change (decrease) in the Condition Index (highlighted in "green") is calculated by comparing the Condition Index from the full quadratic and the restricted quadratic models.

In addition, estimation of the delivery models in the full quadratic functional form consistently results in a higher share of insignificant coefficients, compared to the restricted quadratic functional form. The Commission compared the percentage of insignificant coefficients in the restricted and full quadratic models for the regular and Sunday/holiday delivery equations and found that, in all but one equation, the percentage of statistically insignificant coefficients decreased when the model specification was changed from the full to the restricted model. See Tables A4 through A5. Only one econometric equation had a higher share of statistically insignificant coefficients (highlighted in “red”) in the restricted quadratic form compared to the full quadratic form. *Id.* All other econometric equations in the restricted quadratic form had substantially lower shares of insignificant coefficients than the econometric equations in the full quadratic form (highlighted in “green”). *Id.*

**Table A4**  
**Share of Statistically Insignificant Coefficients<sup>9</sup> (in %) in the Full Quadratic and the Restricted Quadratic Models for Regular Delivery<sup>10</sup>**

Functional Form	# of Variables	March		June		September		December	
		Regular	Small	Regular	Small	Regular	Small	Regular	Small
Full Quadratic	66	63.6%	53.0%	45.5%	66.7%	60.6%	54.5%	28.8%	62.1%
Restricted Quadratic	30	50.0%	23.3%	53.3%	23.3%	50.0%	23.3%	16.7%	20.0%
Change (% points)		-13.6	-29.7	+7.8	-43.4	-10.6	-31.2	-12.1	-42.1

Source: PRC-LR-RM2019-6-1 file “Tables and Impact,” Excel file “Tables.xlsx,” tab “Table A4.”

<sup>9</sup> Statistical significance was estimated at a 5 percent level.

<sup>10</sup> In Tables A4 through A7, the count of number of variables in the models includes the constant term.

**Table A5**  
**Share of Statistically Insignificant Coefficients (in %) in the Full Quadratic and the Restricted Quadratic Models for Sunday/Holiday Delivery**

Functional Form	# of Variables	March	June	September	December
Full Quadratic	55	76.4%	81.8%	72.7%	69.1%
Restricted Quadratic	27	37.1%	48.1%	59.3%	51.8%
Change (% points)		- 39.3	- 33.7	-13.4	-17.3

Source: PRC-LR-RM2019-6-1, file "Tables and Impact," Excel file "Tables.xlsx," tab "Table A5."

Similarly, for the variables included in both the restricted and the full models, in 9 out of 12 econometric equations, the restricted quadratic specification produced fewer statistically insignificant coefficients. See Tables A6 through A7.

**Table A6**  
**Number of Statistically Insignificant Coefficients for the Variables Included in Both the Full Quadratic and the Restricted Quadratic Models for Regular Delivery**

Functional Form	# of Variables	March		June		September		December	
		Regular	Small	Regular	Small	Regular	Small	Regular	Small
Full Quadratic	30	17	11	12	13	19	8	5	10
Restricted Quadratic	30	16	7	16	7	15	7	5	6
Change		-1	-4	+4	-6	-4	-1	0	-4

Source: PRC-LR-RM2019-6-1, file "Tables and Impact," Excel file "Tables.xlsx," tab "Table A6."

**Table A7**  
**Number of Statistically Insignificant Coefficients for the Variables**  
**Included in Both the Full Quadratic and the Restricted Quadratic Models for**  
**Sunday/Holiday Delivery**

Functional Form	# of Variables	March	June	September	December
Full Quadratic	27	16	18	15	16
Restricted Quadratic	27	10	13	16	14
Change		-6	-5	+1	-2

Source: PRC-LR-RM2019-6-1, file "Tables and Impact," Excel file "Tables.xlsx," tab "Table A7."