Postal Rate Commission
Submitted 5/3/2006 2:13 pm
Filing ID: 48696
Accepted 5/3/2006

USPS-T-17

BEFORE THE
POSTAL RATE COMMISSION
WASHINGTON DC 20268-0001

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| POSTAL RATE AND FEE CHANGES, 2006 | Docket No. R2006-1 |

DIRECT TESTIMONY
OF
MICHAEL D. BRADLEY
ON BEHALF OF THE
UNITED STATES POSTAL SERVICE

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## AUTOBIOGRAPHCIAL SKETCH

My name is Michael D. Bradley and I am Professor of Economics at George Washington University. I have been teaching economics there since 1982 and I have published many articles using both economic theory and econometrics. Postal economics is one of my major areas of research and my work on postal economics has been cited by researchers around the world. I have presented my research at professional conferences and I have given invited lectures at both universities and government agencies.

Beyond my academic work, I have extensive experience investigating real-world economic problems, as I have served as a consultant to financial and manufacturing corporations, trade associations, and government agencies.

I received a B.S. in economics with honors from the University of Delaware and as an undergraduate was awarded Phi Beta Kappa, Phi Kappa Phi and Omicron Delta Epsilon for academic achievement in the field of economics. I earned a Ph.D. in economics from the University of North Carolina and as a graduate student I was an Alumni Graduate Fellow. While being a professor, I have won both academic and nonacademic awards, including the Richard D. Irwin Distinguished Paper Award, the American Gear Manufacturers ADEC Award, a Banneker Award and the Tractenberg Prize.

I have been studying postal economics for twenty years, and I have participated in many Postal Rate Commission proceedings. In Docket No. R84-1, I helped in the preparation of testimony about purchased transportation and in

Docket No. R87-1, I testified on behalf of the Postal Service concerning the costs of purchased transportation. In Docket No. R90-1, I presented rebuttal testimony in the area of city carrier load time costs. In the Docket No. R90-1 remand, I presented testimony concerning the methods of city carrier costing.

I returned to transportation costing in Docket No. MC91-3. There, I presented testimony on the existence of a distance taper in postal transportation costs. In Docket No. R94-1, I presented both direct and rebuttal testimony on an econometric model of access costs. More recently, in Docket R97-1, I presented three pieces of testimony. I presented both direct and rebuttal testimony in the area of mail processing costs. I also presented direct testimony on the costs of purchased highway transportation. In Docket No. R2000-1, I again presented three pieces of testimony. I presented direct testimony on the theory and methods of calculating incremental cost, and I presented direct and rebuttal testimony on the econometric estimation of purchased highway transportation variabilities. In Docket No. R2001-1, I presented testimony on city carrier costs. Finally, in Docket No. R2005-1, I presented three pieces of testimony. I presented direct and rebuttal testimony in the area of city carrier costs and I presented direct testimony that covered the analytical foundations of the attribution of both purchased transportation costs and window service costs

Beside my work with the U.S. Postal Service, I have served as an expert on postal economics to postal administrations in North America, Europe, and Asia. For example, I currently serve as External Methodology Advisor to Canada Post.

## PURPOSE AND SCOPE

The purpose of my testimony is to present updated transaction supply side variabilities for window service costs. In order to calculate those variabilities, I first provide an update and refinement of the established econometric equation for transaction time. Finally, I review the current computational formula for calculating variabilities, show that it is inconsistent with the Commission's established approach to variability calculation, and then provide the appropriate formula.

## ASSOCIATED LIBRARY REFERENCES

I am sponsoring the following Library References which are associated with this testimony:

| | |
|---|---|
| USPS-LR-L-80 | Computer Programs And Data Used To Estimate Econometric Models And Calculate Window Service Supply Side Variabilities. |
| USPS-LR-L-81 | Calculation Of Certain Average Window Service Transaction Times. |

## I. MOTIVATION FOR UPDATING THE WINDOW SERVICE SUPPLY SIDE VARIABILITIES.

The Postal Service is presenting an updated set of supply side variabilities for window service transactions. In order to provide this update, the Postal Service was required to sponsor a new field study of transaction times and to re-estimate the established econometric equation. In addition, a review of the established methodology for calculating variabilities revealed that the computational formula used is not correct. The correct formula was derived and applied.

This section of my testimony explains why an update to the supply side variabilities is timely and why the Postal Service pursued such an update. It also explains why a field study was required and briefly describes that field study. (Details can be found in the testimony of witness Nieto and Library Reference-LR-L-78). The next section of my testimony discussed deficiencies in the computational formula used to currently calculate variabilities and provides a corrected formula. This is followed by a section which presents the updated econometric equation and variabilities.

### A. A Brief Review of the Established Methodology

The established methodology is based upon the testimonies of Postal Service witnesss LaMorte (in Docket No. R90-1) and Brehm (in Docket No. R97-1.)[1] This

[1] See, Direct Testimony of Michelle LaMorte on Behalf of the United States Postal Service, Docket No. R90-1, USPS-T-6 and Direct Testimony of

1 methodology is described in detail in witness Brehm's testimony and will be only
2 briefly reviewed here.[2]
3 The costing process starts with the use of IOCS tallies to identify the
4 accrued time (cost) associated with a variety of window service products and
5 activities. These include things like selling stamps, accepting mail items like
6 Priority Mail, First Class Mail, and Express Mail, selling special services and
7 providing non-postal services like phone cards and passports. A variability is
8 developed for each of the cost pools. In the window service costing method, the
9 overall variability is the combination of possibly three separate variabilities: the
10 demand side variability, the transaction supply side variability and the network
11 supply side variability.[3]
12 The network supply side variability measures "the percentage change in
13 total window costs resulting from a percentage change in processing time." [4] In
14 the established methodology it is assumed to be 100 percent, so it takes the
15 value of 1.0 in all variability calculations. It is thus neutral with respect to all
16 calculated variabilities and needs no further discussion. Demand side
17 variabilities were estimated by witness LaMorte for the items included in the

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Christopher Brehm on Behalf of the United States Postal Service, Docket No. R97-1, USPS-T-21.

[2] See, Testimony of Christopher Brehm on Behalf of the United States Postal Service, Docket No. R97-1, USPS-T-21 at 1-10.

[3] Because network supply side variabilities need no further discussion, the simple term "supply side" variability will apply to transactional supply side variability throughout this testimony.

[4] See, Testimony of Christopher Brehm on Behalf of the United States Postal Service, Docket No. R97-1, USPS-T-21 at 6.

heading "Postage Sales." This includes selling stamps, selling postal cards, setting meters and selling stamped envelopes. These demand side variabilities were not updated by witness Brehm and are not updated here. The demand side variabilities for all other products are not explicitly determined; this means they are implicitly assumed to be 100 percent.

The current transaction supply side variabilities were first presented by witness Brehm in Docket No. R97-1. They are updated in this testimony.

Established Variabilities

| | **Demand Side Variability** | **Transaction Supply Side Variability** | **Network Supply Side Variability** | | **Overall Variability** |
|---|---|---|---|---|---|
| Selling Stamps | 65.88% | 70.01% | 100.00% | | 46.12% |
| Selling Cards | 50.44% | 100.00% | 100.00% | | 50.44% |
| Setting Meters | 26.05% | 92.77% | 100.00% | | 24.17% |
| Stamped Envelopes | 47.93% | 100.00% | 100.00% | | 47.93% |
| First Class | 100.00% | 56.37% | 100.00% | | 56.37% |
| Priority Mail | 100.00% | 56.37% | 100.00% | | 56.37% |
| Express Mail | 100.00% | 83.15% | 100.00% | | 83.15% |
| Second Class | 100.00% | 56.37% | 100.00% | | 56.37% |
| Third Class | 100.00% | 56.37% | 100.00% | | 56.37% |
| Fourth Class | 100.00% | 56.37% | 100.00% | | 56.37% |
| Other Mail | 100.00% | 56.37% | 100.00% | | 56.37% |
| Money Orders | 100.00% | 65.37% | 100.00% | | 65.37% |
| PO Boxes | 100.00% | 100.00% | 100.00% | | 100.00% |
| Other Special Services | 100.00% | 100.00% | 100.00% | | 100.00% |

**B. The POS ONE System.**

Starting in 1997, the Postal Service began a rollout of a new point-of-sale system. Known as POS (Point of Service) ONE, it was designed to replace the

integrated retail terminals (IRTs) with commercial off-the-shelf hardware and software, along with support services and training. With the deployment of POS ONE, Postal Service customers were to receive improved and timelier information about available services and to gain immediate access to mailing options and costs. A discussion of the deployment of the POS ONE system is contained in the testimony of witness Hintenach.

The introduction of the POS ONE system raised the possibility that the "supply side" nature of window service transactions had changed. Specifically, with a new technology used for processing transactions, it is possible that the relationship between transactions and transaction time was modified. If so, the transaction supply side variabilities will have changed. This provides an important reason for updating the established econometric equation.

In addition, the existence of a new, more comprehensive data set relating to window service transactions raises the possibility that a more detailed, perhaps more accurate, product costing analysis could be performed. Transactional data captured though the POS ONE system has far more extensive information about window transactions and could be a potentially valuable data source. For these reasons, the Postal Service decided to initiate an update and possible refinement of the established methodology.

The Postal Service first investigated the use of only transactional data from POS ONE for estimating the transaction supply side variabilities. The POS ONE system records what is sold in each visit, by transaction and the time required for that transaction. At first blush, this would seem to be just the

information required for estimating a supply side variability. If the transactional data from the POS ONE system contains both the items processed and the transaction times, then the possibility arises that no field study would be required and the econometric analysis could proceed on just the transactional data.

Further investigation revealed that a “POS ONE data” only approach would, unfortunately, not work. The “transaction time” recorded in POS is simply the time from when the window clerk presses the button to enter the first item to be sold until the time when the receipt is printed. This amount of time is short of the total transaction time and the gap between the actual time and the POS ONE recorded time will vary with the type of transactions.

For example, consider a transaction with a single stamp coil being sold. The customer probably does not have many questions about the item and there are only a few alternatives to consider. This means that there will be only a limited amount of time before the first POS terminal key is pushed. In this transaction, the ratio of total transaction time to POS terminal time should be relatively close to one.

A transaction including a Priority Mail weigh and rate could be a bit more complex. The customer may wish to know about shipping alternatives, may have a question about the flat rate envelope, may need some help in preparing the Priority Mail envelope, and so on. Here the ratio of actual transaction time to transactional time recorded in POS would likely be significantly higher.

As these examples have shown, there is likely to be a systematic difference between the actual transaction time and the transaction time recorded in POS ONE. The difference is not a pure random variable and could be dependent upon what is being processed in the transaction. This means that the POS ONE transactional time would not just be inaccurate but also possibly biased. For this reason the Postal Service, mindful of the Commission's requirements for rate case studies, decided that the POS ONE transactions times were not sufficiently accurate and that a new field study was required to update the window service transaction supply side variabilities.

This is not to say that the transactional data from the POS ONE system are not useful. The existence of POS ONE transaction data means that field data collectors do not have to record what is processed at the window when they are timing a transaction; they need only record the time the transaction took. This means more accurate transaction times can be captured and that more detailed product-specific transactions can be measured. For example, the Docket No. R97-1 study simply had "weigh and rate" as a transaction category, assuming that the different products that are weighed and rated all had the same variability. Transactional data from the POS ONE system permits disaggregated analysis of the "weigh and rate" activity and allows the estimation of separate variabilities for Priority Mail, First Class Mail, Parcel Post and the remaining other weight and rate transactions.

### C. The Transaction Time Study.

For the reasons provided above, update and refinement of the established variabilities required the Postal Service to field a new transaction time study. That study is presented and described by witness Nieto. It follows the study methodology as the approved study from Docket No. R97-1, but applies more recent technology to produce more accurate transaction times.

In essence, data collectors used electronic recording devices at 27 different post offices to time window service transactions. The resulting transaction times were then linked to the corresponding POS ONE data to produce an analysis data set including both the transaction time and the type and quantity of each product processed in nearly 8,000 transactions.

## II. THE COMPUTATIONAL FORMULA FOR CALCULATING THE TRANSACTIONS SUPPLY SIDE VARIABILITY.

As explained in witness Brehm's testimony, the established supply side variabilities are derived from the estimated transaction time equation. That equation has a linear form and is divided between those coefficients that are associated with processing transactions (captured by the $\alpha_j$ below) and those that are simply associated with the existence of a transaction. In the established model, the average amount of this time is captured by $\alpha_0$:

$$TT = \alpha_0 + \sum_{j=1}^{m} \alpha_j X_j$$

Witness Brehm defines the supply side variability as the ratio of "marginal time" for an item to the predicted time for a single quantity transaction for that item.[5] "Marginal time" is defined by witness Brehm as the weighted average of the predicted time for a single quantity transaction for the item and the marginal time for an additional quantity of the item in a multiple quantity transaction.

One can express this in mathematical terms by calculating the established variability for product "j". First define the predicted time for a single quantity product "j" transaction:

$$ST_j = \alpha_0 + \alpha_j (1).$$

In addition, the marginal time, as Witness Brehm defines it, from adding another quantity of product "j" to a multiple quantity transaction is given by:

$$MT_j = \alpha_j (1).$$

The established variability is calculated by the weighted average of the predicted single time ($ST_j$) and multiple time ($MT_j$):

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[5] See, Testimony of Christopher Brehm on Behalf of the United States Postal Service, Docket No. R97-1, USPS-T-21 at 20.

$$\varepsilon_j = \frac{\theta_j \, ST_j + (1-\theta_j)\, MT_j}{ST_j}.$$

The weight, $\theta_j$, is defined as the proportion of product j's transactions which are single item transactions. Substituting from the above formulas yields:

$$\varepsilon_j = \frac{\theta_j \, ST_j + (1-\theta_j)\, MT_j}{ST_j} = \frac{\theta_j\left(\alpha_0 + \alpha_j\right) + (1-\theta_j)\,\alpha_j}{\alpha_0 + \alpha_j}$$

Rearranging terms yields:

$$\varepsilon_j = \frac{\theta_j \alpha_0 + \alpha_j}{\alpha_0 + \alpha_j}$$

This approach has three drawbacks. First, there is no analytical support for this formula. That is, witness Brehm did not derive the formula from the established econometric equation. Instead, he simply asserted that this formula measures the percentage change in transaction time associated with a percentage change in transaction volume. In other words, he did not provide a mathematical demonstration that the proposed measure indeed calculates the required elasticity. Unfortunately, a check of the mathematics shows that it does not.

Second, because witness Brehm's approach is not based upon the appropriate computational formula, it is not consistent with the general Commission methodology for calculating the elasticity. In the various cost components the Commission's methodology uses estimated or assumed parameters and places them in the standard formula: %ΔC/%ΔV. Witness Brehm's computational formula is in conflict with this approach.

Finally, witness Brehm's formula provides a potentially troubling result. Suppose a product is never sold by itself, so it is sold only in multiple item transactions. In a linear model, like the established model, a product never sold by itself would have no "fixed" or "common" time. It is easy to show that a in linear model, a product with no "fixed" or "common" time has a variability that is 100 percent.[6] Witness Brehm's formula does not provide this result. In that formula, a product that has no single item transactions would have a value for $\theta_j$ that is equal to zero. Substituting this value in to the Brehm computational formula yields $\alpha_j/(\alpha_0 + \alpha_j)$ which is clearly less than one. Although the equation representing the cost generating process indicates the variability should be 100 percent, the computational formula provides a different result.

To provide an analytical underpinning and to ensure that the variability formula is consistent with the general Commission approach to calculating variabilities, I derive the transaction time variability mathematically. For notational convenience I will specify that there are "n" window service

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[6] Suppose that the cost generating function was: $y = \eta x$. Then the variability would be given by: $\varepsilon_{yx} = \frac{\partial y}{\partial x}\frac{x}{y} = \eta\frac{x}{y} = \eta\frac{x}{\eta x} = 1.$

transactions in which “m” different products are processed. The cost generating process underlying the established method can be captured in an equation for an individual transaction time ($y_i$) that has two parts, the time for processing the items in the transaction (captured by the $\beta_j$ ) and the time associated with the existence of the transaction itself (captured by $\beta_0$):

$$y_i = \beta_0 + \sum_{j=1}^{m} \beta_j x_{ji} .$$

Due to the linearity of the cost generating process, we can aggregate to all transactions:

$$Y = \sum_{i=1}^{n} y_i = n\beta_0 + \sum_{i=1}^{n}\sum_{j=1}^{m} \beta_j x_{ji}.$$

We can simplify the analysis by using aggregate notation:

$$Y = n\beta_0 + \sum_{j=1}^{m} \beta_j X_j ,$$

where $X_j$ is the total quantity of item “j” transacted at the window.

$$X_j = \sum_{i=1}^{n} x_{ij} ,$$

It is straightforward to derive the marginal time for product “k”

$$\frac{\partial Y}{\partial X_k} = \beta_0 \frac{\partial n}{\partial X_k} + \beta_k$$

From this, one directly computes the overall elasticity for product k:

$$\varepsilon_k = \frac{\partial Y}{\partial X_k}\frac{X_k}{Y} = \frac{\left(\beta_0 \frac{\partial n}{\partial X_k} + \beta_k\right) X_k}{n\beta_0 + \sum_{j=1}^{m} \beta_j X_j}.$$

In actually calculating the variability, there are three computational issues that must be addressed. First, there is no empirical measure of the derivative of total transactions with respect to the transactions volume for product k. Thus, an approximation must be used. To derive a useful approximation, one need consider the nature of transactions and how they come about. To that end, consider the following taxonomy transaction types.

First, define an “item” as a unique product or service processed in a transaction. Examples of “items” include Priority Mail, insurance, or a coil of stamps. Next, define the “quantity” as the amount of each item processed in a transaction. If, for example, a customer buys a book of stamps and sends three pieces of Priority Mail, then the visit would have two items and a total transaction

quantity of four: one book of stamps and three pieces of Priority Mail. With this in mind, we can define a complete set of transactions:

**Type 1: Single Item, Single Quantity (SISQ)**: One unit of one item, the simplest type of transaction.

**Type 2: Single Item, Multiple Quantity (SIMQ):** One item but two or more units being processed.

**Type 3: Multiple Item (MI):** This type of transaction has more than one item. Each item may have one or more units being processed.

The cost for each type of transaction can be expressed mathematically. First the cost of a SISQ transaction for item “k”:

$$y_i^* = \beta_0 + \beta_k \quad .$$

The cost for a SIMQ transaction for item “k” with a quantity of “q.”

$$\hat{y}_i = \beta_0 + \sum_{k=1}^{q} \beta_k \, x_{ki} \; .$$

Finally, the cost for a MI transaction with quantity “q” of item “k’ and quantity “p” for item “*l*”:

$$\tilde{y}_i = \beta_0 + \sum_{k=1}^{q} \beta_k x_{ki} + \sum_{l=1}^{p} \beta_l x_{li} .$$

In addition, total transactions, n, can be decomposed into the three types of transactions:

$$n = \sum_{j=1}^{m} n_{SISQ_j} + \sum_{j=1}^{m} n_{SIMQ_j} + n_{MI} ,$$

where $n_{SISQ_j}$ is the number of single item, single quantity transactions for item “j”, the sum of which is defined as $n_{SISQ}$ ; $n_{SIMQ_j}$ is the number of single item, multiple quantity transactions for item “j,” the sum of which is defined as $n_{SIMQ}$; and $n_{MI}$ is the total number of multiple item transactions. This decomposition is useful for gaining some additional insight into the critical derivative:

$$\frac{\partial n}{\partial X_k} = \frac{\partial n_{SISQ}}{\partial X_k} + \frac{\partial n_{SIMQ}}{\partial X_k} + \frac{\partial n_{MI}}{\partial X_k} .$$

Now consider the different ways that an addition unit of item “k” can affect transactions. First, it could create a brand new transaction, in which case it

would add a new SISQ transaction to the total. Second, it could join an existing SISQ transaction for item k cause the SISQ transaction for item k to become a SIMQ transaction. Thus, there would be a reduction in the number of SISQ transactions balanced by an increase in SIMQ transactions, leading to no net change in transactions. Third, it could join a SISQ or SIMQ transaction for another item. This would translate these SISQ and SIMQ transactions into MI transactions, leading to no change in the number of transactions. Finally, it could join an existing MI transaction and, again, there would be no change in the number of transactions.

In sum, the only way an additional unit of item k could cause a new transaction would be through the creation of a new SISQ transaction. Thus, the change in total transactions from an increase in item k would be measured by the change in SISQ transactions (of item k) with respect to a change in the transactions volume for item k.

$$\frac{\partial n}{\partial X_k} = \frac{\partial n_{SISQ_k}}{\partial X_k}.$$

Unfortunately, a quantitative value for even this more specific derivative is not available. However, it can be approximated by assuming that the rate of change in SISQ transactions of a particular type is equal to their representation in the current population of transactions. The rate of change in SISQ transactions for a

particular item is thus approximated by the proportion of those transactions in all transactions:

$$\frac{\partial n_{SISQ_k}}{\partial X_k} \approx \frac{n_{SISQ_k}}{n} \equiv \rho_k .$$

With this approximation in place, the variability for product “k” can be calculated:

$$\varepsilon_k = \frac{\partial Y}{\partial X_k}\frac{X_k}{Y} = \frac{(\beta_0 \rho_k + \beta_k) X_k}{n\beta_0 + \sum_{j=1}^{m} \beta_j X_j} .$$

Note that $\varepsilon_k$ is the variability of the <u>total</u> transactions time cost pool, with respect to changes in the transactions volume of product k. The established costing model, however, has cost pools which are defined by the item being processed at the window. In other words, the established model has a cost pool for selling stamps, for accepting First Class Mail, for weighing and rating Priority Mail or Parcel Post, and so on. Thus, the overall variability defined above must be translated into a cost-pool specific variability. This is the second computational issue.

This translation is straightforward because of the linearity of the established window service costing framework. Linearity implies that the product-specific cost pools are additively separable and the total window service transaction time can thus be exactly decomposed. Moreover, the total transaction time caused by product k would come from the total time for its SISQ

transactions, the total time for its SIMQ transactions and its contribution to time for the MI transactions. This is what is measured by the IOCS analysis and has a straightforward mathematical representation. Using the aggregate notation it is:

$$Y_k = (n_{SISQ_k} + n_{SIMQ_k})\beta_0 + \beta_k X_k.$$

The cost-pool specific variability is thus defined as the elasticity of this time pool with respect to changes in the transactions volume for product k:

$$\lambda_k = \frac{\partial Y_k}{\partial X_k}\frac{X_k}{Y_k} = \frac{(\beta_0 \rho_k + \beta_k)X_k}{(n_{SISQ_k} + n_{SIMQ_k})\beta_0 + \beta_k X_k.}.$$

Note that there is a clear logical relationship between the overall variability for product k, derived above, and product k's cost pool specific variability. This should not be surprising as both are derived from the underlying cost generating process. A comparison of the two elasticities and some straightforward algebra demonstrates that:

$$\lambda_k = \frac{\varepsilon_k}{\omega_k},$$

where $\omega_k$ is the proportion of overall transaction time associated with product k.

The third and last computational issue that must be addressed is the fact that the variabilities will be calculated at the average transaction level, using the parameters from the established transactions equation, instead of the aggregate level as the above formulas indicate. Again because of linearity, the calculation based upon averages can be exactly derived, simply by dividing the numerators and denominators of both elasticity formulas by 1/n. It is easy to show that this provides the same elasticities as would be computed if the calculation was performed on the aggregate:

$$\varepsilon_k \quad = \quad = \quad \frac{(\beta_0 \rho_k + \beta_k)\dfrac{X_k}{n}}{\beta_0 + \sum_{j=1}^{m} \beta_j \dfrac{X_j}{n}} \quad = \quad \frac{(\beta_0 \rho_k + \beta_k)\overline{X}_k}{\beta_0 + \sum_{j=1}^{m} \beta_j \overline{X}_j}.$$

$$\lambda_k \quad = \quad \frac{(\beta_0 \rho_k + \beta_k)\overline{X}_k}{(\rho_k + \delta_k)\beta_0 + \beta_k \overline{X}_k.},$$

where $\delta_k = n_{SIMQ_k} / n.$

## III. UPDATING THE ESTABLISHED ECONOMETRIC EQUATION.

The variabilities in the established model were derived from an econometric equation estimated by Postal Service witness Brehm in Docket No. R97-1 and accepted by the Commission. In this section of my testimony, I present an update and refinement of that estimated equation.

### A. Specifying the Equation to be Estimated.

The established econometric model is linear in form and regresses the transaction times from a set of transactions on an intercept, dummy variables for payment types and, generally, the quantities of each item processed in the transactions. One unusual aspect of witness Brehm's specification is that it is limited to the inclusion of a "dummy" variable for the existence of a stamp sale instead of including of the quantity of stamps sold. Although witness Brehm's testimony is silent on why this approach was taken it is clearly preferred, if possible to include the quantity of stamp items sold. Fortunately, transactional data from the POS ONE system makes it possible to obtain the number of stamp items sold in a transaction. In the updated equation the quantity of stamp items sold in each transaction will be entered into the equation instead of a dummy variable.

Also, the menu of products processed over the window has changed since the last time the transaction time equation was estimated. Thus, the current products processed at the window will be used in the estimation as opposed to

1 those that were processed in 1996 when the data for the last study were
2 collected.
3 Because the POS ONE system records all items that were processed, the
4 use of transactional data from POS ONE supports more detailed breakouts of
5 items than was possible in the 1996. Recall that in that 1996 field study, data
6 collectors had to record both the time of the transaction and the items (and
7 quantities) being processed. In the current study, only transaction times had to
8 be recorded. The transactional data from POS ONE were used to identify items
9 and quantities. This richer data set permits a more detail transaction product
10 breakout.
11 One more detailed breakout is for stamp sales. As mentioned above, the
12 POS ONE data records the number of stamp items being sold. However, the
13 nature of the stamp item being sold affects the number of stamps sold in the
14 transactions. Some “bulk” stamp items sell a high number of stamps in an single
15 sale. These stamp items include coils, books and full sheets if no selection from
16 the sheet is made. An easy way to identify “bulk” stamp items is that they are
17 bar coded and are scanned into the POS ONE system.
18 The other type of stamp transaction includes non-bulk stamp items that
19 are not bar coded. This includes the sales of individual stamps and partial
20 sheets of stamps. Because it seems possible that these two types of sales may
21 have different processing times associated with them, two stamps sale variables
22 will be included in the econometric equation. One variable will capture bulk

stamp sale items that are scanned into the POS ONE system and the other will capture non-bulk stamp items.

Another product breakout supported by the POS ONE data is in the area of mail products. In the past, the acceptance and weighing and rating of mail was assumed to have the same cost generating characteristics regardless of the mail product. For example, weighing and rating a First Class piece, a Priority Mail piece and a Parcel Post piece were all assumed to have the same processing time. This assumption was made because it was too difficult for data collectors to record both the time of a transaction and the class of the product being processed in the 1996 field study. With the POS ONE data, product-specific quantities are available, so the econometric equation can be refined to include separate terms for First Class Mail, Priority Mail, Parcel Post and Other Weigh and Rate (including the bound printed matter, library rate and medial mail processed at the retail window).

A final refinement was made to the specification of the econometric equation. This relates to the specification of the transaction time that is not associated with the quantity processed, but is associated with the existence of the transaction it self. This is what witness Brehm called “common time.” Witness Brehm included a single intercept in the econometric equation to capture common time.[7] However, it is plausible that the common time may vary from office to office depending upon the characteristics of the office. Consequently,

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[7] Witness Brehm also included variables to capture the variation in transaction time associate with different payment technologies. That specification is included in the current equation.

witness Brehm's specification is expanded to allow for an individual intercept for each equation. In the same vein, a control variable is included to account for instances in which more than one item is included in the transaction.

### B. The Analysis Data Set

The analysis data set consists of 7,915 transactions taken from 27 different post offices. Each observation includes the recorded transaction time, the office at which the transaction took place, the payment technology employed, and the quantity of each item processed.

**Table 1**
Sample Means

| Variable | Mean |
|---|---|
| Time (in seconds) | 121.4 |
| Certified | 0.0726 |
| First Class | 0.3702 |
| Stamp Items (Bulk) | 0.4632 |
| Stamp Items (Non-bulk) | 2.9479 |
| Priority Mail | 0.2922 |
| Money Order | 0.1579 |
| Parcel Post | 0.0493 |
| Other W&R | 0.0363 |
| Express Mail | 0.0461 |
| Insurance | 0.0528 |
| Ready Post | 0.0586 |
| International | 0.0649 |
| Stamped Envelope | 0.1025 |
| Registered | 0.0024 |
| Passport | 0.0071 |
| Retail Products | 0.0021 |
| PO Box | 0.0124 |
| COD | 0.0004 |

*(All product variables are measured in pieces processed per transaction.)*

A review of the data shows that they are generally well behaved and provide plausible sample statistics. Moreover, there seems to be relatively few extreme values. There are four variables that bear further examination, however. The results of that examination are discussed below.

The data set includes 1,271 transactions in which non-bulk stamp items are sold, with an average of 18.36 stamps sold in each.[8] However, there are five non-bulk stamp transactions with extremely high values for the amount of stamps sold and they stand apart from the rest of the non-bulk stamp transactions. For example, one transaction involved 7,990 stamps being sold. While this may be a valid data point, it is clearly an aberration and has the potential for distorting the measurement of the relationship between transaction time and non-bulk stamp items. To preclude this possibility, five observations with very large volume (500 or more stamp items sold) are excluded from the regression analysis.

Priority Mail is accepted in 1,551 transactions with an average of 1.49 pieces processed per Priority Mail transaction. Over 90 percent of Priority Mail transactions include just one or two pieces. However, there is one observation with 121 pieces of Priority Mail processed, a value that is more than three times larger than in the next largest transaction. Given that there are over 1,500 transactions including Priority Mail, and given the difference between this one

[8] Note that this mean value will exceed the sample mean for non-bulk stamp items because the sample mean is based upon all transactions including those that do not include non-bulk stamp sales.

large transaction and all the others, it seems prudent to exclude it from the regression analysis.

Similarly, there are 164 transactions in which stamped envelopes are sold with an average value of 4.95 stamped envelopes per transaction. There is a single transaction that involves 500 stamped envelopes sold. The next closest value is for only 60 stamped envelopes and the next closest value to that is just 20 stamped envelopes. The single extreme observation for stamped envelopes is thus dropped from the regression analysis.

Finally, the average the transaction time, across all 7,915 observations is just over two minutes. Review of the time data show that there are two observations with extremely large times, one taking 3,339 seconds (55.65 minutes) and 3,576 seconds (59.6 minutes). While these may be valid transactions, they are obviously very different from the bulk of the transactions and thus removed from the regression analysis.[9]

### C. Econometric Results.

The econometric equation was initially estimated on the analysis data set described above containing 7,906 observations. This initial estimation revealed two important points: the residuals were heteroskedastic and there was a small set of observations with large negative residuals caused by the inclusion of passport transactions.

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[9] There are also some transactions with very short times and possible candidates for elimination from the regression. However, the results from dropping these observations are virtually the same as with them included (these are presented in the alternative analyses section below).

White's test for heteroskedasticity indicates a clear rejection of the null hypothesis of homoskedastic residuals, and all future estimations will adjust the standard errors for homoskedasticity. In addition, the residuals from the initial estimation were output and examined. A small group of observations had very large negative residuals, indicating that the actual time was for less than the time predicted by the estimated equation. Careful review of the data for those observations shows that they all included one or more passport transactions, which are generally very time consuming. Nevertheless, these transactions involved little transaction time, suggesting they included atypical passport transactions.

Because of this pattern, and because the established analysis does not require a variability for passports, these ten extreme observations are dropped from the estimation. There was also a small set of observations for which there were large positive residuals. A review of these observations revealed that some included passports but others did not. Moreover, many of them included variables for which variabilities are calculated. Because of this, these observations were left in the data set in estimating the recommended model. However, the results of estimating the equation with them omitted are presented in the alternative analyses section below.

A summary of the regression results are presented in the following table. The complete results are presented in Library Reference USPS-LR-L-80.

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**Table 2**
**Econometric Estimate of the Transaction Time Equation**
White Heteroskedasticity-Consistent Standard Errors

| Variable | Coefficient | HC Standard Error | HC t-Statistic |
|---|---|---|---|
| Certified | 5.501 | 3.380 | 1.63 |
| First Class | 15.501 | 1.225 | 12.65 |
| Stamps Bulk | 3.514 | 0.810 | 4.34 |
| Stamps Non-Bulk | 0.579 | 0.136 | 4.26 |
| Priority Mail | 28.277 | 1.712 | 16.52 |
| Money Order | 36.175 | 3.990 | 9.07 |
| Parcel Post | 41.339 | 8.219 | 5.03 |
| Other Weigh & Rate | 25.900 | 5.678 | 4.56 |
| Express Mail | 78.884 | 4.428 | 17.82 |
| PVI | 32.108 | 7.640 | 4.20 |
| Insurance | 32.133 | 4.932 | 6.52 |
| Ready Post | 8.960 | 3.385 | 2.65 |
| International | 66.430 | 5.403 | 12.29 |
| Stamped Envelopes | 0.997 | 0.443 | 2.25 |
| Registered | 182.395 | 44.841 | 4.07 |
| Passport | 523.653 | 45.879 | 11.41 |
| Retail Products | 51.051 | 13.532 | 3.77 |
| PO Box | 119.071 | 16.873 | 7.06 |
| COD | 166.519 | 5.485 | 30.36 |
| First Class Enclosure | 53.594 | 7.176 | 7.47 |
| Other Special Services | 7.456 | 2.077 | 3.59 |
| General Services | 41.450 | 3.701 | 11.20 |
| Check | 27.602 | 4.425 | 6.24 |
| Credit Card | 25.640 | 4.035 | 6.35 |
| Debit Card | 7.955 | 4.549 | 1.75 |
| Adjusted R-squared | 0.5008 | | |
| Number of Obs. | 7896 | | |

### D. Calculating the Variabilities

Once the coefficients in the econometric equation are estimated, they can be used to calculate the required variabilities. Recall that the formula for calculating the variability for product k is:

$$\lambda_k = \frac{(\beta_0 \rho_k + \beta_k)\overline{X}_k}{(\rho_k + \delta_k)\beta_0 + \beta_k \overline{X}_k}.$$

In this formula, the $\beta_k$ are the estimated coefficients for the individual products, $\beta_0$ represents what witness Brehm called “common” time, which is time associated with the transaction but not the specific items being processed. This value is calculated by using the non-volume terms in the econometric regression. The calculated value for $\beta_0$ is just over 64 seconds. Finally, $\rho_k$ is the ratio of SISQ transactions for product k and $\delta_k$ is the ratio of SIMQ transactions for product k. These ratios are calculated from the analysis data set used to estimate the econometric equation.

**Table 3**
**Transaction Ratios and Calculated Variabilities**

| | SISQ Ratio | SIMQ Ratio | X Bar | Variability |
|---|---|---|---|---|
| Stamps Bulk | 10.46% | 4.86% | 0.4627 | 41.3% |
| Stamps Non Bulk | 3.22% | 4.66% | 1.5313 | 68.1% |
| Priority Mail | 6.40% | 1.14% | 0.2776 | 70.8% |
| First Class | 6.32% | 2.13% | 0.3705 | 64.9% |
| Parcel Post | 0.89% | 0.18% | 0.0494 | 75.9% |
| Other W&R | 0.60% | 0.11% | 0.0363 | 68.2% |
| Express Mail | 2.68% | 0.26% | 0.0461 | 67.2% |
| Money Order | 4.22% | 1.48% | 0.1577 | 65.5% |
| Certified | 0.00% | 0.00% | 0.0727 | 100.0% |
| Insurance | 0.00% | 0.00% | 0.0529 | 100.0% |
| Registered | 0.00% | 0.00% | 0.0024 | 100.0% |
| International | 1.49% | 0.41% | 0.0650 | 79.0% |
| PO Box | 0.66% | 0.19% | 0.0124 | 73.2% |
| COD | 0.00% | 0.00% | 0.0004 | 100.0% |
| Other Special Services | 0.01% | 0.00% | 0.1637 | 99.5% |
| PVI | 0.45% | 0.09% | 0.0161 | 60.4% |

One last variability calculation is required. The established costing model has a single variability for “stamps” reflecting all methods by which postage is sold. In the POS ONE data, there are three ways that postage is sold: as stamps bulk, as stamps non-bulk and as a PVI strip. To calculate the single required “stamps” variability, the variabilities for each of the three methods of selling postage are combined. Following the established method for combining variabilities in purchased highway transportation, the variabilities are weighted by

their relative product specific transaction times. As explained above, the product specific time for product k is given by:

$$Y_k = (n_{SISQ_k} + n_{SIMQ_k})\beta_0 + \beta_k X_k.$$

The overall variability is calculated as:

$$\lambda = \sigma_{SB}\lambda_{SB} + \sigma_{SNB}\lambda_{SNB} + \sigma_{PVI}\lambda_{PVI},$$

Where; $\sigma_i = \dfrac{Y_i}{\sum_{i=1}^{3} Y_i}$

Given this formula, the overall "stamps" variability is calculated below:

| Item | Product Specific Time | Variability |
|---|---|---|
| Stamps Bulk | 90,589.0 | 41.29% |
| Stamps Non Bulk | 46,993.4 | 68.16% |
| PVI | 6,811.2 | 60.41% |
| Overall | 144,393.7 | 50.9% |

### E. Alternative Estimations

In this section, I describe the alternative econometric analyses I performed. These analyses were performed as part of the research path in estimating the equation which supports the recommended variabilities. For each

of the alternatives, I identify how it varies from the recommended equation and discuss how the results vary from the recommended results. In general, the results are quite close to the recommended equation, suggesting that it is relatively robust to reasonable variations in econometric method. Finally, in each case I indicate why the recommended model is preferred.

E.1. Including only a single intercept.

This alternative includes a single intercept, common for all sites, rather that an intercept for each site. The estimated coefficients are close to the recommended model although they are generally, but not always, a bit smaller for the variables for which variabilities are required. More importantly the fit of the model is materially worsened by using only one intercept. The adjusted $R^2$ term falls from 50.08 to 47.43. This is reinforced by an F-test of the additional 26 intercept coefficients. The calculated test statistic for the null hypothesis that the other 26 intercept coefficients are equal to zero has a value of 20.1. This test statistic is distributed with an F distribution with 26 and 7,843 degrees of freedom so a calculated test statistic of 20.1 indicates rejection of the null hypothesis.

Given the estimated coefficients in the recommended model and the fact that a mode with site-specific intercepts provides a better fit, the specification of the econometric equation with only a single intercept is not preferred.

**Table 4**
**Econometric Estimate of the Transaction Time Equation**
White Heteroskedasticity-Consistent Standard Errors
*No Site-Specific Intercepts Included*

| Variable | Coefficient | HC Standard Error | HC t-Statistic |
|---|---|---|---|
| Certified | 7.170 | 3.419 | 2.10 |
| First Class | 15.054 | 1.239 | 12.15 |
| Stamps Bulk | 3.092 | 0.852 | 3.63 |
| Stamps Non-Bulk | 0.631 | 0.147 | 4.30 |
| Priority Mail | 28.213 | 1.765 | 15.98 |
| Money Order | 36.148 | 3.921 | 9.22 |
| Parcel Post | 39.515 | 8.311 | 4.75 |
| Other Weigh & Rate | 25.928 | 6.079 | 4.26 |
| Express Mail | 80.498 | 4.408 | 18.26 |
| PVI | 29.895 | 7.920 | 3.77 |
| Insurance | 32.848 | 5.047 | 6.51 |
| Ready Post | 9.410 | 3.327 | 2.83 |
| International | 68.559 | 5.571 | 12.31 |
| Stamped Envelopes | 0.626 | 0.418 | 1.50 |
| Registered | 189.280 | 45.908 | 4.12 |
| Passport | 529.692 | 47.429 | 11.17 |
| Retail Products | 50.163 | 13.150 | 3.81 |
| PO Box | 117.979 | 18.323 | 6.44 |
| COD | 160.319 | 5.514 | 29.07 |
| First Class Enclosure | 54.973 | 6.161 | 8.92 |
| Other Special Services | 8.045 | 2.137 | 3.76 |
| General Services | 38.422 | 3.818 | 10.06 |
| Check | 20.254 | 4.575 | 4.43 |
| Credit Card | 27.216 | 4.181 | 6.51 |
| Debit Card | 9.342 | 4.634 | 2.02 |
| Adjusted R-squared | 0.4743 | | |
| Number of Observations | 7896 | | |

1

2 E.2 Dropping observations with very short transaction times.

3 In the above discussion of estimating the recommended model, I indicated
4 that I estimated a version of the model based upon a data set that dropped
5 observations with very low transaction times. The results of that estimation are
6 presented in this section. Specifically, a transaction time was required to take at
7 least 10 seconds to be included in this alternative analysis. This filter caused 42
8 observations to be dropped from the analysis.

9 Dropping these observations had virtually no impact on the estimated
10 coefficients. Typically the change in the coefficient is less that one-tenth of a
11 second. The main exception is for PO Box transactions, which the estimated
12 coefficient fell by one-half a second. However, given that that the estimated PO
13 Box coefficient is 119 seconds, this is not a material difference.

14 Given that dropping the observations with very short transaction times
15 does not change the estimated result and does not improve the fit of the model,
16 there is no reason to prefer this approach over the recommended model.

17

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**Table 5**
**Econometric Estimate of the Transaction Time Equation**
White Heteroskedasticity-Consistent Standard Errors
*Dropping Obs. With Very Small Transaction Times*

| Variable | Coefficient | HC Standard Error | HC t-Statistic |
|---|---|---|---|
| Certified | 5.615 | 3.377 | 1.66 |
| First Class | 15.465 | 1.231 | 12.57 |
| Stamps Bulk | 3.460 | 0.815 | 4.25 |
| Stamps Non-Bulk | 0.576 | 0.136 | 4.23 |
| Priority Mail | 28.223 | 1.698 | 16.62 |
| Money Order | 36.305 | 3.992 | 9.10 |
| Parcel Post | 41.207 | 8.216 | 5.02 |
| Other Weigh & Rate | 25.884 | 5.671 | 4.56 |
| Express Mail | 78.978 | 4.416 | 17.88 |
| PVI | 32.057 | 7.634 | 4.20 |
| Insurance | 32.085 | 4.929 | 6.51 |
| Ready Post | 8.985 | 3.383 | 2.66 |
| International | 66.350 | 5.403 | 12.28 |
| Stamped Envelopes | 0.998 | 0.442 | 2.26 |
| Registered | 182.456 | 44.898 | 4.06 |
| Passport | 523.291 | 45.885 | 11.40 |
| Retail Products | 51.038 | 13.469 | 3.79 |
| PO Box | 118.642 | 16.875 | 7.03 |
| COD | 166.773 | 5.483 | 30.41 |
| First Class Enclosure | 53.707 | 7.169 | 7.49 |
| Other Special Services | 7.449 | 2.071 | 3.60 |
| General Services | 41.716 | 3.717 | 11.22 |
| Check | 27.917 | 4.443 | 6.28 |
| Credit Card | 25.453 | 4.037 | 6.31 |
| Debit Card | 8.793 | 4.534 | 1.94 |
| Adjusted R-squared | 0.5010 | | |
| Number of Observations | 7854 | | |

2

### E.3 Excluding observations with large positive residuals.

Another variation discussed in the development of the recommended model was a version estimated on a data set that omitted observations that had large positive residuals in the original estimation. The results of the estimation on this restricted data set are presented in this section.

Most of the estimated coefficients are not influenced by dropping the observations with large positive residuals but four have a noticeable, although not large, changes. The coefficients for these four variables merit further discussion.

The first two coefficients, for passports and insurance are not used in the calculation of variabilities so changes in their coefficients are not material. The other two coefficients, for parcel post and PO Box are used in variability calculations. Omission of observations with large positive residuals leads to a mild reduction both of these coefficients and would therefore cause a modest reduction in these products' estimated variabilities. Further review of the omitted observations reveals that this change in estimated coefficients comes from the elimination of a single transaction, one that includes the processing of six parcel post items and 3 insurance items. The transaction time for this transaction is 1,404 seconds (23.4 minutes). While one would expect this type of transaction to take 5 to 10 minutes, it is not implausible that it actually did take 23 minutes. This larger amount of time caused the large positive residual.

Because this transaction could not be ruled out as clearly erroneous the omission of observations with large positive residuals is not preferred over the recommended model.

**Table 6**
**Econometric Estimate of the Transaction Time Equation**
White Heteroskedasticity-Consistent Standard Errors
*Dropping Obs. With Large Positive Residuals*

| Variable | Coefficient | HC Standard Error | HC t-Statistic |
|---|---|---|---|
| Certified | 5.172 | 3.261 | 1.59 |
| First Class | 15.433 | 1.223 | 12.62 |
| Stamps Bulk | 3.637 | 0.795 | 4.57 |
| Stamps Non-Bulk | 0.589 | 0.135 | 4.36 |
| Priority Mail | 28.558 | 1.781 | 16.04 |
| Money Order | 37.124 | 3.925 | 9.46 |
| Parcel Post | 34.007 | 3.647 | 9.33 |
| Other Weigh & Rate | 25.862 | 5.703 | 4.53 |
| Express Mail | 80.038 | 4.388 | 18.24 |
| PVI | 32.177 | 7.623 | 4.22 |
| Insurance | 29.673 | 4.079 | 7.28 |
| Ready Post | 8.852 | 3.378 | 2.62 |
| International | 66.671 | 5.424 | 12.29 |
| Stamped Envelopes | 0.984 | 0.440 | 2.24 |
| Registered | 182.495 | 44.874 | 4.07 |
| Passport | 474.602 | 37.028 | 12.82 |
| Retail Products | 50.409 | 13.417 | 3.76 |
| PO Box | 111.482 | 15.186 | 7.34 |
| COD | 170.675 | 3.617 | 47.18 |
| First Class Enclosure | 52.280 | 7.045 | 7.42 |
| Other Special Services | 7.425 | 2.108 | 3.52 |
| General Services | 41.709 | 3.677 | 11.34 |
| Check | 28.292 | 4.317 | 6.55 |
| Credit Card | 23.499 | 3.678 | 6.39 |
| Debit Card | 9.061 | 4.460 | 2.03 |
| Adjusted R-squared | 0.5255 | | |
| Number of Obs. | 7887 | | |

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2 E.4. Including an “other” term.

3 The analysis data set includes a catchall variable that includes transaction
4 items not covered by the normal POS ONE variables. An analysis was
5 performed to see if this “other “ variable was capturing mis-recording of any of
6 the items of interest. The results of including the “other” variable are presented
7 in this section.

8 Including the “other” variable make no material difference for the
9 estimated coefficients demonstrating that it does not capture otherwise omitted
10 items of interest. The inclusion of the “other” variable in the model is thus
11 superfluous and the specification of the model with it included is not preferred to
12 the recommended model.

**Table 7**
**Econometric Estimate of the Transaction Time Equation**
White Heteroskedasticity-Consistent Standard Errors
*Including an "Other" Variable*

| Variable | Coefficient | HC Standard Error | HC t-Statistic |
|---|---|---|---|
| Certified | 6.279 | 3.444 | 1.82 |
| First Class | 14.859 | 1.424 | 10.43 |
| Stamps Bulk | 3.578 | 0.804 | 4.45 |
| Stamps Non-Bulk | 0.580 | 0.136 | 4.27 |
| Priority Mail | 28.314 | 1.721 | 16.45 |
| Money Order | 36.256 | 3.987 | 9.09 |
| Parcel Post | 41.327 | 8.211 | 5.03 |
| Other Weigh & Rate | 26.128 | 5.637 | 4.64 |
| Express Mail | 78.964 | 4.431 | 17.82 |
| PVI | 32.259 | 7.654 | 4.21 |
| Insurance | 32.498 | 4.936 | 6.58 |
| Ready Post | 9.261 | 3.392 | 2.73 |
| International | 66.493 | 5.450 | 12.20 |
| Stamped Envelopes | 1.011 | 0.444 | 2.28 |
| Registered | 182.919 | 44.668 | 4.10 |
| Passport | 523.295 | 45.947 | 11.39 |
| Retail Products | 51.044 | 13.572 | 3.76 |
| PO Box | 118.825 | 16.849 | 7.05 |
| COD | 166.827 | 5.486 | 30.41 |
| First Class Enclosure | 53.645 | 7.158 | 7.49 |
| Other Special Services | 7.570 | 2.101 | 3.60 |
| General Services | 41.555 | 3.699 | 11.23 |
| Other | 6.775 | 3.146 | 2.15 |
| Check | 27.873 | 4.437 | 6.28 |
| Credit Card | 25.634 | 4.035 | 6.35 |
| Debit Card | 8.214 | 4.550 | 1.81 |
| Adjusted R-squared | 0.5011 | | |
| Number of Obs. | 7896 | | |

## IV. EFFECT OF THE UPDATE.

There are two ways to measure the impact of the update relative to the previous results. The first is to compare the estimated variabilities for mail acceptance and stamp sales. The following table provides the old variabilities and the updated variabilities. With the exception of Express Mail, the mail acceptance variabilities increased whereas the total stamp variability decreased.

**Table 8**
Estimated Variabilities

| **Product or Special Service** | Docket No. R2006-1 | Docket No. R97-1 |
|---|---|---|
| **FIRST-CLASS MAIL** | 64.90% | 56.37% |
| **PRIORITY MAIL** | 70.80% | 56.37% |
| **EXPRESS MAIL** | 67.20% | 83.15% |
| **MAILGRAMS** | 64.90% | 56.37% |
| **PERIODICALS** | 68.20% | 56.37% |
| **STANDARD MAIL** | 64.90% | 56.37% |
| **PACKAGE SERVICES** | | |
| PARCELS ZONE RATE | 75.90% | 56.37% |
| BOUND PRINTED MATTER | 68.20% | 56.37% |
| MEDIA MAIL | 68.20% | 56.37% |
| **US POSTAL SERVICE** | 68.20% | 56.37% |
| **FREE MAIL** | 68.20% | 56.37% |
| **INTERNATIONAL MAIL** | 79.00% | 56.37% |
| **SPECIAL SERVICES** | | |
| REGISTRY | 100.00% | 100.00% |
| CERTIFIED | 100.00% | 100.00% |
| INSURANCE | 100.00% | 100.00% |
| COD | 100.00% | 100.00% |
| MONEY ORDERS | 65.50% | 65.37% |
| STMPD CARDS | 99.50% | 0.00% |
| STMPD ENVELOPES | 99.50% | 100.00% |
| SPECIAL HANDLING | 99.50% | 100.00% |
| POST OFFICE BOX | 73.20% | 100.00% |
| OTHER | 99.50% | 100.00% |
| TOTAL STAMPS | 33.50% | 46.12% |
| TOTAL CARDS | 50.44% | 50.44% |
| TOTAL METERED | 24.17% | 24.17% |
| STAMPED ENVELOPES | 47.93% | 47.93% |

The other way to measure the impact of the update is to compare volume variable costs. The following table was provided to me by witness Milanovic. It presents the volume variable costs for the current base year and the volume variable cost for the current base year that would occur if the old variabilities were applied.

The volume variable costs for some products rise, but for other products they decline. Overall, the effect of the new variabilities is to reduce volume variable cost by about $83 million. Stated differently the ratio of volume variable cost to accrued cost in window service fell to 39.2 percent from 42.2 percent because of the update.

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**Table 9**
Volume Variable Costs

| Product or Special Service | Base Year | Base Year Using R97-1 Variabilities |
|---|---|---|
| **FIRST-CLASS MAIL** | 431,888 | 510,426 |
| **PRIORITY MAIL** | 90,797 | 76,483 |
| **EXPRESS MAIL** | 36,653 | 43,195 |
| **MAILGRAMS** | - | - |
| **PERIODICALS** | 3,774 | 3,742 |
| **STANDARD MAIL** | 53,635 | 67,737 |
| **PACKAGE SERVICES** | | |
| PARCELS ZONE RATE | 27,171 | 21,990 |
| BOUND PRINTED MATTER | 2,804 | 2,612 |
| MEDIA MAIL | 9,319 | 8,023 |
| **TOTAL PACKAGE SERVICES** | 39,294 | 32,625 |
| **US POSTAL SERVICE** | 25,138 | 24,961 |
| **FREE MAIL** | 473 | 438 |
| **INTERNATIONAL MAIL** | 46,976 | 36,561 |
| **TOTAL MAIL** | 728,629 | 796,170 |
| **SPECIAL SERVICES** | | |
| REGISTRY | 6,948 | 6,964 |
| CERTIFIED | 61,193 | 61,193 |
| INSURANCE | 38,857 | 38,857 |
| COD | 1,198 | 1,198 |
| MONEY ORDERS | 104,111 | 103,905 |
| STMPD CARDS | - | - |
| STMPD ENVELOPES | 3,304 | 3,321 |
| SPECIAL HANDLING | 200 | 201 |
| POST OFFICE BOX | 41,093 | 56,138 |
| OTHER | 71,241 | 71,599 |
| **TOTAL SPECIAL SERVICES** | 328,145 | 343,375 |
| **TOTAL MAIL AND SPEC SVCS** | 1,056,774 | 1,139,545 |
| **OTHER COST** | 1,639,915 | 1,557,145 |
| **TOTAL** | 2,696,690 | 2,696,690 |

All values are in thousands of dollars

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Addendum to USPS-T-17

In the course of preparing the documentation, I reviewed the spreadsheet that calculates the variabilities. That review revealed that the spreadsheet contained minor cell errors. For example, the number 7896 was erroneously entered into the spreadsheet as 7986. These errors caused a very small upward bias in the calculated variabilities (except those for special services which don't depend upon this number). The submitted variabilities (which are contained in the base year spreadsheets) and the corrected ones are presented below.

**Table 10**
Effect of Correcting Minor Cell Errors

| Item | Submitted Variability | Corrected Variability | Difference |
|---|---|---|---|
| Stamps Scanned | 41.3% | 41.0% | -00.3% |
| Stamps Not Scanned | 68.2% | 68.0% | -00.2% |
| Priority | 70.8% | 70.2% | -00.6% |
| First Class | 64.9% | 64.2% | -00.6% |
| Parcel Post | 75.9% | 75.3% | -00.6% |
| Other W&R | 68.2% | 67.5% | -00.8% |
| Express Mail | 67.2% | 66.4% | -00.8% |
| Money Order | 65.5% | 64.7% | -00.7% |
| Certified | 100.0% | 100.0% | 00.0% |
| Insurance | 100.0% | 100.0% | 00.0% |
| Registered | 100.0% | 100.0% | 00.0% |
| International | 79.0% | 78.5% | -00.6% |
| PO Box | 73.2% | 72.5% | -00.7% |
| COD | 100.0% | 100.0% | 00.0% |
| Other Special Services | 99.5% | 99.4% | 00.0% |
| PVI | 60.4% | 59.6% | -00.8% |
| Stamps Overall | 50.9% | 50.7% | -00.3% |