

Report on the City Carrier Street Time Study

January 14, 2015

AGENDA

- I. INTRODUCTION
- II. CONSTRUCTING THE COST POOLS
- III. ESTIMATING THE REGULAR DELIVERY EQUATION AND ASSOCIATED VARIABILITIES
- IV. ESTIMATING THE PACKAGE AND ACCOUNTABLE DELIVERY EQUATIONS AND ASSOCIATED VARIABILITIES
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I. INTRODUCTION

The current development of attributable city carrier street time costs uses a model that was calibrated with data collected in 2002.

There have been a number of important changes to city carrier delivery:

- Adoption of DPS

- Reduction in delivered volumes

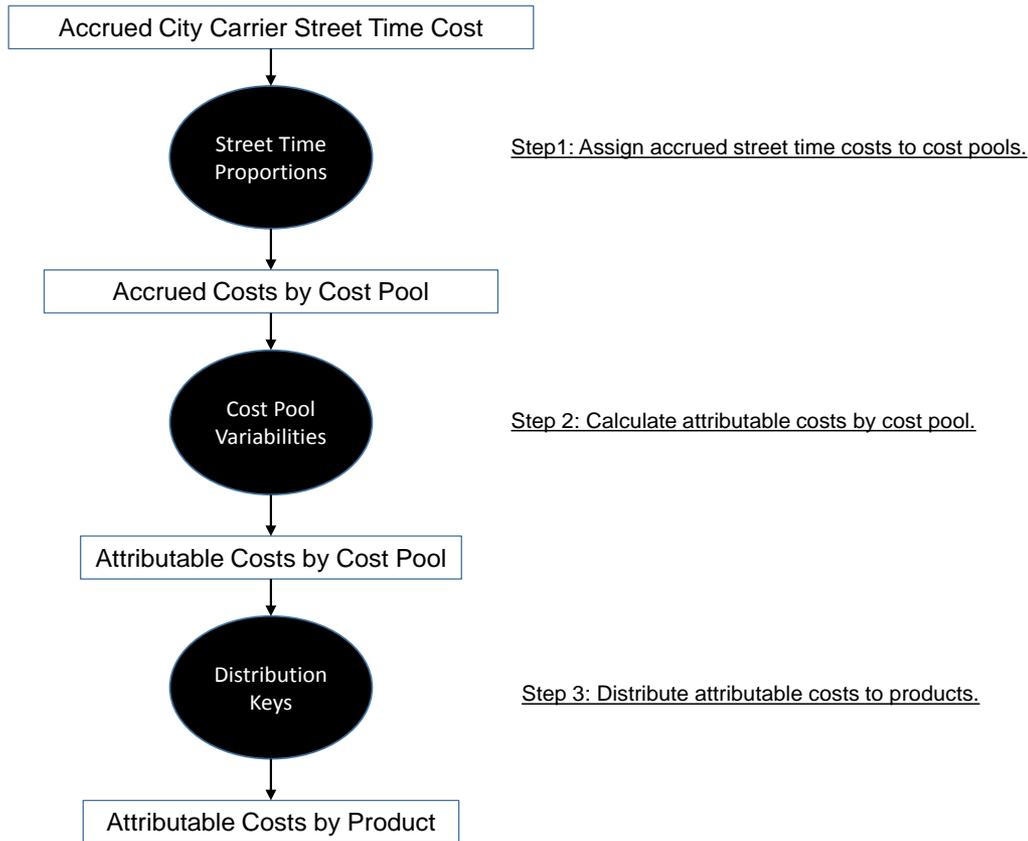
- Introduction of FSS

- Restructuring of the carrier network

The Postal Service initiated a comprehensive study of city carrier street time activities and costs.

The production of city carrier street time attributable costs has three main steps

Figure 1: Calculating Attributable Street Time Costs Has Three Steps



This study updates and refines the first two steps in the process: determining the cost pools and measuring the variabilities needed to calculate attributable costs.

The distribution keys needed to attribute costs to individual products are updated each year with the Carrier Cost System and are not part of this study.

II. CONSTRUCTING THE COST POOLS

The formation of cost pools requires identifying the proportions of city carrier street time that are spent in the various activities.

In the past, the time proportions were derived from expensive special studies that required collection of field data on all carrier activities.

The Postal Service proposes replacing those studies with data taken from its city carrier route evaluation system. This approach has several advantages:

- The data set will be comprehensive.
- The time proportions reflect operational reality.
- The time proportions can be updated on a timely basis.
- Time proportions automatically reflect network and operational changes.

A route evaluation is a process in which the Postal Service collects data on the times the carrier spends in the various office and street activities on a route.

The structure of the data reflects the Postal Service Form 3999. Thus, the street time portion of route evaluation data is often called "Form 3999 data."

There is one observation for each city carrier route in the country.

	Route Evaluations	Proportions
2008 & Before	82	0.06%
2009	864	0.6%
2010	5,344	3.8%
2011	20,772	14.8%
2012	62,658	44.6%
2013	50,737	36.1%
Total	140,457	100.0%

The city carrier street time cost model requires time proportions for the part of street time known as “directly attributable” street hours.

	Hours	Proportion
Directly Attributable Street Hours	5.37	87.4%
Indirectly Attributable Street Hours	0.46	7.5%
Vehicle Load/Unload	0.31	5.1%
Gross Street Hours	6.14	100.0%

Street Activity	Time Proportion
Regular Delivery	78.23%
In-Receptacle Package Delivery	4.40%
Deviation Delivery	5.39%
Collection from Street Letter Boxes	0.20%
Travel To and From	5.03%
Relay	3.82%
Network Travel	2.93%
Total	100.0%

The time proportions reflect the various activities city carriers do on the street.

III. ESTIMATING THE REGULAR DELIVERY EQUATION AND VARIABILITIES

Regular delivery time includes primary delivery activities like accessing stops, putting letters and flats into mail receptacles, and retrieving collection mail from those receptacles.

The cost drivers of regular delivery time are the volumes, delivered and collected, and the number of delivery points in the network.

The volume cost drivers should reflect the separate bundles or containers used in delivery routes. They are: DPS mail, cased mail, sequenced mail, FSS mail, and mail collected from customers.

Regular delivery time could also be influenced by the technology of delivery and certain characteristics of the delivery area.

The primary delivery technology distinction is whether a ZIP Code primarily involves walking or driving.

The characteristic variables are the proportion of business deliveries and geographic density the delivery area.

The regular delivery equation thus has six cost drivers and three characteristic variables. It is quadratic in form and looks like:

$$\begin{aligned}
 DT_{it} = & \beta_0 + \beta_1 DPS_{it} + \beta_{11}DPS_{it}^2 + \beta_2 CM_{it} + \beta_{21}CM_{it}^2 + \beta_3 SEQ_{it} + \beta_{31}SEQ_{it}^2 + \beta_4 FSS_{it} \\
 & + \beta_{41}FSS_{it}^2 + \beta_5 CV_{it} + \beta_{51}CV_{it}^2 + \beta_6 DP_{it} + \beta_{61}DP_{it}^2 + \beta_{12} DPS_{it} * CM_{it} \\
 & + \beta_{13} DPS_{it} * SEQ_{it} + \beta_{14} DPS_{it} * FSS_{it} + \beta_{15} DPS_{it} * CV_{it} + \beta_{16} DPS_{it} * DP_{it} \\
 & + \beta_{23} CM_{it} * SEQ_{it} + \beta_{24} CM_{it} * FSS_{it} + \beta_{25} CM_{it} * CV_{it} + \beta_{26} CM_{it} * DP_{it} \\
 & + \beta_{34} SEQ_{it} * FSS_{it} + \beta_{35} SEQ_{it} * CV_{it} + \beta_{36} SEQ_{it} * DP_{it} + \beta_{45} FSS_{it} * CV_{it} \\
 & + \beta_{46} FSS_{it} * DP_{it} + \beta_5 CV_{it} * DP_{it} + \beta_7 DM_{it} + \beta_{71}DM_{it}^2 + \beta_8 MPDP_{it} \\
 & + \beta_{81}MPDP_{it}^2 + \beta_9 BR_{it} + \beta_{91}BR_{it}^2 + \varepsilon_{it}
 \end{aligned}$$

Data for most of the variables are available from operational delivery systems, but not mail collected from customers' receptacles. A field study was required to obtain that volume.

Collection volume data were obtained for all routes in a sample of approximately 300 ZIP Codes over a two week period.

The econometric estimation procedure accounted for heteroscedasticity, multicollinearity, and investigated the possibility of unduly influential observations.

In general, the model fits well, with a high R^2 and most coefficients being statistically significant. All of the cost driver coefficients have the expected signs. The first-order terms are positive and the second order terms are negative.

Variabilities and Marginal Times Produced by the Regular Delivery Equation		
Cost Driver	Variability	Marginal Time
DPS	16.8%	2.07
Cased Mail	7.0%	2.79
Sequenced	3.4%	2.61
FSS	3.0%	5.21
Collection	5.4%	5.75

IV. ESTIMATING THE PACKAGE AND ACCOUNTABLE DELIVERY EQUATIONS AND VARIABILITIES

There are three separate delivery activities included in total package and accountable delivery time:

- (1) the delivery of packages which fit into the mail receptacle,
- (2) the delivery of packages that require a carrier deviation, and
- (3) the delivery of accountables which require a signature or customer contact.

The cost drivers of package and accountable delivery are the volumes delivered and the number of delivery points to be covered.

The characteristic variables are the proportions of the package and accountable deliveries by mode and the proportion of business delivery points.

The actions required to deliver in-receptacle packages are not related to the actions required to deliver deviation packages and accountables. It is appropriate, therefore, have separate equations. Both have a quadratic specification.

$$\begin{aligned}
 IRPDT_{it} = & \lambda_0 + \lambda_1 IRP_{it} + \lambda_{11} IRP_{it}^2 + \lambda_2 DP_{it} + \lambda_{22} DP_{it}^2 + \lambda_{12} IRP_{it} * DP_{it} + \lambda_3 \rho DR_{it} \\
 & + \lambda_4 \rho CR_{it} + \lambda_5 \rho DM_{it} + \lambda_6 \rho CEN_{it} + \lambda_7 BR_{it} + v_{it}
 \end{aligned}$$

$$\begin{aligned}
 DEVDT_{it} = & \psi_0 + \psi_1 DEVP_{it} + \psi_{11} DEVP_{it}^2 + \psi_2 ACT_{it} + \psi_{22} ACT_{it}^2 + \psi_3 DP_{it} + \psi_{33} DP_{it}^2 \\
 & + \psi_{12} DEVP_{it} * ACT_{it} + \psi_{12} DEV_{it} * DP_{it} + \psi_{23} ACT_{it} * DP_{it} + \psi_4 \rho CBU_{it} \\
 & + \psi_5 \rho CR_{it} + \psi_6 \rho DM_{it} + \psi_7 \rho CEN_{it} + \psi_8 BR_{it} + \xi_{it}
 \end{aligned}$$

The data needed to estimate the package and accountable delivery time equations are not available from operational data systems and a field study was required.

The sample for the field study was the same 300 ZIP Codes that were included in the collection volume study, and were thus used to estimate the regular delivery equation.

Delivery times for the various activities were measured by having carriers scan a limited number of special barcodes, indicating that a particular activity was starting or finishing.

The elapsed time for the activity was measured as the difference between the initial scan and the terminal scan.

Carriers also recorded the volumes, by shape that they delivered.

Daily Volumes Per Route		
Shape	Average	Median
In Receptacle Packages	24.5	23.0
Deviation Packages	16.6	15.0
Accountables	2.8	2.0

Estimation of the two equations produced the coefficients required for estimating the relevant variabilities.

Calculated Package and Accountable Variabilities	
Shape	Variability
In Receptacle Package	48.8%
Deviation Package	31.1%
Accountable	18.0%

V. ASSESSING THE IMPACT OF THE STUDY

The aggregate impact of the study is a modest decline in overall volume variable costs. The average variability for city carrier costs falls slightly from 48.5 percent to 47.3 percent.

The update did lead to changes in attributable costs across products.

First-Class Mail street time costs fell, but Standard Mail and package street time costs rose.

These changes are entirely consistent with a decline in First-Class Mail relative to Standard Mail, and increases in both sequenced mail volume and package volume.

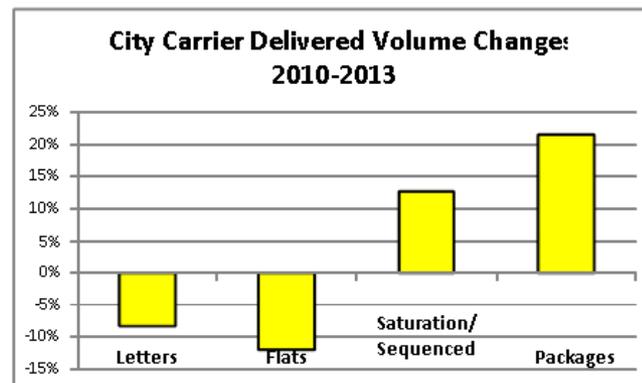


Table 53
Changes In Costs Per RPW Piece

	FY 2013 CRA With New Study	FY 2013 CRA	Difference
FIRST-CLASS MAIL			
SINGLE-PIECE LETTERS	\$0.259	\$0.275	-\$0.016
SINGLE-PIECE CARDS	\$0.261	\$0.278	-\$0.016
PRESORT LETTERS	\$0.116	\$0.119	-\$0.002
PRESORT CARDS	\$0.079	\$0.081	-\$0.002
FLATS	\$0.878	\$0.890	-\$0.011
PARCELS	\$2.400	\$2.361	\$0.040
STANDARD MAIL			
HIGH DENSITY & SATURATION LETTERS	\$0.063	\$0.060	\$0.003
HIGH DENSITY & SATURATION FLATS & PARCELS	\$0.095	\$0.074	\$0.021
EVERY DOOR DIRECT MAIL - RETAIL	\$0.058	\$0.039	\$0.018
CARRIER ROUTE	\$0.196	\$0.187	\$0.009
LETTERS	\$0.102	\$0.105	-\$0.003
FLATS	\$0.459	\$0.452	\$0.008
PARCELS	\$1.586	\$1.524	\$0.062
PERIODICALS			
IN COUNTY	\$0.150	\$0.144	\$0.006
OUTSIDE COUNTY	\$0.369	\$0.363	\$0.006
PACKAGE SERVICES			
BOUND PRINTED MATTER FLATS	\$0.566	\$0.568	-\$0.002
BOUND PRINTED MATTER PARCELS	\$1.238	\$1.216	\$0.022
MEDIA AND LIBRARY MAIL	\$3.967	\$3.940	\$0.027
Ancillary Services			
CERTIFIED	\$2.149	\$2.288	-\$0.138
COD	\$7.348	\$7.609	-\$0.261
INSURANCE	\$2.612	\$2.699	-\$0.086
REGISTRY	\$12.395	\$12.500	-\$0.105