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

POSTAL RATE AND FEE CHANGES, 2000

Docket No. R2000–1

RESPONSE OF UNITED STATES POSTAL SERVICE
WITNESS BOZZO TO INTERROGATORIES OF
MAGAZINE PUBLISHERS OF AMERICA
(MPA/USPS–T15–1-8)

The United States Postal Service hereby provides the responses of witness Bozzo to the following interrogatories of Magazine Publishers of America: MPA/USPS–T15-1-8, filed on January 21, 2000.

Each interrogatory is stated verbatim and is followed by the response.

Respectfully submitted,

UNITED STATES POSTAL SERVICE

By its attorneys:

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February 4, 2000

MPA/USPS–T–15–1. Please refer to Section VIIIB.3., where you describe your investigation and corroboration of Dr. Bradley's R97–1 results for the MODS allied operations. On page 138, you indicate that you investigated several different models that enhanced Dr. Bradley's work with data on additional cost drivers, specifically data on crossdocked containers, destinating volumes, and truck arrivals and departures.

a. Please describe the precise models that you investigated and the variability estimates you obtained for each. Please include descriptions of any and all alternate model specifications that you investigated.

b. Please provide the data and programs for performing the analyses described above in MPA/USPS–T–15–1 (a).

c. Please describe any tests of significance or specification that you performed on these models.

d. Please describe the statistical analyses underlying your conclusion on lines 14–17 of page 138 that Dr. Bradley's "proxy" cost drivers provide "the bulk of the explanatory power."

MPA/USPS–T–15–1 Response.

a. The labor demand models for allied operations that I investigated have the general form

$$\begin{aligned} hrs_{it} = f(&TPH_{AUTOL,it}, TPH_{FSM,it}, TPH_{MANL,it}, TPH_{MANF,it};\\ &DLETTERS_{it}, DFLATS_{it}, DPARCELS_{it};\\ &CAP_{it}, DELS_{it}, WAGE_{it}, TREND_{it};\\ &QTR2_{it}, QTR3_{it}, QTR4_{it}) \end{aligned}$$

where hrs_{it} is the number of MODS hours recorded for the allied operation in plant i and quarter t; $TPH_{AUTOL,it}$, $TPH_{FSM,it}$, $TPH_{MANL,it}$, and $TPH_{MANF,it}$ are the MODS piece handlings recorded for plant i and quarter t in the automated/mechanized letters (OCR + LSM + BCS), FSM, manual letters, and manual flats cost pools, respectively; $DLETTERS_{it}$, $DFLATS_{it}$, and $DPARCELS_{it}$ represent ODIS destinating volumes of letters, flats, and parcels in plant *i* and quarter *t*; and the remaining variables are defined as they were in my direct testimony.

As I did with the estimation of labor demand functions for the sorting operations described in my testimony, I employed a flexible translog functional form when estimating the allied labor demand equations. Thus, each current period variable enters with (log) linear and (log) quadratic terms, as well as interaction terms with all other current period regressors. In addition, four lagged quarters of the volume-related drivers (TPHs and destinating volumes) enter with (log) linear and (log) quadratic terms, but are not interacted with the other variables. (For example, besides $\ln(TPH_{AUTOL,it})$ and its square, the model also includes $[\ln(TPH_{AUTOL,it})(-1)]$, $[\ln(TPH_{AUTOL,it})(-2)]$, $[\ln(TPH_{AUTOL,it})(-3)]$, and $[\ln(TPH_{AUTOL,it})(-4)]$ and their squares.) The trend enters in levels rather than logs, with linear and quadratic terms, and is interacted with all current period regressors. Finally, the seasonal (quarterly) dummy variables enter linearly in levels and are not interacted at all. Please see the computer programs vv-allied.tsp and vv-allied-v2.tsp, which will be provided in LR-I-178, for the exact specification of the model.

This model estimates many more parameters relative to that used to estimate mail processing labor demand in the direct distribution cost pools (136 versus 38, exclusive of the facility intercepts, autocorrelation coefficient, and standard error of the regression). For this reason, I was not surprised that some of the higher-order lagged terms were found to be highly collinear with other included variables. I therefore also experimented with specifications with fewer lags. See the vv-allied.out and vv-allied-v2.out files, which will be provided in LR–I–178, for the results.

b. I will provide two spreadsheets containing allied labor data sets in LR-I-178. The spreadsheet all9398.xls contains MODS workhours for the Platform, Opening Pref, Opening Bulk, and Pouching operation groups; destinating letter, flat, and parcel volumes from ODIS; facility square footage; and dummy variables indicating whether the facility is an ADC or AADC. The spreadsheets include a header row with variable labels. The data are organized such that when the header row is deleted, the data in all9398.xls align with the data provided in the reg9398.xls spreadsheet, provided in LR-I-107.

The spreadsheet platform.xls contains information on crossdocked containers and dock square footage from Christensen Associates data (from a different study than that described in LR-I-115), matched MODS data on "direct" piece handlings and platform workhours, PERMIT data on bulk entered mail volumes, and truck arrivals and departures from TIMES or the analogous form 5398 data. These data are organized as four weekly observations (from October 19, 1996 to November 15, 1996) for each of seventy-six surveyed facilities, for a total of 304 observations. Data on other variables matched to this data set are not available.

Two TSP programs, vv-allied.tsp and vv-allied-v2.tsp, that estimate the general model described in part (a) will also be provided in LR-I-178, along with their output files. The programs provide OLS and feasible generalized least-squares (FGLS) estimates of the translog specification of the general model described in part (a), as well as the relevant elasticities evaluated at the sample arithmetic mean. The vv-allied.tsp program estimates the model with four lags of the piece handling and destinating volume variables; the vv-allied-v2.tsp program estimates the model with a single quarter lag of the piece handling and destinating volume variables. With appropriate modifications, specifications involving additional variables or alternative assumptions should be easily incorporated. Additionally, a simplified version of the model described in part (a) could be estimated using the data in the platform.xls spreadsheet.

c. The main statistical tests performed on these models include a Lagrange multiplier test of the pooled model against an error-components model (see my direct testimony, USPS-T-15, at 123 for a description); a Hausman test of the random effects against the fixed effects formulation of the error-components model (ibid.); a version of the Durbin-Watson test for serial correlation, suitably modified for panel data (see Docket No. R97-1, USPS-T-14, at 48 for a description); and a t-test on the estimated volume-variability factor. See the vv-allied.out and vv-allied-v2.out files, which will be provided in LR–I–178, for the results.

d. I calculated the volume-variability factors for the allied labor models described in part (a) as the sum of the elasticities with respect to the piece handling variables and the elasticities with respect to the destinating volume variables. My statement was based on the observation that the piece handling elasticities constituted large fractions of the allied labor variabilities.

MPA/USPS–T–15–2. Please refer to Section VII.C., where you discuss your alternate estimation methods.

a. Is it the case that the pooled and "between" estimation methods are identical except that the pooled model uses the full dataset and the "between" model uses only the mean of each variable for each facility? If this is not the case, please describe all other differences between the pooled and "between" estimation methods.

b. Please describe the general circumstances—according to standard econometric theory and practice—in which it is considered preferable to use averaged cross-section data rather than panel data when both are available. Similarly, please describe the general circumstances in which it is considered preferable to use panel data rather than averaged cross-section data. In each case, please briefly explain the rationale for these preferences or provide appropriate citations to such explanations contained in standard econometric references.

c. Please confirm that the effect of using the mean of each variable for each facility is to remove information from the dataset about the nature of volume-variability within facilities. If this is not the case, please explain why it is not.

d. Please explain the difference (if any) between measuring volume-variability between facilities and measuring it within facilities in terms of the economic meaning of the demand function that is being measured in each case.

MPA/USPS–T–15–2 Response.

a. Mostly, yes. Note that as I implemented the procedures for Section VII.C of my testimony, both the pooled ordinary least squares (OLS) and between estimators use the same underlying set of observations, so the pooled OLS estimator does not use a "fuller" data set than the between estimator in one sense. I believe a better characterization would be that the pooled OLS estimator uses the data *in panel form*, whereas the between estimator uses only the facility means of the data. Another difference is that there is no need to compute regression results adjusted for autocorrelation of the disturbances, since the between estimator is a type of cross-section estimator.

b. I do not believe that there are any circumstances of general applicability in which using only the individual means of the data would be preferred over using the data in panel form, given the availability of both. Two texts frequently cited in Docket No. R97-1, Hsiao's *Analysis of Panel Data* and Greene's *Econometric Analysis*, actually lack index entries for the between estimator. Greene and Hsiao only mention the between estimator in the context of demonstrating the algebraic fact that the pooled OLS estimator and generalized least squares (GLS) estimators such as the random effects model can be expressed as a weighted average of the within and between estimators.

The use of panel data, and more specifically estimation techniques such as the fixed-effects ("within") and random-effects estimators, has several well-known advantages. As summarized by Hsiao, these are:

> (1) identification of economic models and discrimination of competing economic hypotheses, (2) eliminating or reducing estimation bias, and (3) reducing problems of data multicollinearity. (*Analysis of Panel Data*, p. 213.)

The classic specification question in panel data analysis is not whether to use the panel data versus facility averages (or aggregated time series data), but rather whether to apply the fixed-effects, random-effects, or pooled OLS estimators to the data in panel form. See Hsiao, *Analysis of Panel Data*, pp. 41-49.

The underlying theoretical problem with the between estimator is that it is a biased and inconsistent estimator of the slope coefficients β_k of a general "error components" regression model with the form:

$$y_{it} = \alpha_i + \sum_{k=1}^{K} \beta_k x_{k,it} + \varepsilon_{it}, \qquad (1)$$

unless the individual intercepts (or "fixed effects") α_i are uncorrelated with the other regressors (a special case of which is identical or "pooled" intercepts). Most sources that state the result clearly, such as Davidson and MacKinnon (*Estimation and Inference in Econometrics*, Oxford University Press, 1993, p. 323), do not prove the result explicitly, presumably since it follows directly from general omitted variables results, such as the proof in Schmidt's *Econometrics* at 39-40. In the cases in which it is unbiased and consistent, the between estimator is an inefficient estimator of the coefficients in (1), since (depending on the precise specification of the intercept and error terms) the best linear unbiased estimator would be GLS applied to the data in panel form (which may reduce to pooled OLS; see Hsiao, *Analysis of Panel Data*, p.

34). In contrast, the within estimator produces consistent estimates of the coefficients of equation (1) regardless of the presence of correlation between the fixed effects and the other regressors (Id.), and is asymptotically efficient (as the number of time periods becomes large; see Hsiao, *Analysis of Panel Data*, p. 37).

Note that with appropriate definitions of the *x* variables, equation (1) can represent a very wide class of regression models, including the estimating equations on pages 117 and 118 of my testimony, USPS-T-15. Note also that in section VII.B.2 of my testimony, I report the results of statistical tests that reject the hypotheses that the intercepts are identical and that they are uncorrelated with the other regressors, indicating that the between model is indeed biased and inconsistent when applied to the mail processing data.

c. Partly confirmed. I believe a more precise statement would be that the effect of using the facility means is to lose all information about within-facility variations of any sort in the data. As I state in my testimony at pages 67-71, exploiting the within-facility variations in the data is extremely important for the accurate estimation of volume-variability factors, particularly given the importance of distinguishing the effects of mail volume from those of correlated non-volume factors (e.g., network effects) and unobserved fixed factors.

d. I assume that "measuring volume-variability between facilities" means, technically, estimating the labor demand relationship using the between model (I read "within facilities" the same way). As Hsiao's enumeration of the advantages of panel data suggests—see the response to part (b) of this interrogatory, above—some types of economic relationships may be difficult or impossible to identify and estimate using cross-section or aggregate time series analysis.

For the most part, though, I see the between and within estimators simply as alternative strategies for estimating the labor demand functions underlying the Postal Service's operating data. Given labor demand functions with the form of equation (1), the within estimator is consistent (unbiased) whenever the between estimator is also consistent (unbiased), and remains consistent (unbiased) in cases where the between estimator is inconsistent (biased). My specification testing (see USPS-T-15, section VII.B) indicates that the between estimates are, indeed, biased. Therefore, the question boils down to whether there is an economic interpretation to the potential bias or inconsistency due to misspecification of the between estimator (omitted variables bias). Since neither the direction nor the magnitude of the potential bias is easily knowable in advance, I believe there will be no stable economic interpretation of inconsistent results obtained from the between model. See also Mr. Degen's testimony for discussion of operational factors that give rise to non-volume cost causing factors that may be correlated with, but not caused by, mail volumes (USPS-T-16 at 14; 18-23).

MPA/USPS–T–15–3. Did you perform any alternate data scrubs that are not reported in USPS–T–15? If so, please describe each such data scrub and provide the results of any investigations you performed about the impact of the scrub on the data characteristics and the resulting volume-variability estimates.

MPA/USPS–T–15–3 Response.

No. I did not implement any other types of sample selection rules than those described in USPS-T-15.

MPA/USPS–T–15–4. Please refer to Section VIII.B.1, page 134, where you state:

While witness Degen's testimony does not directly address these operations, many of the factors he identifies as consistent with lower volume-variability factors for Function 1 operations are also present in the analogous Function 4 and non-MODS operations.

Please identify the analogous pairings of Function 1 and Function 4 operations, and of Function 1 and non-MODS operations, for which there are similar factors that are consistent with lower volume-variability factors.

MPA/USPS–T–15–4 Response.

The following table matches Function 4 and non-MODS distribution and allied labor cost pools with analogous Function 1 cost pools. Note that the following table does not suggest exactly the same pairings as Dr. Bradley proposed in Docket No. R97-1 (see Docket No. R97-1, USPS-T-14). Witness Degen also discussed the rationale for some of Dr. Bradley's volume-variability assumptions for other operations without econometric variabilities in Docket No. R97-1 (Tr. 12/6385-6).

Function 4 or non-MODS cost pool	Predominant activities	Analogous Function 1 cost pool(s)
LD41	Automated letter distribution (mostly CSBCS)	BCS
LD42	Mechanized flat distribution	FSM
LD43	Manual letter, flat, and parcel distribution; allied labor at stations and branches	Manual letters, manual flats, manual parcels; platform, opening, pouching
LD44	Manual distribution of letters and flats (to PO Boxes)	Manual letters, manual flats
Auto/Mec (non-MODS)	Automated letter distribution (mostly CSBCS)	BCS
Manual letters (non-MODS)	Manual letter distribution	Manual letters (Function 1)
Manual flats (non-MODS)	Manual flat distribution	Manual flats (Function 1)
Manual parcels (non-MODS)	Manual parcel distribution	Manual parcels (Function 1)
Allied labor (non-MODS)	Allied labor at non-MODS facilities	Platform, opening, pouching

MPA/USPS–T–15–5. Please refer to Section II.B., page 19, where you state that the Commission's conclusion in R97–1 about biases introduced by Dr. Bradley's data scrubs is "simply unsupported by the record in that case." Please provide citations for the precise model comparisons that substantiate your statement.

MPA/USPS–T–15–5 Response.

The primary basis for the quoted statement is Dr. Neels's table comparing regression results from Dr. Bradley's preferred sample (i.e., "scrubbed" data) and results from the models re-estimated with "all usable" observations. This is the material found at the page (15618) I cite in volume 28 of the Docket No. R97-1 transcript. Dr. Neels's table reports results for 23 MODS and BMC operation groups. If the application of Dr. Bradley's "scrubs" imparted a large downward bias on his results, one would expect most or all of the variabilities from Dr. Neels's "all usable" exercise to be higher. However, according to Dr. Neels' results, the variabilities based on "all usable" observations are higher in eleven cases and lower in twelve. Since Dr. Neels's results fail to identify even a predominant direction, let alone a single direction, of the differences between the two sets of results, they are inconsistent with the presence of a large bias in either direction due to Dr. Bradley's "scrubs."

The composite variability (using BY96 cost pool weights; see also the response to MPA/USPS-T-15-8) for the cost pools in Dr. Neels's table is 5.4 percentage points lower using Dr. Bradley's preferred results (79.1 percent versus 84.5 percent). The 5.4 percentage point difference is slightly less than the average of "a bit over 6 percentage points" reported by Mr. Higgins for the six letter and flat distribution cost pools at one of the pages I cite in volume 33 of the Docket No. R97-1 transcript (18019). The six cost pools discussed by Mr. Higgins account for a bit over two thirds of the overall difference. See spreadsheet MPA5.xls, which will be provided in LR-I-178. It is likely that at least a portion of the 5.4 percentage point net difference results from the admission of some highly erroneous data into the regressions in Dr. Neels's "all usable" results, but even if the entire difference could be attributed to bias, the composite variability would still be well below 100 percent.

MPA/USPS–T–15–6. Please describe the method used to construct your facility capital index. Please describe and provide any additional data used to construct this index that have not already been described and provided in USPS–LR–I–107.

MPA/USPS–T–15–6 Response.

The general methodology for the construction of my facility capital index is described in the report, "USPS Quarterly Total Factor Productivity Methodology," which was provided by Mr. Degen as part of LR-H-272 in Docket No. R97-1. The dollar value of facility capital is deflated by a national capital price index. The national capital price index is a multilateral Tørnqvist index, computed by the "multilat" command in the LR-I-107 program load.qindex.epl. I am providing documentation of the methodology of the "multilat" command as Attachment 1 to this response. The spreadsheet Capital index.xls, which will be provided in LR-I-178, contains the requested data.

MULTILAT

Form Of Command

```
GROUP pair1 pair2 ... pairn
MULTILAT (method, type, order) pname $
MULTILAT (method, type, order) qname $
MULTILAT (method, type, order) pname baseobservation $
MULTILAT (method, type, order) qname baseobservation $
MULTILAT (method, type, order) pname qname $
MULTILAT (method, type, order) pname qname baseobservation $
MULTILAT (method, type, order) pname baseobservation basevaluep $
MULTILAT (method, type, order) qname baseobservation basevalueq $
MULTILAT (method, type, order) pname qname baseobservation basevaluep $
MULTILAT (method, type, order) pname qname baseobservation basevaluep basevalueq $
```

where pair$_1$, ... are pairs of timeseries names that denote prices followed by quantities, quantities followed by values, or prices followed by values for each of the concepts to be aggregated.

Method Is one off the method options listed below.

Type is one or both of the type options listed below.

Order is one of the order options listed below.

Baseobservation is the observation number in which the resulting indexes will be based. If a SAMPLE YEAR or SAMPLE PANEL YEAR statement is in effect, the YEAR synonym for the base period must be used. Baseobservation must be a number or a scalar.

Basevaluep is the value for the price index in the base observation. Basevaluep may be a number, a scalar name, a timeseries name, an asterisk (*), or the pound sign(#) . If a scalar name is used, the base observation value of the price index will equal the scalar. If a timeseries name is used, the base observation value of the price index will equal the base observation value of the timeseries. If an asterisk is used, the base observation value of the price index will equal the sum of the base observation values from the timeseries of values. (If the timeseries of values are not specified in the GROUP command, they are implicitly calculated by multiplying the price timeseries by the quantity timeseries.) If a pound sign is used, the price index will be scaled so that its mean is 1.

Basevalueq is the value for the price index in the base observation. Basevalueq may be a number, a scalar name, a timeseries name, an asterisk (*), or the pound sign(#) . If a scalar name is used, the base observation value of the price index will equal the scalar. If a timeseries name is used, the base observation value of the price index will equal the base observation value of the timeseries. If an asterisk is used, the base observation value of the price index will equal the sum of the base observation values from the timeseries of values. (If the timeseries of values are not specified in the GROUP command, they are implicitly calculated by multiplying the price timeseries by the quantity timeseries.) If a pound sign is used, the price index will be scaled so that its mean is 1.

Description Of Command

Currently EPL has a wide array of price and quantity indexes that are based on "bilateral comparisons." These indexes are accessed through the command INDEX. These indexes are useful when one is using time series data on an individual firm. These indexes are less useful, however, when one is looking at a cross section of firms or a panel of firms. There is a class of multilateral price and quantity indexes that are specifically designed for those circumstances.

The first is the Multilateral Tornqvist index, developed by Caves, Christensen, and Diewert. This index is an extension of the Tornqvist index, which is currently an option in EPL. The other two indexes are the Gini-EKS system and the Fisher Own Share system, which are extensions of the Fisher Ideal Index, also a current option in EPL. The Gini-EKS and Fisher Own Share systems have recently been advocated by Diewert because the satisfy a large number of axiomatic properties and are exact for a flexible functional form (i.e. are superlative).

Options

Method options denote which index will be computed:

T Tornqvist
G Gini-EKS
F Fisher Own Share

Type options denote the type of index to be computed:

P Price Index
Q Quantity Index

Order options describe the data used in the GROUP command:

PQ The GROUP command contains price followed by quantity for each component.
QV The GROUP command contains quantity followed by value for each component.
PV The GROUP command contains price followed by value for each component.

The Multilateral Tornqvist Quantity Index

Suppose that there are N cross-sectional observations and K commodities that we wish to aggregate. (For purposes of constructing a Multilateral Tornqvist index for a panel consisting of N firms in T periods, one can think of the panel as a cross-section of NT observations.) We will use the following definitions:

p_{ik} ≡ the price of commodity k for observation i (1)

q_{ik} ≡ the quantity of commodity k for observation i (2)

s_{ik} ≡ the value share of commodity k for observation i

$$= \frac{p_{ik} \cdot q_{ik}}{\sum_j p_{ij} \cdot q_{ij}} \qquad (3)$$

$\overline{s_k}$ = the average share of commodity k

$$= \frac{1}{N} \cdot \sum_i s_{ik} \qquad (4)$$

$$\overline{\ln(q_k)} = \frac{1}{N} \cdot \sum_i \ln(q_{ik}) \qquad (5)$$

The Multilateral Tornqvist quantity index for observation i is then given by the formula:

$$Q_i = \exp\left(\sum_k .5 \cdot \left(s_{ik} + \overline{s_k}\right) \cdot \left(\ln(q_{ik}) - \overline{\ln(q_k)}\right)\right) \qquad (6)$$

The Multilateral Tornqvist price index is obtained by substituting prices for quantities in equations (5) and (6).

The Gini-EKS Quantity Index

Using definitions (1) and (2), the Fisher Ideal Quantity Index between observations i and j is defined to be:

$$F(i,j) = \sqrt{\frac{\left(\sum_k p_{ik} \cdot q_{ik}\right) \cdot \left(\sum_k p_{jk} \cdot q_{ik}\right)}{\left(\sum_k p_{ik} \cdot q_{jk}\right) \cdot \left(\sum_k p_{jk} \cdot q_{jk}\right)}} \qquad (7)$$

Then the Gini-EKS Quantity Index for observation i is given by the formula:

$$Q_i = \left[\prod_{j=1}^{N} F(i,j)\right]^{1/N} \qquad (8)$$

The Gini-EKS Price Index is computationally parallel to the Gini-EKS Quantity Index. It is obtained by applying equation (8) to the set of Fisher Ideal Price Indexes.

The Fisher Own-Share Quantity Index

Using definitions (1) and (2), as well as the Fisher Ideal Quantity Index (7), the Fisher Own-Share Quantity Index for observation i is given by the formula:

$$Q_i = N \cdot \left[\sum_{j=1}^{N} F(j,i)\right]^{-1} \qquad (9)$$

Note that the bilateral Fisher Ideal comparisons in equation (9) is the reverse of the comparisons in (8). Not also that the Fisher Ideal index has the property: F(j,i) = 1/F(i,j).

The Fisher Own-Share Price Index is computationally parallel to the Fisher Own-Share Quantity Index. It is obtained by applying equation (9) to the set of Fisher Ideal Price Indexes.

Examples

1. GROUP P1 Q1 P2 Q2 P3 Q3 $
   MULTILAT(T,P,PQ) pind qind $

   The Multilateral Tornqvist price index will be computed and based such that observation 1 is equal to 1. The dual quantity index will be computed such that pind*qind is equal to the total value of the series being aggregated.

2. GROUP Q1 V1 Q2 V2 Q3 V3 $
   MULTILAT(F,P,Q,QV) pind qind $

   The Fisher Own-Share price index and quantity index will both be computed and based such that observation 1 is equal to 1.

3. GROUP P1 V1 P2 V2 P3 V3 $
   MULTILAT(G,P,PV) pind qind 3 * * $

   The Gini-EKS price index will be computed and based such that observation 3 is equal to the total value of the series being aggregated. The dual quantity index will be computed such that pind*qind is equal to the total value of the series being aggregated. Thus the second asterisk has no effect.

4. GROUP P1 Q1 P2 Q2 P3 Q4 $
   MULTILAT (T,P,Q,PQ) pind qind 1 * * $

   The Multilateral Tornqvist price index will be computed and based such that observation 1 is equal to the total value of the series being aggregated. The quantity index will also be computed and base such that observation 1 is equal to the total value of the series being aggregated.

5. GROUP P1 Q1 P2 Q2 P3 Q3 $
   MULTILAT(T,P,PQ) pind 1 # $

   The Multilateral Tornqvist price index will be computed and rescaled such that the mean of the index is equal to 1.

Notes

1. If only the P option is used, MULTILAT computes the price index. This price index is based to basevalup at observation baseobservation. The dual quantity index is also computed. This dual index takes values such that the price index times the dual quantity index equals the total value of the series being aggregated. The dual quantity index will not be rebased to basevaluq at the base observation. Basevalue q is ignored unless the Q option is specified.

   If only the Q option is used, the opposite to the preceding discussion will be computed. If both the P and Q options are used, INDEX computes price and the quantity indexes and dual indexes are not computed.

2. MULTILAT operates only on the observations in the current SAMPLE statement.

3. MULTILAT acts on the most recent GROUP command in effect. To compute several alternative indexes from the same component pairs it is not necessary to repeat the GROUP command.

Response of United States Postal Service Witness Bozzo
to Interrogatories of Magazine Publishers of America

MPA/USPS–T–15–7. Please explain why you have chosen to use quarterly data rather than accounting period data.

MPA/USPS–T–15–7 Response.

Several factors motivated the decision to use quarterly data rather than accounting period (AP) data for my preferred model. These include:

- Using quarterly data mitigates several types of potential data errors. Data errors (particularly those due to sporadic errors such as data entry failures) that would be large relative to high frequency data (daily, weekly) would be much smaller relative to larger aggregates of the data. Quarterly data subject to "accounting adjustments" (data entries in one period that reverse an error in a previous period) will to be more accurate to the extent errors and the adjustments that reverse them occur in the same quarter but not the same accounting period.
- Using quarterly data facilitates combining the MODS data with data from other sources. My development of data from sources other than MODS follows procedures developed for the estimation of quarterly Total Factor Productivity (TFP) for Postal Service field units. See also the response to MPA/USPS-T-15-6.
- Using quarterly data permits longer-term labor adjustment processes to be specified with fewer variables than with AP data. Specifying lag terms of piece handlings up to one year, with first and second-order terms, requires eight regressors with quarterly data compared to twenty-six with AP data.

Conserving degrees of freedom is not vital for the panel data estimators I recommend using, but it would be relatively more difficult to reliably estimate cross-section estimators such as the between estimator, the more regressors that need to be included in the model. Additionally, using fewer regressors may mitigate computational difficulties resulting from near-multicollinearity of the data.

Response of United States Postal Service Witness Bozzo
to Interrogatories of Magazine Publishers of America

MPA/USPS–T–15–8. Please refer to Table 9 on page 126. The composite variability factor for BY 1998 appears to be a weighted average using the Pool Total Costs derived by witness Van-Ty-Smith and reported in Table 1 of USPS–T–17. Please confirm that this is the case. If it is not, please provide the appropriate formula for constructing the composite.

MPA/USPS–T–15–8 Response.

Confirmed. Strictly speaking, the "composite variability" is the (pool total) cost weighted average elasticity, or equivalently the ratio of volume-variable costs to pool total costs for the cost pools in question.

DECLARATION

I, A. Thomas Bozzo, declare under penalty of perjury that the foregoing answers are true and correct, to the best of my knowledge, information, and belief.

A. Thomas Bozzo

Dated: 2/4/00

CERTIFICATE OF SERVICE

I hereby certify that I have this day served the foregoing document upon all participants of record in this proceeding in accordance with section 12 of the Rules of Practice.

Susan M. Duchek

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