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

PERIODIC REPORTING (PROPOSAL TWELVE)	Docket No. RM2015-5

STATUS REPORT OF THE UNITED STATES POSTAL SERVICE
REGARDING ORDER NO. 2462
(August 28, 2015)

Order No. 2462 (May 1, 2015) conditionally approved the Postal Service's Proposal Twelve regarding new treatment of Customer Care Center costs. Order No. 2462 concluded that the proposed methodology is a reasonable approach to determining attributable customer care center activities in the face of an operational change replacing contract employees with postal employees. On that basis, the Commission gave conditional approval to Proposal Twelve. Additionally, however, Order No. 2462 specified the need for more information regarding the degree of possible variability of certain call types with mail volume, and the specific sources and rationales for the various distribution keys employed. Order No. 2462 at 10-11. With such additional information, the Commission intends to address final approval of Proposal Twelve.

Attached to this pleading, the Postal Service provides two separate documents. One addresses the variability issues, and the other addresses the distribution keys. With these additional materials, the Postal Service submits that the Commission has the best information currently available to complete consideration of Proposal Twelve.

One question that naturally arises from this material, however, is whether any modifications of Proposal Twelve might be warranted based upon the new analysis. The Postal Service concludes that no modifications are presently appropriate. As fully discussed in the first attachment, the overwhelming limitation on the variability analyses is the lack of a sufficiently lengthy time series of data upon which more robust conclusions can be reached. As submitted, Proposal Twelve treats call types (other than those considered product specific) as either fully variable with volume, or as invariant with respect to volume. Analysis of the limited data that are available supports two tentative conclusions. First, if one constrains the choice to the most basic options of full variability, or no variability, Proposal Twelve appears to have assigned each specific activity into the correct category. Second, while the results are suggestive that future refinements may be possible that allow more precise estimation of variabilities between the two extremes, those refinements must await the passage of time necessary to allow accumulation of a sufficiently lengthy sample period to permit derivation of more robust estimates. In the opinion of the Postal Service's experts, it is still too early to attempt to advance beyond the selection for each activity of one of the two basic options – fully variable or fully invariable.

Upon review of the attached material, the Postal Service respectfully suggests that the Commission can grant unconditional approval to Proposal Twelve. Of course, such approval would not equate to a determination that the assumed variability levels should not be revisited in the future. Instead, approval would simply be an acknowledgement that, with the information currently available, it would be premature to purport to reach reliable conclusions regarding more exact variability estimates. Those will come later, based upon future analysis using more extensive data than are currently available.

Respectfully submitted,

UNITED STATES POSTAL SERVICE

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Report on

Estimation of Variabilities for Customer Care Centers

A. Introduction

In Order No. 2462 in Docket No. RM2015-5, the Commission conditionally approved the Postal Service's proposed methodology for costing Customer Care Centers. The approval was conditioned upon the Postal Service further investigating the variabilities and distribution keys used in the methodology. Specifically, the Commission directed the Postal Service:[1]

> [T]o provide a more thorough analysis of the variability of the attributable call types and the distribution of the attributable call types to the products and services. This analysis should be accompanied by an explanation of the reasons for the choice of distribution key.

This report presents the Postal Service's effort to address the first of the Commission's two concerns: providing a more thorough analysis of the variabilities applied to the call center cost pools.[2] The variability analysis has two steps. It begins with an operational analysis to identify whether call center cost pools should be in one of three categories: volume variable, institutional, or product specific.[3]

It continues in a second step, the subject of this report, in which variability equations are estimated for those cost pools classified as volume variable. This estimation is designed to investigate the current assumption of 100 percent variability

[1] See, Postal Regulatory Commission, Order No. 2462, Docket No. RM2015-5 at 11.

[2] The requested explanations of the reasons for the choice of distribution keys are presented in another report.

[3] The identification of the cost pools and the resulting classifications were originally presented in the Postal Service's submission in Docket No. RM2015-5 and are repeated below.

and, to the extent possible, empirically estimate the required variabilities. Variability equations will also be estimated for the call center cost pools classified as institutional, as a check on the assumption of zero percent variability. Variability equations will not be estimated for product specific cost pools, as all of those costs are attributed to products on a non-variability basis.

The call center cost pools and their associated classifications are presented in Table 1. There are seven volume variable cost pools, four product specific cost pools, and nine institutional cost pools.

Table 1: Classifications of Call Center Cost Pools

Cost Pool	**Classification**
Customer Specific NSA	Volume Variable
BSN	Institutional
Change of Address	Institutional
USPS Tracking	Volume Variable
General Inquiry	Volume Variable
Go Post	Volume Variable
International Product	Product Specific
Hold Mail	Institutional
Hours and Locations	Institutional
IC3 Tech Support	Institutional
International Pricing	Group Specific
USPS Tracking- Intl	Group Specific
Misdelivery	Volume Variable
Passports	Institutional
Prices & Commitments	Institutional
Redelivery	Volume Variable
Small Business	Institutional
Stamps	Volume Variable
International Product	Product Specific
ZIP Code	Institutional

B. Model Formulation and Estimation Methodology

The primary issue limiting an attempt at estimating variability equations for call center cost pools is the availability of data to perform the estimation. The Postal Service has been collecting data on call center operations for a relatively short period of time, and this lack of data availability limits the possible analyses that can be performed. Quarterly data on the number of calls, and the associated volumes, are available for the 2011 though 2015 period, and the analysis dataset is limited to just 17 quarterly observations. This is barely enough to estimate a variability equation.

The limited amount of data necessitates the use of a parsimonious model that can both capture the required volume variability as well as account for non-volume-related variations in the number of calls. In addition, the model should account for the fact that the available data are in time series form.

An extremely useful model in this situation is a transfer function model. Such a model describes the current value of the dependent variable (here the number of calls per quarter) as a function of its own stochastic history and the current and lagged values for one or more exogenous variables. Consider the simplest case in which there is only one exogenous variable. Then the transfer function model takes the following form:

$$y_t = \gamma(L)x_t + \lambda(L)\,\varepsilon_t + \mu_t$$

where $\lambda(L)$ and $\gamma(L)$ are lag operators. With no data limitations, the transfer function model allows for multiple lags of both the exogenous and dependent variables.

However, each lag uses up a degree of freedom, and with just 17 observations, there is an extreme need to preserve degrees of freedom. Thus, the model will focus on the likely timing between the number of calls, by type, and the relevant volumes and will include only the stochastic history of the dependent variable. Because calls are typically related to current volumes, the model will specify that a given quarter's calls depend solely upon the current and immediately previous quarters' mail volume. This means it includes the assumption that the number of calls does not depend upon mail volumes from further back than the immediately previous quarter.[4] Similarly, the model specifies that non-volume movements in the number of calls can be described by the two previous quarters' stochastic terms and time-related variables.[5]

This latter specification is attempting to account for other movements in the number of calls not caused by changes in volumes. Such movements could occur due to changes in technology, methods, or organization. There are three possible model additions that can be used to capture these changes: inclusion of a time trend, dummy variables to account for level shifts, and seasonal dummy variables. In any given equation, the inclusion of one of these three time-related variables will depend upon the behavior of the number of calls over time. For example, if for some reason the number of calls increases sharply for just one quarter (not because of an increase in volume), then a level-shift dummy would be appropriate to account for this non-volume change.

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[4] Empirically, the assumption appeared to be reasonable. In most of the variability equations, lagged volumes had no statistically significant impact on the current number of calls.

[5] With more data, a lag structure for the dependent variable would also be estimated.

Similarly, if the number of calls is rising or falling through time, then including a time trend would be appropriate.

Which of the time-related variables are included in each call center equation will vary from cost pool to cost pool, and will thus be included in the transfer function models on a case-by-case basis. However, the general form of transfer function model for the current application can be written as:

$$y_t = \gamma_1 x_t + \gamma_2 x_{t-1} + \gamma_1 t + \gamma_2 t^2 + \gamma_3 D_t + \sum_{i=1}^{3} \gamma_{3+i} SD_i$$

$$+\lambda_1 \varepsilon_{t-1} + \lambda_2 \varepsilon_{t-2} + \mu_t$$

In this equation, y represents the log of number of calls and x represents the log of volume, t is a time trend D_t is a level-shift dummy, the SD_i are quarterly seasonal dummies, the ε_{t-i} are the lagged stochastic terms and μ_t is the contemporaneous innovation.[6] Because the model is estimated in log form, the volume variability is given by the sum of $\gamma_1 + \gamma_2$.[7]

While the transfer function model is parsimonious, and relatively robust with respect to limited data, it must be emphasized that the call center data are extremely

[6] The stochastic structure in a transfer function model is typically autoregressive. In the current application, the autoregressive structure is of order two. Specifically, it can be described as:

$$\varepsilon_t = \lambda_1 \varepsilon_{t-1} + \lambda_2 \varepsilon_{t-2} + \mu_t.$$

[7] Logs were use in estimating the model because they provide the most straightforward way to estimate the variability.

limited. As such, they do not provide sufficient data to support robust variability estimation. The following analysis should thus be considered exploratory in nature.

In the next section, transfer function models are estimated for the cost pools that have been classified as volume variable. That is followed by a section including application of the model to the activities classified as institutional.

C. Estimating Variability Equations for the Activities Classified as Volume Variable.

Operational review of the call center activities identified those cost pools for which the number of calls is expected to vary with changes in volume. As a first step, the Postal Service assumed that the number of calls was proportional to relevant volume, implying a variability of 100 percent. In other words, if volume increased by five percent, it was expected that the number of calls increased five percent.

This assumption is now investigated and the transfer function model is applied to empirically estimate variabilities for the volume-variable call center cost pools. Note that the assumption of proportionality would be supported by estimated variabilities close to one. In the transfer function model this occurs when the sum, $\gamma_1 + \gamma_2$, is close to or equal to one.

The following call center activities are classified as volume variable: Customer Specific NSA, GoPost, Misdelivery, Redelivery, Stamps, and USPS Tracking (domestic). Transfer function models for these cost pools will be investigated in the following subsections.[8]

1. A Customer Specific NSA.

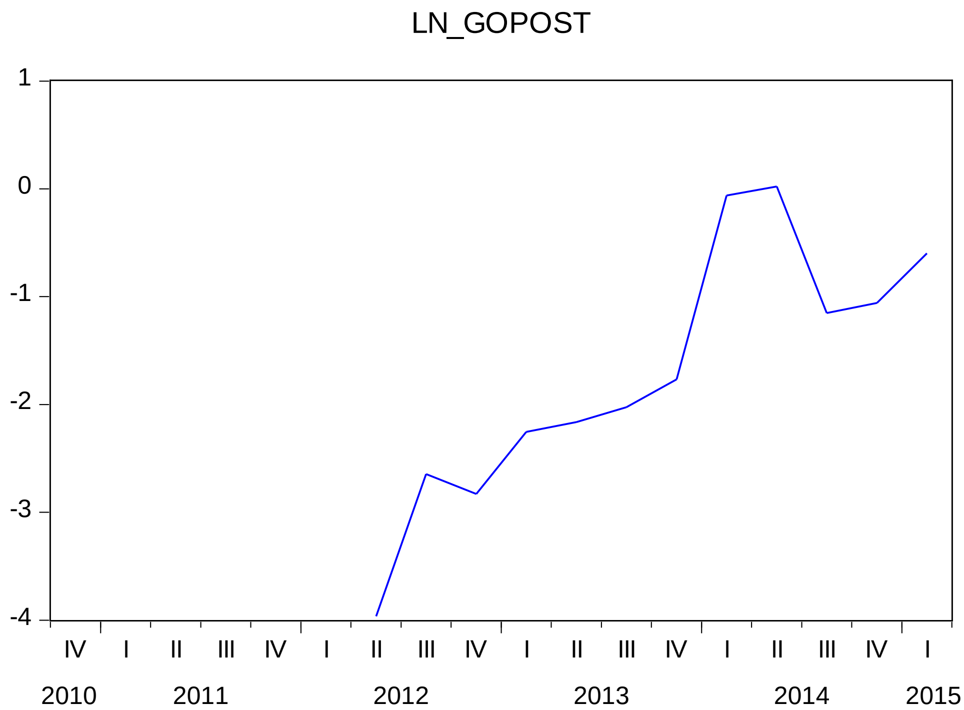
The Postal Service has only three quarters of data for the number of calls about a Customer Specific NSA, covering the last two quarters of 2014 and the first quarter of 2015. As a result, there are not enough observations to estimate a variability model and the assumption of proportionality will have to be maintained until more data become available.

2. GoPost

The Postal Service has data on GoPost calls starting in the second quarter of 2012. This means there are 12 quarters of GoPost data available. While this is a very small amount of data, it is sufficient to at least attempt to estimate the transfer function model.

[8] No variability model was estimated for the general inquiry call center cost pool. That is because this cost pool does not make use of the assumption of proportionality, but rather takes on the average variability of the other call center cost pools.

Below is a plot of the log of the GoPost calls by quarter.[9]



The graph shows that the GoPost calls have been following a positive trend, and has a level shift for the first and second quarters of 2014. Thus, a quadratic time trend is included and dummy variables for those two quarters in 2014 are included in the transfer function model. Because GoPost relates to the delivery of parcels to lockers, where they are picked up by customers, the relevant volume for measuring variability is parcel volume. Thus, the current and lagged parcel volumes were included in the model, but the lagged parcel volume term was not significantly different from zero, and

[9] In the econometric exercise, the dependent variable, the number of calls, is measured in thousands. Thus, in any quarter in which there were less than 1,000 calls, the value for the dependent variable will be less than one (e.g. 0.631, indicating 631 calls). When this occurs, the log of the dependent variable will be a negative number. Note that scaling the dependent variable does not affect the econometric estimation. If the dependent variable were multiplied by 1,000, the exact same variabilities would be estimated.

was dropped from the model to increase the number of degrees of freedom. The complete regression results are provided in Appendix I, but Table 2 provides a summary of the key results.[10]

Table 2: GoPost Variability Equation

Variable	**Estimated Coefficient**	**t-statistic**
Constant	-16.31887	-6.083602
Log(Parcel Volume)	0.84402	4.298787
Level Shift Dummy	1.356003	50.85613
Time	0.32014	12.07934
Time^2	-0.005288	-4.773061
ε_{t-1}	-0.924025	-1.269308
ε_{t-2}	-0.215071	-0.744602
R-Squared	0.999498	

Both the level shift dummy and the quadratic time trend are important explanatory variables for non-volume movements in GoPost calls, but the lagged stochastic terms are not.[11] Of particular interest is the estimated coefficient on volume, which implies a variability of 84.4 percent. While this is not equal to the proportional variability of 100 percent, it is quite high and shows a close relationship between parcel volumes and GoPost calls.

[10] The transfer function models were estimated in "Eviews," which is econometric software specifically designed to estimate time series models.

[11] An experiment of dropping the dummy and trend variables yields result in which the lagged stochastic terms term do the explaining of GoPost calls. This versions yields a very similar variability, 89.5 percent.

3. Misdelivery

The Postal Service has data on the number of calls about misdelivered mail for all 17 quarters, but the measure of relevant volume, the number of misdelivery scans, is available only for five quarters. Thus, this measure of volume is insufficient to estimate the variability equation and alternatives had to be considered. Three alternative volume measures were tried: (1) total mail volume, (2) total parcel volume, and (3) total First Class volume. In other words, three transfer function models were estimated for misdelivery calls, one for each of the alternative possible volume measures.

The plot of the log of the number of calls about misdelivered mail is presented below. The plot shows a negative trend with a sharp drop off for the period after the third quarter of 2013, indicating a level shift at that point. This level shift is captured in the transfer function model by a dummy variable for the period after the third quarter of 2013. Finally, in all cases, the lagged volume term was not significant, so it was dropped.

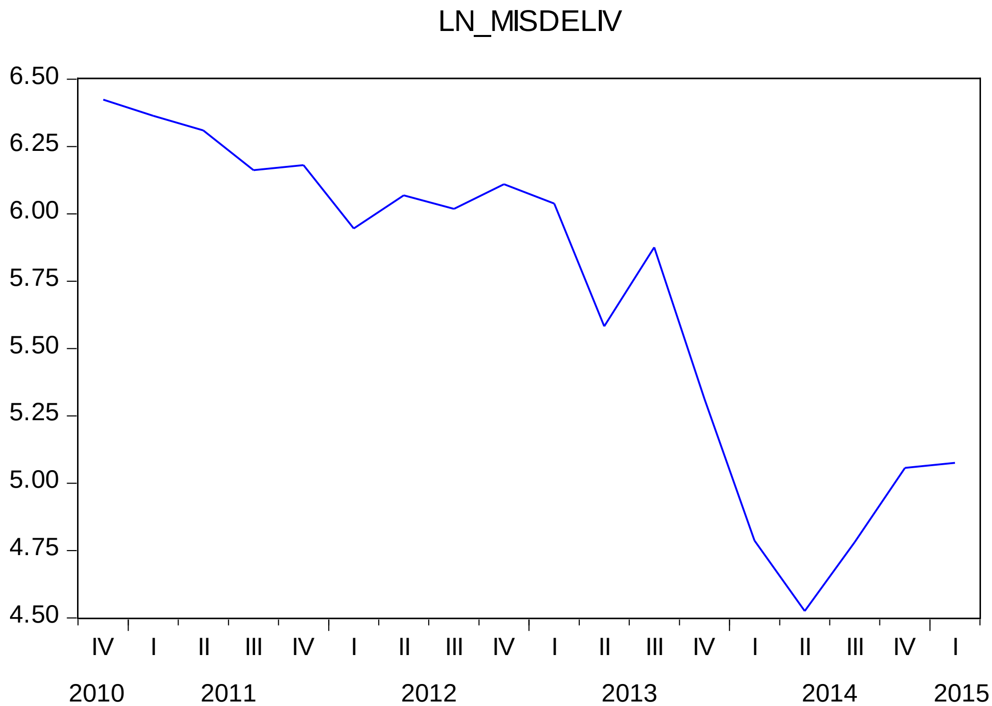


Table 3 present two transfer function models for misdelivery calls, one with total mail volume and one with First Class mail volume. In all instances, the estimated coefficient on volume was indistinguishable from zero (this was also true for the model when parcel volume was used). This result contradicts the assumption of proportionality between misdelivery calls and volume, although this result may be arising simply because the model does not include the correct volume measure. This result certainly is not sufficient to overturn an operationally-based assumption of a proportional volume variable activity.

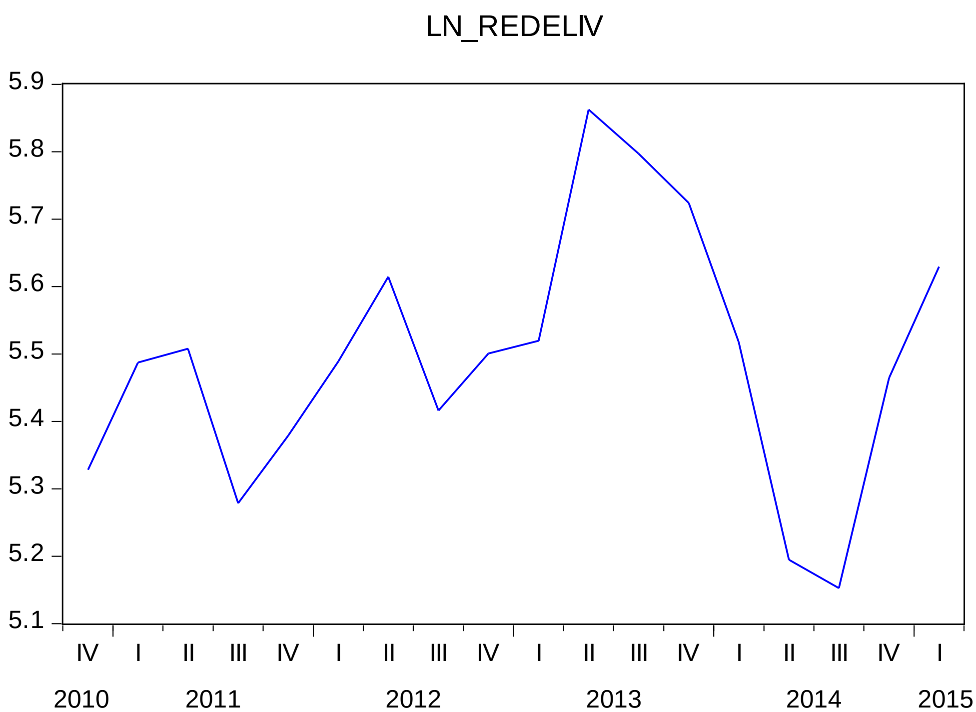
Table 3: Misdelivery Variability Equations

Variable	**Estimated Coefficient**	**t-statistic**
Constant	-0.255696	-0.015222
Log(Total Mail Volume)	0.375889	0.392531
Level Shift Dummy	-0.015222	-7.359056
Time	-0.042298	-3.454905
ε_{t-1}	0.118295	0.473766
ε_{t-2}	-0.816878	-3.080113
R-Squared	0.946067	

Variable	**Estimated Coefficient**	**t-statistic**
Constant	5.042533	0.270573
Log(First Class Mail Volume)	0.077391	0.069515
Level Shift Dummy	-0.828246	-7.281922
Time	-0.043993	-2.88204
ε_{t-1}	0.131564	0.525802
ε_{t-2}	-0.825973	-3.069024
R-Squared	0.945207	

4. Redelivery

The next call center cost pool to be analyzed relates to the redelivery of parcels. It is reasonable to specify that the number of calls about redelivering parcels would be related to the volume of parcels delivered. Interestingly, the plot of the log of the number of calls relating to redelivery does not show the strong upward trend associated with parcel volume growth. In fact, there is a sharp drop off starting in the fourth quarter of 2013.[12]



The transfer function model will thus account for this level shift as well as for the seasonal peaks that occur in quarter two of each year. The relevant volume is total parcel volume. Table 4 presents the key results from estimating the model for redelivery calls.

[12] The number of calls about signature confirmation has fallen quite a bit and may explain at least some of the decline.

Table 4: Redelivery Variability Equation

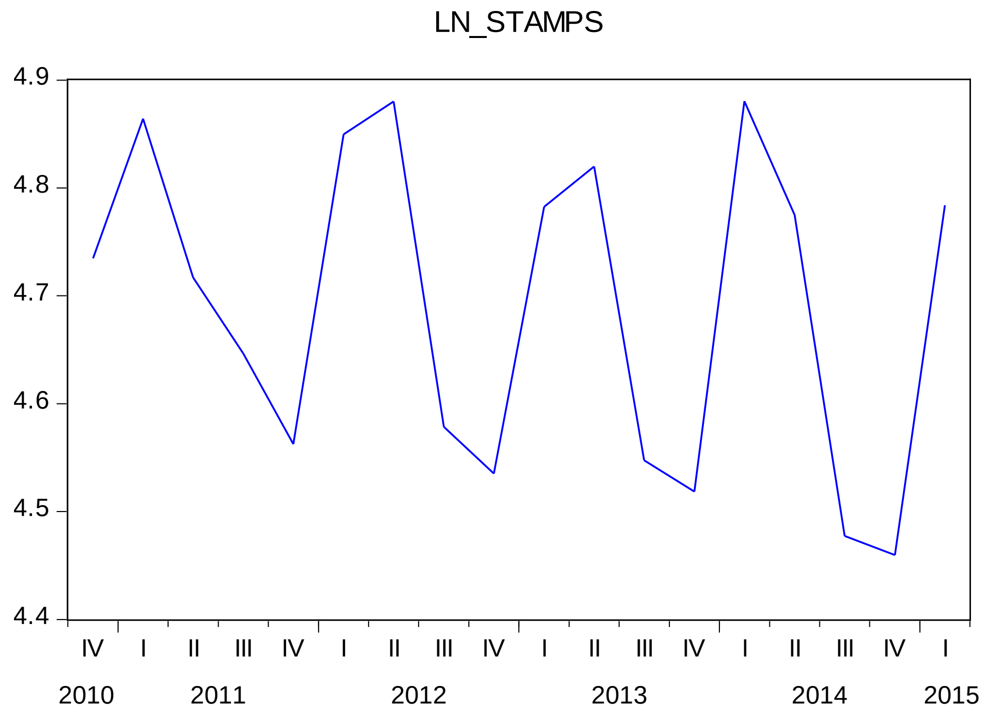
Variable	**Estimated Coefficient**	**t-statistic**
Constant	3.859778	1.191487
Log(Parcel Volume)	0.121993	0.513537
Level Shift Dummy	-0.257064	-2.467893
Quarter 2 Dummy	0.153534	3.721304
ε_{t-1}	1.060385	3.730785
ε_{t-2}	-0.622922	-2.046266
R-Squared	0.819451	

As with misdelivery, the model was unable to estimate a variability that was statistically different from zero. Given the increase in parcel volumes of this time period and the lack of increase in redelivery calls, this is probably not surprising.

5. <u>Stamps</u>

The call center cost pool for calls about stamps was cited by the Commission, in Order 2462, as a specific activity whose variability should be further investigated. The Commission reasoned that because window sales of stamps have a variability well below 100 percent, it was quite possible that stamp calls would also have a variability less than 100 percent. To investigate this possibility, a transfer function model for stamp calls was estimated as a function of stamped volume. The Postal Service has stamp call data for the full range of the data set and there are seventeen observations available for estimating the equation.

Review of the plot of the log of stamp calls shows neither a trend nor a level shift, but it does show a very strong seasonal pattern. Consequently, the transfer function model will include seasonal dummies for the first and second quarters of each year.



As with other equations, the lagged volume term was not significant for stamps and was dropped from the model. This means the model contains the volume term, two seasonal dummies and the two lagged terms. The results of estimating the stamps model are presented in Table 5.

Table 5: Stamps Variability Equation

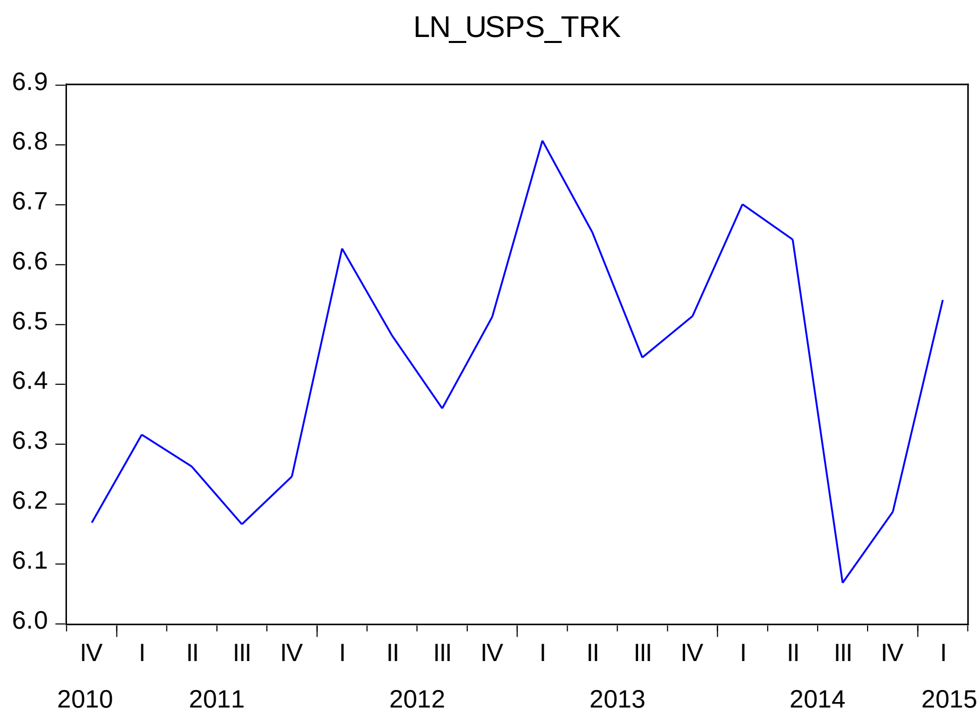
Variable	Estimated Coefficient	t-statistic
Constant	-3.445783	-0.92139
Log(Stamp Volume)	0.525778	2.134098
Quarter 1 Dummy	0.165705	2.146733
Quarter 2 Dummy	0.317065	6.362305
ε_{t-1}	0.036769	0.150429
ε_{t-2}	-0.240585	-1.0549
R-Squared	0.9197	

At a value of 52.8 percent, the estimated stamps variability is well below one hundred percent and is consistent with material economies of scale in stamp sales. As the Commission indicated in its Order, the volume variability of selling stamps over the window is 33.3 percent, but the call center stamp services differ significantly from window stamp services.

The call centers originated as a form of information sharing between the Postal Service and its customers; selling stamps was not the initial purpose. The call centers evolved to accommodate the occasional request to purchase stamps over the telephone. Postal personnel who work closely with the call centers have indicated that few of the calls which fall into the stamp category result in the purchase of stamps. As such, the volume variabilities associated with selling stamps at the window are not necessarily applicable to the call centers. In other words, the calls not associated with stamp sales are not subject to the same economies of scale associated with stamp sales.

6. USPS Tracking (Domestic)

The last volume-variable call center activity for which a variability equation will be estimated is domestic USPS tracking.[13] One would anticipate that calls about USPS tracking are related to parcel volumes. As parcel volumes grow, one would expect calls about USPS tracking to also grow. However, review of the plot of the log of USPS tracking calls shows that they follow a parabolic shape, not a consistent upward linear trend like parcel volumes.[14] As the next graph shows, USPS tracking calls actually peaked in the first quarter of 2013. Such a parabolic shape could be captured by a second order time trend.



[13] Initial efforts to estimate a transfer function model using Track and Confirm volumes did not yield a statistically significant coefficient on volume. As a result, parcel volumes were tried. Both versions of the model are presented in the appendix.

[14] The decline in tracking calls coincides with tracking being added automatically to Priority Mail. There was also a change in which the Postal Service started trying to move inquiries away from calls onto the online system.

In addition, there is a very steep drop in calls in the third quarter of 2014, which continues into the fourth quarter of 2014 before recovering in 2015. The model will thus include a level shift dummy for those two quarters. Also, there is a seasonal peak in calls in the first quarter of each year, so a seasonal dummy for the first quarter is included in the model. Unlike the other transfer function models, the contemporaneous parcel volume coefficient was not significant, but the lagged parcel volume coefficient was. The model thus includes just the lagged parcel volume term. Table 6 presents the results.

Table 6 : USPS Tracking Variability Equation

Variable	**Estimated Coefficient**	**t-statistic**
Constant	-1.792021	-1.148533
Log(Parcel Volume) (t-1)	0.56848	4.888514
Time	0.119026	6.56678
Time^2	-0.0061	-7.315734
Level Shift Dummy	-0.214365	-5.543038
Quarter 1 Dummy	0.378164	14.79423
ε_{t-1}	-0.61988	-1.956023
ε_{t-2}	0.39663	1.199728
R-Squared	0.980082	

The estimated variability of USPS tracking calls is relatively low, at 56.9 percent. This suggests that there are other important determinants of the number of USPS tracking calls besides parcel volume, but the number of calls is related to volume.

D. Estimating Variability Equations for the Activities Classified as Institutional.

Operational analysis identified nine call center activities that do not appear to be directly related to mail volume, and were therefore classified as institutional. These activities cover a spectrum of responsibilities, from calls about held mail, to inquiries about hours or passports. But they all have in common the likelihood that the number of calls is not tied to changes in mail volumes. As a check on the operational analysis, transfer function models were estimated for all nine institutional activities to see if they could produce any evidence indicating that the volume variabilities were different from zero.

The estimation process was the same as for the activities classified as volume variable. For each institutional activity, a transfer function model with the current and lagged volumes and two lags of the stochastic term were estimated. In addition, each of the individual time series were investigated to identify the appropriateness of time trends, level shift dummies or seasonal dummies. Appendix II contains the graphs and models for each of the institutional categories, but Table 7 summarizes the results. In no instance was there any evidence suggesting rejection of the null hypothesis of a zero variability.

Table 7: Results of Estimating Transfer Function Models for Institutional Categories

Activity	**Volume Measure**	**Model**	**Test of Hypothesis Variability is Zero**
BSN	Total Parcels	Linear Trend, Level Shift Dummy	Fail to Reject
Change of Address	Total Mail	Linear Trend	Fail to Reject
Hold Mail	Total Mail	None	Fail to Reject
Hours and Locations	Total Mail	Linear Trend	Fail to Reject
IC3 Tech Support	Total Mail	Linear Trend, Level Shift Dummy	Fail to Reject
Passports	Total Mail	Quadratic Trend, Level Shift Dummy, Seasonal Dummy	Fail to Reject
Prices & Commitments	Total Mail	Linear Trend, Level Shift Dummy	Fail to Reject
Small Business	Total Parcels	Quadratic Trend	Fail to Reject
ZIP Code	Total Mail	Level Shift Dummy	Fail to Reject

E. Conclusions and Caveats

The Commission identified a need for the Postal Service to further analyze the variabilities for call center cost pools. Such an analysis is limited by the fact that the current call center structure is relatively recent and, consequently, there is relatively little data available for estimation purposes.

Given the nature of the data and its relatively short length, simple transfer function models were estimated for the relevant call center cost pools. The empirical results are broadly supportive of the classification approach initially proposed by the Postal Service. Cost pools that had been identified as volume variable generally had positive volume variabilities and cost pools that had been identified as institutional generally had volume variabilities of zero. Where positive variabilities were estimated, they were substantial, but less than one.

However, it is important to emphasize that, given the small amount of data, these empirical results are not robust. A logical, appropriate, and consistent approach was applied to estimating the variabilities, but different methodologies could produce very different results. For example, it would likely be possible to estimate a set of models for which none of the estimated variabilities were statistically different from zero.

In sum, the empirical evidence is not yet sufficient to overturn the initial assumption that the volume-variable call center variabilities are 100 percent. But, as more data become available, this assumption can be further tested.

APPENDIX I:

TRANSFER FUNCTION EQUATIONS FOR ACTIVTIES CLASSIFIED AS VOLUME VARIABLE

GOPOST

Dependent Variable: LN_GOPOST
Method: Least Squares

Sample (adjusted): 2012Q4 2015Q1
Included observations: 10 after adjustments
Convergence achieved after 26 iterations

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-16.31887	2.682435	-6.083602	0.0089
LN_PAR_VOL	0.844020	0.196339	4.298787	0.0232
GOPOST_DUM	1.356003	0.026664	50.85613	0.0000
@TREND^2	-0.005288	0.001108	-4.773061	0.0175
@TREND	0.320140	0.026503	12.07934	0.0012
AR(1)	-0.924025	0.727975	-1.269308	0.2939
AR(2)	-0.215071	0.288840	-0.744602	0.5105

R-squared	0.999498	Mean dependent var	-1.388521
Adjusted R-squared	0.998494	S.D. dependent var	0.972747
S.E. of regression	0.037752	Akaike info criterion	-3.519528
Sum squared resid	0.004276	Schwarz criterion	-3.307718
Log likelihood	24.59764	Hannan-Quinn criter.	-3.751882
F-statistic	995.3869	Durbin-Watson stat	2.261500
Prob(F-statistic)	0.000049		

MISDELIVERY MODEL 1

Dependent Variable: LN_MISDELIV
Method: Least Squares

Sample (adjusted): 2011Q2 2015Q1
Included observations: 16 after adjustments
Convergence achieved after 10 iterations

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5.042533	18.63650	0.270573	0.7922
LN_FCM	0.077391	1.113296	0.069515	0.9459
@TREND	-0.043993	0.015264	-2.882040	0.0163
MISDELIV_DUM	-0.828246	0.113740	-7.281922	0.0000
AR(1)	0.131564	0.250217	0.525802	0.6105
AR(2)	-0.825973	0.269132	-3.069024	0.0119

R-squared	0.945207	Mean dependent var	5.614171
Adjusted R-squared	0.917811	S.D. dependent var	0.596405
S.E. of regression	0.170981	Akaike info criterion	-0.414532
Sum squared resid	0.292345	Schwarz criterion	-0.124811
Log likelihood	9.316255	Hannan-Quinn criter.	-0.399696
F-statistic	34.50127	Durbin-Watson stat	2.269979
Prob(F-statistic)	0.000005		

MISDELIVERY MODEL 2

Dependent Variable: LN_MISDELIV
Method: Least Squares

Sample (adjusted): 2011Q2 2015Q1
Included observations: 16 after adjustments
Convergence achieved after 10 iterations

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.255696	16.79799	-0.015222	0.9882
LN_TOTAL_MAIL	0.375889	0.957604	0.392531	0.7029
@TREND	-0.042298	0.012243	-3.454905	0.0062
MISDELIV_DUM	-0.831457	0.112984	-7.359056	0.0000
AR(1)	0.118295	0.249691	0.473766	0.6458
AR(2)	-0.816878	0.265210	-3.080113	0.0116

R-squared	0.946067	Mean dependent var	5.614171
Adjusted R-squared	0.919101	S.D. dependent var	0.596405
S.E. of regression	0.169634	Akaike info criterion	-0.430354
Sum squared resid	0.287756	Schwarz criterion	-0.140633
Log likelihood	9.442828	Hannan-Quinn criter.	-0.415517
F-statistic	35.08338	Durbin-Watson stat	2.344276
Prob(F-statistic)	0.000005		

MISDELIVERY MODEL 3

Dependent Variable: LN_MISDELIV
Method: Least Squares

Sample (adjusted): 2011Q3 2015Q1
Included observations: 15 after adjustments
Convergence achieved after 12 iterations

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6.675122	9.271400	0.719969	0.4898
LN_PAR_VOL	-0.028323	0.692177	-0.040919	0.9683
@TREND	-0.038476	0.019130	-2.011275	0.0752
MISDELIV_DUM	-0.870789	0.119430	-7.291206	0.0000
AR(1)	0.094014	0.266940	0.352192	0.7328
AR(2)	-0.843375	0.273040	-3.088830	0.0130

R-squared	0.944152	Mean dependent var	5.567814
Adjusted R-squared	0.913125	S.D. dependent var	0.586743
S.E. of regression	0.172940	Akaike info criterion	-0.382574
Sum squared resid	0.269173	Schwarz criterion	-0.099354
Log likelihood	8.869304	Hannan-Quinn criter.	-0.385591
F-statistic	30.43028	Durbin-Watson stat	2.325256
Prob(F-statistic)	0.000022		

REDELIVERY

Dependent Variable: LN_REDELIV
Method: Least Squares

Sample (adjusted): 2011Q3 2015Q1
Included observations: 15 after adjustments
Convergence achieved after 10 iterations

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.859778	3.239463	1.191487	0.2639
LN_PAR_VOL	0.121993	0.237555	0.513537	0.6199
REDELIV_DUM	-0.257064	0.104163	-2.467893	0.0357
@SEAS(2)	0.153534	0.041258	3.721304	0.0048
AR(1)	1.060385	0.284226	3.730785	0.0047
AR(2)	-0.622922	0.304419	-2.046266	0.0710

R-squared	0.819451	Mean dependent var	5.502538
Adjusted R-squared	0.719146	S.D. dependent var	0.204686
S.E. of regression	0.108475	Akaike info criterion	-1.315427
Sum squared resid	0.105901	Schwarz criterion	-1.032206
Log likelihood	15.86570	Hannan-Quinn criter.	-1.318443
F-statistic	8.169607	Durbin-Watson stat	2.185519
Prob(F-statistic)	0.003678		

STAMPS

Dependent Variable: LN_STAMPS
Method: Least Squares
Date: 08/01/15 Time: 16:08
Sample (adjusted): 2011Q3 2015Q1
Included observations: 15 after adjustments
Convergence achieved after 11 iterations

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-3.445783	3.739768	-0.921390	0.3809
LN_STAMP_VOL	0.525778	0.246370	2.134098	0.0616
@SEAS(1)	0.165705	0.077189	2.146733	0.0604
@SEAS(2)	0.317065	0.049835	6.362305	0.0001
AR(1)	0.036769	0.244424	0.150429	0.8837
AR(2)	-0.240585	0.228064	-1.054900	0.3190

R-squared	0.919700	Mean dependent var	4.673140
Adjusted R-squared	0.875089	S.D. dependent var	0.155305
S.E. of regression	0.054889	Akaike info criterion	-2.677825
Sum squared resid	0.027115	Schwarz criterion	-2.394605
Log likelihood	26.08369	Hannan-Quinn criter.	-2.680842
F-statistic	20.61588	Durbin-Watson stat	1.240508
Prob(F-statistic)	0.000110		

USPS TRACKING MODEL 1

Dependent Variable: LN_USPS_TRK
Method: Least Squares

Sample (adjusted): 2011Q4 2015Q1
Included observations: 14 after adjustments
Convergence achieved after 9 iterations

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.792021	1.560269	-1.148533	0.2945
LN_PAR_VOL(-1)	0.568480	0.116289	4.888514	0.0027
@TREND	0.119026	0.018125	6.566780	0.0006
@TREND^2	-0.006100	0.000834	-7.315734	0.0003
USPS_TRK_DUM	-0.214365	0.038673	-5.543038	0.0015
@SEAS(1)	0.378164	0.025562	14.79423	0.0000
AR(1)	-0.619880	0.316909	-1.956023	0.0982
AR(2)	0.396630	0.330600	1.199728	0.2755

R-squared	0.980082	Mean dependent var	6.484769
Adjusted R-squared	0.956845	S.D. dependent var	0.208519
S.E. of regression	0.043317	Akaike info criterion	-3.144977
Sum squared resid	0.011258	Schwarz criterion	-2.779801
Log likelihood	30.01484	Hannan-Quinn criter.	-3.178780
F-statistic	42.17730	Durbin-Watson stat	1.753071
Prob(F-statistic)	0.000110		

USPS TRACKING MODEL 2

Dependent Variable: LN_USPS_TRK
Method: Least Squares

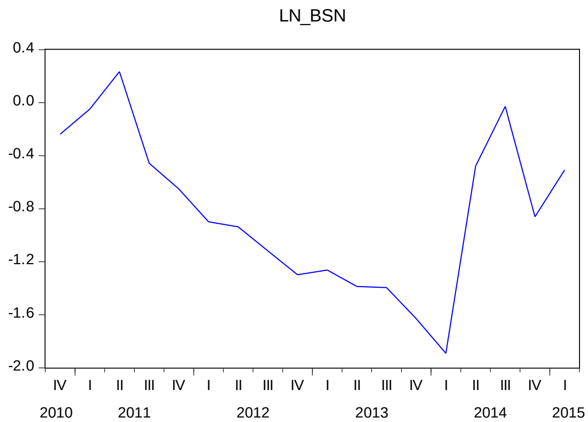
Sample (adjusted): 2012Q4 2015Q1
Included observations: 10 after adjustments
Convergence achieved after 31 iterations

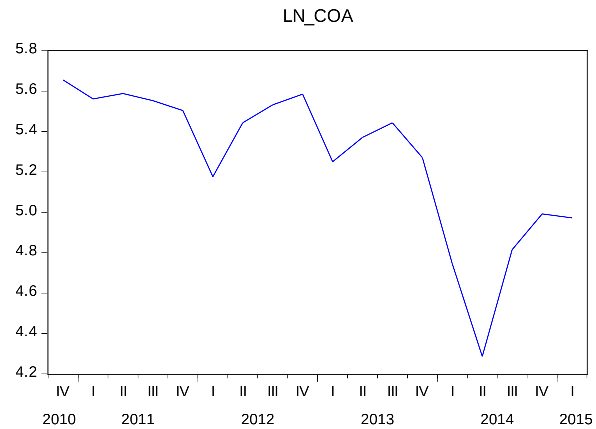
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.644693	4.978315	0.932985	0.4493
LN_TANDC_VOL(-1)	0.143685	0.131671	1.091239	0.3891
USPS_TRK_DUM	-0.286201	0.169492	-1.688583	0.2334
@TREND	0.081688	0.792538	0.103071	0.9273
@TREND^2	-0.005945	0.023692	-0.250947	0.8253
@SEAS(1)	0.388652	0.151612	2.563460	0.1244
AR(1)	-0.356973	2.853032	-0.125121	0.9119
AR(2)	0.645678	3.005335	0.214844	0.8498

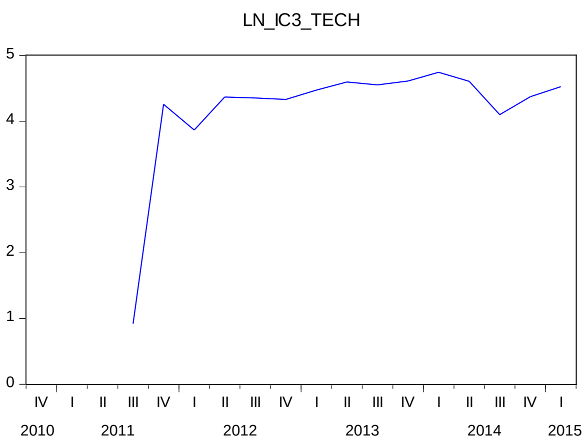
R-squared	0.980104	Mean dependent var	6.507253
Adjusted R-squared	0.910470	S.D. dependent var	0.227855
S.E. of regression	0.068178	Akaike info criterion	-2.542831
Sum squared resid	0.009296	Schwarz criterion	-2.300763
Log likelihood	20.71415	Hannan-Quinn criter.	-2.808379
F-statistic	14.07499	Durbin-Watson stat	1.480532
Prob(F-statistic)	0.067920		

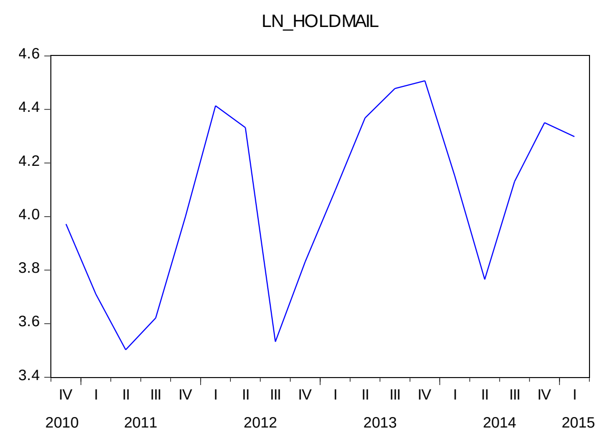
APPENDIX II:

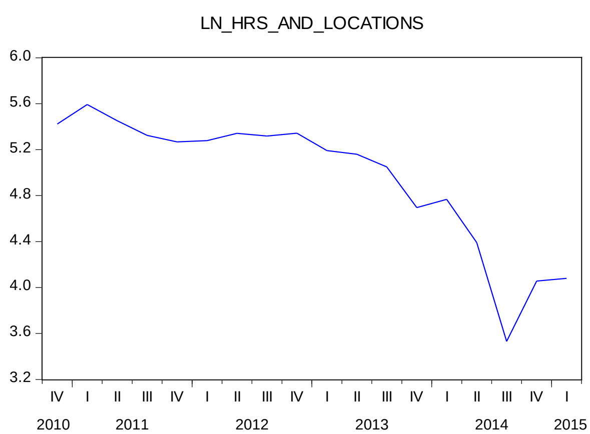
GRAPHS AND TRANSFER FUNCTION EQUATIONS FOR ACTIVTIES CLASSIFIED AS INSTITUTIONAL

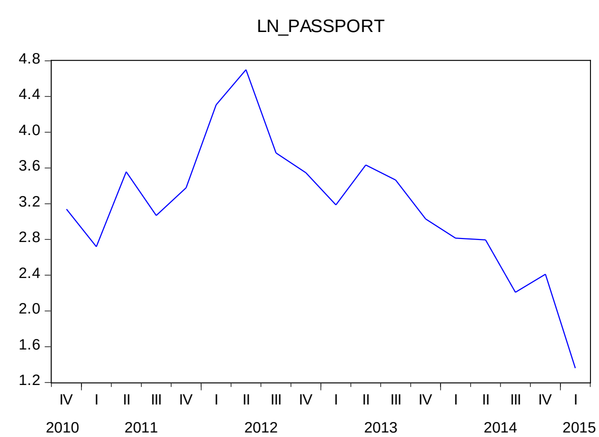


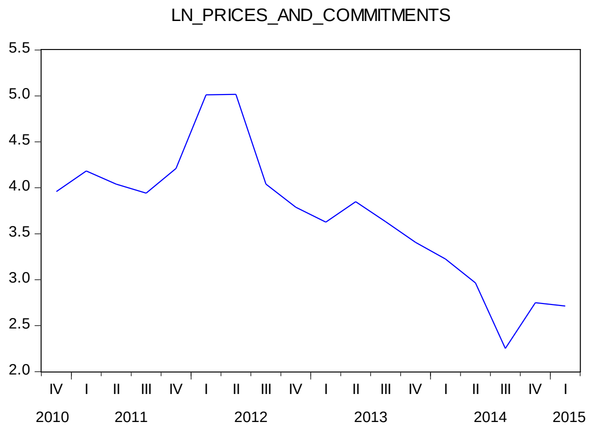








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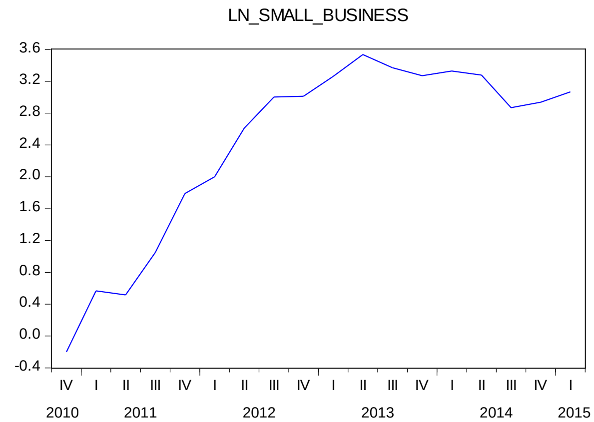
3.5
3.0
2.5
2.0
IV I II III IV I II III IV I II III IV I II III IV I
2010 2011 2012 2013 2014 2015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2.8
2.4
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1.6
1.2
0.8
0.4
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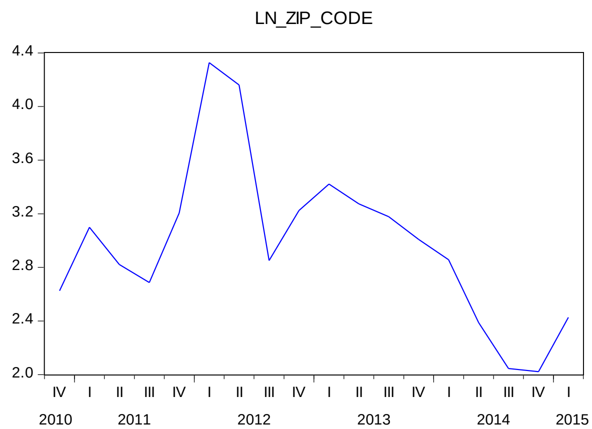
2010 2011 2012 2013 2014 2015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4.0
3.6
3.2
2.8
2.4
2.0
IV I II III IV I II III IV I II III IV I II III IV I
2010 2011 2012 2013 2014 2015

BSN

Dependent Variable: LN_BSN
Method: Least Squares

Sample (adjusted): 2011Q4 2015Q1
Included observations: 14 after adjustments
Convergence achieved after 8 iterations

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6.847339	8.211273	0.833895	0.4319
LN_PAR_VOL	-0.739552	0.407233	-1.816043	0.1122
LN_PAR_VOL(-1)	0.209814	0.435247	0.482058	0.6445
BSNDUM	1.585914	0.102835	15.42187	0.0000
@TREND	-0.105949	0.016513	-6.415999	0.0004
AR(1)	-0.772764	0.303638	-2.545015	0.0384
AR(2)	0.156059	0.240451	0.649025	0.5370

R-squared	0.946669	Mean dependent var	-1.024212
Adjusted R-squared	0.900956	S.D. dependent var	0.501747
S.E. of regression	0.157906	Akaike info criterion	-0.546783
Sum squared resid	0.174540	Schwarz criterion	-0.227254
Log likelihood	10.82748	Hannan-Quinn criter.	-0.576361
F-statistic	20.70918	Durbin-Watson stat	2.122623
Prob(F-statistic)	0.000398		

CHANGE OF ADDRESS

Dependent Variable: LN_COA
Method: Least Squares

Sample (adjusted): 2011Q3 2015Q1
Included observations: 15 after adjustments
Convergence achieved after 7 iterations

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	66.82850	36.96288	1.807989	0.1041
LN_TOTAL_MAIL	-1.854840	1.197239	-1.549264	0.1557
LN_TOTAL_MAIL(-1)	-1.628987	1.235736	-1.318231	0.2200
@TREND	-0.073294	0.023091	-3.174091	0.0113
AR(1)	0.721995	0.342254	2.109533	0.0641
AR(2)	-0.431171	0.346167	-1.245556	0.2444

R-squared	0.749357	Mean dependent var	5.195673
Adjusted R-squared	0.610112	S.D. dependent var	0.369882
S.E. of regression	0.230958	Akaike info criterion	0.196015
Sum squared resid	0.480076	Schwarz criterion	0.479235
Log likelihood	4.529886	Hannan-Quinn criter.	0.192998
F-statistic	5.381543	Durbin-Watson stat	2.289873
Prob(F-statistic)	0.014503		

HOLDMAIL

Dependent Variable: LN_HOLDMAIL
Method: Least Squares

Sample (adjusted): 2011Q3 2015Q1
Included observations: 15 after adjustments
Convergence achieved after 15 iterations

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	61.00262	33.86957	1.801104	0.1019
LN_TOTAL_MAIL	-1.985375	1.169779	-1.697222	0.1205
LN_TOTAL_MAIL(-1)	-1.269159	1.188404	-1.067952	0.3106
AR(1)	0.530710	0.215550	2.462124	0.0336
AR(2)	-0.724889	0.224564	-3.227980	0.0091

R-squared	0.518837	Mean dependent var	4.125365
Adjusted R-squared	0.326372	S.D. dependent var	0.313297
S.E. of regression	0.257138	Akaike info criterion	0.382792
Sum squared resid	0.661198	Schwarz criterion	0.618809
Log likelihood	2.129061	Hannan-Quinn criter.	0.380278
F-statistic	2.695748	Durbin-Watson stat	2.233278
Prob(F-statistic)	0.092696		

HOURS AND LOCATIONS

Dependent Variable: LN_HRS
Method: Least Squares

Sample (adjusted): 2011Q3 2015Q1
Included observations: 15 after adjustments
Convergence achieved after 11 iterations

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-32.86735	41.45072	-0.792926	0.4482
LN_TOTAL_MAIL	0.867399	1.488967	0.582551	0.5745
LN_TOTAL_MAIL(-1)	1.359581	1.517802	0.895757	0.3937
@TREND	-0.115474	0.044295	-2.606909	0.0284
AR(1)	0.529783	0.334526	1.583682	0.1477
AR(2)	0.000744	0.344711	0.002159	0.9983

R-squared	0.832621	Mean dependent var	4.853345
Adjusted R-squared	0.739632	S.D. dependent var	0.581883
S.E. of regression	0.296913	Akaike info criterion	0.698418
Sum squared resid	0.793415	Schwarz criterion	0.981638
Log likelihood	0.761867	Hannan-Quinn criter.	0.695401
F-statistic	8.954022	Durbin-Watson stat	2.081828
Prob(F-statistic)	0.002665		

IC3 TECHNICAL SUPPORT

Dependent Variable: LN_IC3_TECH
Method: Least Squares

Sample (adjusted): 2012Q1 2015Q1
Included observations: 13 after adjustments
Convergence achieved after 9 iterations

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-10.18480	23.25504	-0.437961	0.6767
LN_TOTAL_MAIL	0.321598	0.861062	0.373490	0.7216
LN_TOTAL_MAIL(-1)	0.510690	0.800744	0.637768	0.5472
@TREND	0.017256	0.029927	0.576595	0.5852
IC3TECH_DUM	-0.344358	0.158257	-2.175944	0.0725
AR(1)	0.138071	0.321500	0.429460	0.6826
AR(2)	0.170930	0.060592	2.821026	0.0303

R-squared	0.843696	Mean dependent var	4.423938
Adjusted R-squared	0.687393	S.D. dependent var	0.235391
S.E. of regression	0.131610	Akaike info criterion	-0.914215
Sum squared resid	0.103927	Schwarz criterion	-0.610012
Log likelihood	12.94240	Hannan-Quinn criter.	-0.976743
F-statistic	5.397799	Durbin-Watson stat	2.360392
Prob(F-statistic)	0.029793		

PASSPORTS

Dependent Variable: LN_PASSPORT
Method: Least Squares

Sample (adjusted): 2011Q2 2014Q4
Included observations: 15 after adjustments
Convergence achieved after 24 iterations

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	25.77823	43.88432	0.587413	0.5783
LN_TOTAL_MAIL	-2.066736	1.236802	-1.671033	0.1457
LN_TOTAL_MAIL(1)	0.750879	2.193347	0.342344	0.7438
@TREND	0.229088	0.053430	4.287642	0.0052
@TREND^2	-0.017376	0.002537	-6.849679	0.0005
@SEAS(2)	0.300764	0.262117	1.147446	0.2949
PASSPORT_DUM	0.972773	0.165412	5.880896	0.0011
AR(1)	-0.536140	0.482933	-1.110175	0.3094
AR(2)	-0.048182	0.476157	-0.101189	0.9227

R-squared	0.959171	Mean dependent var	3.324661
Adjusted R-squared	0.904732	S.D. dependent var	0.658251
S.E. of regression	0.203173	Akaike info criterion	-0.065812
Sum squared resid	0.247675	Schwarz criterion	0.359018
Log likelihood	9.493590	Hannan-Quinn criter.	-0.070337
F-statistic	17.61919	Durbin-Watson stat	2.131722
Prob(F-statistic)	0.001240		

PRICES AND COMMITMENTS

Dependent Variable: LN_PANDC
Method: Least Squares

Sample (adjusted): 2011Q3 2015Q1
Included observations: 15 after adjustments
Convergence achieved after 26 iterations

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-45.50442	47.51628	-0.957660	0.3663
LN_TOTAL_MAIL	0.132564	1.468045	0.090300	0.9303
LN_TOTAL_MAIL(-1)	2.744211	1.530661	1.792828	0.1108
PANDC_DUM	0.576301	0.259084	2.224379	0.0568
@TREND	-0.120785	0.026376	-4.579283	0.0018
AR(1)	0.730033	0.294253	2.480971	0.0381
AR(2)	-0.355395	0.302041	-1.176645	0.2732

R-squared	0.947359	Mean dependent var	3.628757
Adjusted R-squared	0.907878	S.D. dependent var	0.787052
S.E. of regression	0.238882	Akaike info criterion	0.279035
Sum squared resid	0.456519	Schwarz criterion	0.609458
Log likelihood	4.907240	Hannan-Quinn criter.	0.275515
F-statistic	23.99549	Durbin-Watson stat	2.280054
Prob(F-statistic)	0.000106		

Dependent Variable: LN_SMALL_BUS
Method: Least Squares

Sample (adjusted): 2011Q4 2015Q1
Included observations: 14 after adjustments
Convergence achieved after 7 iterations

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-18.14831	17.47476	-1.038544	0.3336
LN_PAR_VOL	0.344509	0.751620	0.458355	0.6606
LN_PAR_VOL(-1)	1.014402	0.731841	1.386096	0.2083
@TREND	0.528660	0.369461	1.430893	0.1955
@TREND^2	-0.023038	0.017190	-1.340194	0.2220
AR(1)	0.410350	0.548837	0.747671	0.4790
AR(2)	-0.134490	0.677094	-0.198628	0.8482

R-squared	0.923567	Mean dependent var	2.952852
Adjusted R-squared	0.858052	S.D. dependent var	0.508418
S.E. of regression	0.191551	Akaike info criterion	-0.160468
Sum squared resid	0.256844	Schwarz criterion	0.159061
Log likelihood	8.123274	Hannan-Quinn criter.	-0.190046
F-statistic	14.09715	Durbin-Watson stat	1.663556
Prob(F-statistic)	0.001352		

ZIPCODE

Dependent Variable: LN_ZIP
Method: Least Squares

Sample (adjusted): 2011Q3 2015Q1
Included observations: 15 after adjustments
Convergence achieved after 97 iterations

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-574.3439	1570766.	-0.000366	0.9997
LN_TOTAL_MAIL	1.043575	1.618124	0.644929	0.5351
LN_TOTAL_MAIL(-1)	0.407297	1.501508	0.271259	0.7923
ZIP_DUM	0.876978	0.299819	2.925022	0.0169
AR(1)	1.206637	0.424901	2.839807	0.0194
AR(2)	-0.206763	0.601895	-0.343519	0.7391

R-squared	0.815256	Mean dependent var	3.004971
Adjusted R-squared	0.712620	S.D. dependent var	0.665381
S.E. of regression	0.356696	Akaike info criterion	1.065310
Sum squared resid	1.145090	Schwarz criterion	1.348530
Log likelihood	-1.989825	Hannan-Quinn criter.	1.062293
F-statistic	7.943196	Durbin-Watson stat	1.722810
Prob(F-statistic)	0.004053		

Customer Care Centers – Distribution Keys

In Order No. 2462, the Commission directed the Postal Service “to provide a more thorough analysis of the variability of the attributable call types and the distribution of the attributable call types to the products and services. This analysis should be accompanied by an explanation of the reasons for the choice of distribution key.” What follows is the requested explanation for the choice of distribution key by call type.

<u>Stamps</u>: A call about stamps can include questions about the products a stamp can be used on, about the First Day of Issue, about purchasing stamps, or any other question which may be related to stamps. These questions can also be about both denominated and Forever stamps. The distribution key for the ”stamps” call type is the RPW Shape Indicia Report, in which the Postal Service can identify the proportions of all stamped products. The RPW Shape Indicia Report, footnote _2 in the Call.Cntr.DK_FY13 excel spreadsheet can be found in USPS-FY13-NP25 and publicly in USPS-FY13-14.

<u>Track and Confirm</u>: The Carrier Cost Systems Tracking Barcode Distribution Keys, originating in both City Carrier and Rural CarrierSystems, were used to distribute the calls regarding tracking and confirmation, as well as activities considered to be Domestic Research related to the products bearing tracking barcodes. The activity labeled “Domestic Research” is considered to be time spent by the clerk researching and investigating domestic items with confirmation or a tracking barcode. As such, the distribution keys for these two activities are the volume proportions of products which bear a tracking barcode or confirmation. These data are identified in the Carrier Cost Systems and can be found in USPS-FY13-32.

<u>International: Product Specific (Other Call types)</u>: There are several call types specifically geared towards the Postal Service’s International products. Where a call type is defined to

include one product exclusively, the Postal Service considers the costs for these call types to be product specific. This is consistent with the handling of other costs that are associated with a single product. The remainder of the international product calls are considered to be group specific. The group specific classification is consistent with previous use of International IVR call volumes for international related call topics.

<u>Redelivery</u>: The call type identified as “Redelivery” is distributed to the products via scanning information. When an item cannot be delivered, for various reasons, it receives an “Attempted” scan and necessitates a redelivery. It is expected that a portion of items that require a redelivery would also result in a call to the customer call centers to inquire about redelivery. The Enterprise Data Warehouse (EDW) is where this particular scan data regarding the “Attempted” deliveries is stored, and the Delivery Success Report is generated. This report provides the product volumes of items which received this scan, and those proportions are then used as the distribution key for “Redelivery” call types.

<u>Parcels</u>: “GoPost” calls are distributed based on parcel proportions. GoPost was designed to deliver more parcels on the first attempt in more convenient location to the customer. Fittingly, as GoPost was designed to accommodate parcels, the calls regarding GoPost are distributed based on parcel product proportions. The RPW Shape Indicia Report provides volume information on shape by product; as such, this was the report used to generate those proportions. This report can be found in USPS-FY13-14.

<u>Misdelivery</u>: Service Performance Pieces with Problems Report from EDW. The call type identified as “Misdelivery” is one of the more ambiguous call types identified here. A misdelivered mailpiece can be the result of an incorrect address, an illegible address, an incorrectly entered address through the POS system, mail processing error, machine errors,

and other reasons. Whether the fault of the error was the Postal Service or the customer, the result is the same: a misdelivered mailpiece. Many mailpieces with these errors are corrected. However, the few that are not corrected receive a “Missent” scan upon discovery of the error. A missent mailpiece is one that arrives at a location other than the intended delivery point. These scans are captured and recorded in an EDW report, and the volumes of products are used to distribute these calls.

Customer Specific NSA: (Other call types):The Postal Service has NSAs with a multitude of customers. In an effort to better manage the calls regarding mailpieces sent under customer specific NSAs, the Postal Service has created call types which correspond to several of these NSAs. As such, the volume by product of those NSAs is used to distribute those call types. The source of those volumes are eVS and PostalOne!. The customers would be contacting the call center in regards to already shipped volumes; therefore the call volumes would be related.