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POSTAL RATE, FEE AND CLASSIFICATION CHANGES, 2006)

DIRECT TESTIMONY OF
JAMES A. CLIFTON
ON BEHALF OF
GREETING CARD ASSOCIATION

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I. Qualifications and Background

My name is James A. Clifton. I am President of the Washington Economics Consulting Group, Inc., (WECG). The firm is devoted to regulatory and economic policy analysis as well as litigation support services. I have testified on five previous occasions before this Commission. In Docket No. R90-1, I presented direct testimony on behalf of McGraw-Hill, Inc. In the Docket No. R94-1 rate case, I presented rebuttal testimony on behalf of the American Bankers Association. In Docket No. MC95-1 I presented direct testimony on behalf of the Greeting Card Association. In Docket No. R97-1, I presented direct testimony on behalf of the American Bankers Association, National Association Presort Mailers, Newspaper Association of America, and Edison Electric Institute. In Docket No. R2000-1 I presented testimony on behalf of the American Bankers Association and National Association of Presort Mailers.

My professional experience includes three years with the U.S. Chamber of Commerce as a senior regulatory economist (1979 – 1983), three years as Republican Staff Director of the House Budget Committee (1983 – 1986), and four years as President of the Center for Industrial Competitiveness, a non-profit foundation (1986 – 1990). In the consulting arena, I was principal associate at Nathan Associates from 1990 – 1991, an academic affiliate of the Law and Economics Consulting Group from 1992 – 1995, and an independent consultant from 1987 – 1990 and 1996 – 1997.

I have also been Associate Professor of Economics and Business at The Catholic University of America, from 1992 through 1997. My other academic experience includes Assistant Professor of Economics at the University of Maine-Orono (1975 – 1978), and Visiting Professor at Cambridge University during 1977.

I received a BA in Economics from Cornell University in 1969 and a Ph.D. in Economics from the University of Wisconsin-Madison in 1975. At the latter institution, I was a Ford Foundation fellow. I have published occasional research in academic journals including the Cambridge Journal of Economics, Contributions to Political Economy, Business Economics, and the Journal of Economic Behavior and Organization.

II. PURPOSE AND SCOPE OF TESTIMONY:

The purpose of my testimony is to develop and introduce better and more accurate estimates of the own price elasticity of demand for First Class single piece letters than those provided by USPS witness Thomas Thress in this case in USPS-T7. In the face of the growth of competing electronic substitutes for First Class single piece letters since the last litigated rate case in R2000-1, I believe Mr. Thress' approach to modeling those competing substitutes is fundamentally flawed and produces seriously downward biased estimates of the own price elasticity of First Class single piece letters. This leads to flaws in rate proposals and the revenue requirement, and flaws in the assignment of institutional cost coverages based on faulty demand elasticities and other perceptions of market conditions.

A Declaration dated September 5, 2006, from Prof. Harry Kelejian, a noted econometrician, concurs that Mr. Thress' approach is seriously flawed. The model I develop avoids these flaws. Overall, I estimate the own-price elasticity of First Class single piece mail to be -0.456, compared to Mr. Thress' biased estimate of -0.184. Importantly, I also used my econometric approach to re-estimate the own price elasticity of Standard A Regular Mail. The correct estimate of the own-price elasticity for Standard A Regular mail is -0.254, somewhat less than that for First Class single piece letters.

The conclusion I draw from these findings is that the Commission should look last, not first, at single piece letter mail when it raises rates to cure a general revenue deficiency. At a minimum it should look to rate increases for Standard A Regular mail to solve general revenue deficiencies before it considers whether to raise First Class single piece rates at all. Unlike First Class single piece letter mail, volume growth is healthy for Standard Mail and my elasticity estimate strongly indicates it can absorb higher rate increases than those proposed by the Postal Service in this case. It is in many instances self-defeating for the Postal Service to raise First Class single piece rates at this time.

In the U. S. payments market, for example, I believe raising rates for First Class single piece mail will cause more of a revenue loss from lost volume than is gained by increased rates on remaining postal volumes in that market. The facts are the Postal Service has no remaining “pricing power” in such markets, where its correctly measured market share is well under 50%, yet USPS refuses to compete on price where others are. That needs to change starting with the Commission’s decision in this rate case.

III. THE POSTAL SERVICE’S APPROACH TO MEASURING ELASTICITIES FOR THE FIRST CLASS LETTERS SUBCLASS IS NO LONGER CREDIBLE

The Postal Service must, by regulation, provide estimates in each rate case as to the impact its proposed changes in rates will have on postal volumes and revenues. A key to estimating the “after rates” volumes and revenues is the set of own-price elasticities of demand for postal products whose rates are changed. Beyond the need to cover attributable costs and avoid cross subsidization of those attributable costs in the rates proposed, postal rates also entail a mark-up above costs to cover so-called institutional costs, costs that the Postal Service believes cannot be attributed to mail class and subclass or that the Commission, after evaluating the evidence, decides cannot be attributed to mail class and subclass.

Market or demand factors, including USPS-estimated own-price elasticities, enter into the determination of the mark-ups for each mail class and subclass. In general, the Commission has seldom, if ever, challenged an own-price elasticity submitted by the Postal Service in a rate case, but has instead focused its scrutiny mainly on costs and cost models even though the Postal

Service has in recent years been subject to rapidly changing market conditions for First Class Mail.

How reliable are the First Class own-price elasticities used by the Postal Service and the Commission in assessing the relative institutional cost assignments for setting rates? At least with respect to First Class mail, I believe they have become largely unreliable. While this testimony is directed primarily toward the accuracy of the Postal Service's single piece own-price elasticity, the record in Docket No. R2006-1 compared to Docket No. R2005-1 for the workshared elasticity graphically illustrates the growing lack of credibility of USPS elasticity estimates.

In the R2005-1 rate case, the own price elasticity of workshared FCLM was estimated to be -0.329. With only three extra quarters of 2005 data beyond the data available for R2005-1, the R2006-1 estimate of the same elasticity was -0.130. That is a 60% swing in just one year measured from the base year, or a 253% higher estimate in 2005 than for 2006. Both estimates cannot be correct. When USPS witness Thress was asked whether the elasticity had changed that much in one year, his response was incredulous. "I do not believe that First-Class workshared mail has become increasingly inelastic between the R2005-1 and R2006-1 rate cases." (Response of USPS witness Thress to ABA-NAPM/USPS-T7-2.) Under oral cross examination, witness Thress elaborated. "The numbers show that my estimate has declined from minus .329 to minus .130, but my current estimate is that the own-price elasticity of first class workshared letters is now minus .130 and was a year ago minus .130." (R2006-1, Tr. at 1325, lines 23-25 through 1326, lines 1-2.)

Mr. Thress attributes his changed estimate to a flawed model in R2005-1. When asked if his R2005-1 model for estimating the own price elasticity of workshared letters was flawed, his answer was "Yes." (Tr., op. cit., 1326 at line 5).

He goes on to state:

> I'm saying my previous estimate was less accurate based on new information and a reevaluation of the existing information. I have revised my estimate, yes. . . The new information which led me to that conclusion was in part the existence of three additional quarters of data and was also a reevaluation of what happened to workshare letters volume beginning in 2002 quarter four and into 2003 and 2004. In particular, upon reexamination that seems to have been a case of increasing electronic diversion as opposed to whereas the previous model attributed some of that loss in volume to a rate change that took place in June on June 30, 2002. (Tr., op. cit., 1326 lines 5-21.)

The new information which witness Thress relied upon to lower his estimate of the impact of the 2002 rate increase on workshared mail volume is a data series on broadband usage. Witness Thress claims that inclusion of this new variable improved the single metric he uses for evaluating the strength of his demand models, mean-square-error (MSE). The inclusion of a broadband variable for workshared letters makes no economic sense, however, regardless of what it does to MSE or any other econometric diagnostic. Large and small businesses, essentially any business that operates in a commercial office environment has had access to high speed T1 line technology for many, many years and certainly well before the rate increase in 2002. The broadband deepening that has gone on in recent years since 2000 is almost exclusively in the household or residential sector, the substitution of cable company high speed internet offerings or telephone company DSL offerings.

It would have made sense on economic grounds for witness Thress to include a broadband variable in his single piece demand equation as part of his never-ending experimentation to model the impact of Internet diversion correctly, but not in his worksharing equation as he has done. Mr. Thress' associate, Mr. Bernstein, states that broadband deepening of Internet usage by households is in fact one of the major reasons online banking and payment of bills generally online has been increasing since 2000. (Tr., op cit., page 1449, line 6 through page 1451, line 1.) Mr. Thress tried but rejected inclusion of the broadband variable in his single piece demand equation evidently because it did not produce a lower MSE. The reasons it did not produce a lower MSE may be many, but the fact remains that on economic grounds, it should be included in the single piece equation. What witness Thress did do was to attempt to capture Internet deepening through a very complicated set of changes to his Internet variable in the single piece demand equation, changes which may have improved his MSE relative to straightforward application of broadband data, but which create other problems whenever a time trend dummy variable capturing everything and nothing is re-introduced into a demand equation.

We now know witness Thress' R2005-1estimate for the workshared letters elasticity was 253% higher than what he claims was its true value. Is there any reason to believe the R2006-1 figure any more than the R2005-1 figure, or will we be told in the next rate case that -0.130 was way too low, or way too high? In R2000-1, the estimated value of the own-price elasticity of demand for workshared letters was -0.251, a year later in R2001-1, it was -0.71. What was the true value back then? Did witness Thress make a mistake in R2000-1, a litigated case, as he did in R2005-1? Was the true value in R2000-1 -0.71 and not -0.251? Or was the true value in R2000-1 and R2001-1 in fact -0.130 as we are now told?

The problems with Mr. Thress' elasticity numbers go beyond his calculations. A good example from this case as to how they get mis-used is the following. When asked about the loss of financial statements mail volume, and whether lower rates proposed in this case for 1 ½ ounce and 2 ½ ounce statements would help stem that erosion, USPS witness Taufique indicated price did not have much to do with the loss of financial statements mail, citing as a reference USPS witness' Thress' Testimony, R2006-1, USPS-T-7, Table 16 showing a very inelastic worksharing mail elasticity of -0.130. This is an overall elasticity, not the elasticity of financial statements mail, where price competition from electronic payments systems has reduced the usage of checks, which has in turn reduced the volume of extra ounce postage for canceled checks returned to customers in the mail with their monthly bank statements. Witness Thress makes a similar error in asserting that the own-price elasticity of single piece payments mail, despite the huge losses in mail volume in recent years, must be the same or nearly the same as his aggregate own-price elasticity for single piece. (Tr., op. cit., 1322 lines 10-15.) Yet payments by households constitute 25% of total transactions mail and 13% of total Household First-Class Mail according to the 2005 Household Diary Study (HDS).[1] Postal Service witness Peter Bernstein notes that an alternative approach to elasticity measurement is to "decompose First-Class Mail into individual mail segments and make a segment-by-segment projection of diversion." (Response of USPS witness Bernstein to GCA/USPS-T8-1.c.)

While witness Thress' approach to estimating the own-price elasticity for workshared letters is problematic, these problems pale in comparison to problems with his approach to the single piece letters demand equation specification and econometric estimation, as I will demonstrate in the following sections. In Docket Nos. R2000-1 and R2001-1, USPS witness Thress estimated this elasticity to be -0.262 and -0.311, respectively. After two rate increases from those two rate cases, significant lost volumes in major components of the single piece mailstream such as bill payments by mail, and continued Internet diversion of other types of single piece mail, Mr. Thress estimates that single piece elasticities are much more inelastic, -0.175 in R2005-1 and -0.184 in R2006-1.[2] Alternatively, witness Thress apparently believes that

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[1] Calculated from data on page 25, 2005 HDS.

[2] Witness Thress' justification for such declines in elasticity is that once the more price sensitive customers move away from First Class Mail, the remaining customers are more price inelastic. Yet this would be true for any mail class and does not serve to explain the difference in

throughout the post-2000 period, single piece elasticity has stayed the same at -0.184, despite dramatic price and non-price competition for postal services in the payments and transactions arena and other dramatic challenges in market conditions faced by the Postal Service.

When asked under oral cross examination if single piece "First Class letter mail is migrating to electronic substitutes to some extent because of the relative prices of these two different media", Mr. Thress replied:

> "I think it's true that this migration is because of the relative prices, but what's driving the change in relative prices is that the price of electronic alternatives is declining so that it's the price of the electronic alternative that is driving the substitution much more so, in my opinion, than the price of first class single piece letter stamps, which essentially in the long run are unchanged relative to inflation."
> (Tr., op cit., 1320, lines 9-21.)

In a behavioral sense, if a market is dominated by price competition but one of the participants refuses to compete on price, one has the following situation. A correct estimate of the market own-price elasticity of demand would show it to be fairly elastic. However, when computing the own-price elasticity of demand for the single competitor who refuses to compete on price, and loses market share, he will appear unto himself to have a low own-price elasticity of demand because he does not respond to the competition, at least not in that way. His lost volume is due to "other factors, not price". This is a preposterous and false conclusion. His own own-price elasticity of demand is the result of his own irrational behavior, not the condition of the market demand curve. When he

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elasticities between, for example, FCM and Priority mail as witness Thress claims. (See USPS witness Thress' response to GCA/USPS-T7-8e).

attempts to assert, however, that the market in which he is competing is highly price inelastic, he is deluding himself, and suffers the consequences in lost demand for his product each time he raises prices and his competitors don't. The consequences of such irrational behavior are what some economists refer to as the "death spiral." But it should be clear that the death spiral refers primarily to First Class single piece mail, not all postal services.

IV. USPS HAS NO REMAINING MARKET POWER IN THE U. S. PAYMENTS MARKET, BUT ACTS LIKE IT DOES WITH BACK-TO-BACK RATE INCREASES IN STAMP PRICES TOTALING 5 CENTS OR 13.5%

A. The **Household Diary Study Omits Debit Card Transactions, the Fastest Growing Means of Bill Payments**

The Postal Service understands the importance of payments mail. "According to HDS, bill payments comprised the greatest single use (51 percent) of First-Class Mail sent by households in 2002." (USPS, 2002 Household Diary Study, p. 16). "Chapter 5: Transactions" of the 2003 Household Diary Study indicates that the three highest volume mailstreams that are at risk insofar as postal products are concerned are: (1) bills; (2) bill payments; and (3) statements, which are largely financial in nature.

However, in the last three annual Household Diary Study chapters on "Transactions", the effect of competing substitutes to mail in the U. S. payments market is downplayed by virtue of how statistics like those in **Table 1** below are constructed and interpreted.

Table 1 – Bill Payment Method, PFY 2003-2005

Bill Payment Method	2002	2003		2004		2005	
	Average Number of Bills Paid Per Month	Average Number of Bills Paid Per Month	Percent Households Using Method	Average Number of Bills Paid Per Month	Percent Households Using Method	Average Number of Bills Paid Per Month	Percent Households Using Method
Mail	8.6	8.3	95%	8.3	95%	8.0	93%
Automatic Deduction	1.0	1.0	43%	1.1	50%	1.3	54%
Internet	0.5	0.7	14%	1.1	22%	1.5	28%
In-Person	0.9	0.8	34%	0.8	35%	0.7	31%
Credit Card	0.2	0.2	16%	0.3	21%	0.3	22%
Telephone	0.2	0.2	10%	0.3	14%	0.3	14%
ATM	0.0	0.0	1%	0.0	2%	0.0	1%
Total	**11.4**	**11.5**	**--**	**12.0**	**--**	**12.0**	**--**

The conclusion the authors, and evidently the Postal Service, intend to be drawn from this table about the relative importance of competing electronic substitutes for mail in the U. S. payments market is clear. " [T]he number of actual bills paid by these [electronic] methods is relatively small (an average of 1.3 and 0.7 pieces per month, respectively)." (2005 HDS, page 29.) In addition to these 2005 automatic deduction and in-person payments figures, respectively, other reported payment substitutes for postal services in **Table 1** are similarly seen to be miniscule in comparison to payments made by mail.

If one accepts the view from **Table** 1 concerning the competitive position of mail in the U.S. payments system, the Postal Service still retains considerable market power. Mail is losing market share, down from 75.4% in 2002 to 66.7% in 2005, but is still the market-dominant product. Therefore, one can still continue to raise rates on payments letter mail without concern for the impact on postal finances. There are three fundamental problems with this view.

First, if payments are made by households at the point of transaction, as with debit cards and purchases over the Internet, no bill is ever sent to the household to be paid by it. However, it is not the Internet, but debit cards that increasingly dominate this element of the payments system. When I called the authors of the HDS, they indicated debit card payments to date had not been included in the HDS data above in **Table 1**. That error alone leads to a significant overstatement of the market position of mail in the U. S. payments system because payments with debit cards are not only a large element of payments, but the fastest growing means of payment.[3]

Second, bill generation and bill payments between businesses are excluded from this data, a fact USPS acknowledges but without seeking to measure what impact those non-household to non-household flows are having on FCLM.

Third, the erosion in the payments market of the USPS market position is not necessarily happening gradually, but seems to be occurring rapidly.[4] In the first quarter of 2000, over 81% of payments processed by Wells Fargo were

[3] Geoffrey R. Gerdes & Jack K. Walton II & May X. Liu & Darrel W. Parke, 2005. "Trends in the use of payment instruments in the United States," Federal Reserve Bulletin, Board of Governors of the Federal Reserve System (U.S.), issue Spr, pages 180-201.

[4] In the R2005-1 rate case, USPS witness Thress included a separate logistics time trend for the short run period, 2002-2004, in an effort to reflect the accelerated impact that competitive substitutes may now be having on postal services.

paper. By the first quarter of 2004, only 12% were, while 88% of payments were made and/or processed electronically.[5]

B. Correctly Measured, the USPS Market Share in the U. S. Payments Market is Well Under 50%

Studies done for the Federal Reserve Bank of Atlanta for the years 2000 and 2003 by Dove Consulting summarized in **Table 2** enable one to see that bill payments sent to and made by households through the mail that are paid by check are no longer a dominant element of the payments system, and are a declining share of the total U. S. payments market. USPS witness Thress has a more aggregated table containing the same data, which also includes 1995 figures (See R2006-1, USPS-T7, Table 6, page 47). However, Mr. Thress never uses the data to challenge the viewpoint expressed in the HDS.

I believe this total payments base is superior to the HDS as it reports all payments, including debit card payments. The Atlanta Fed study does not report directly payments made by mail. However, it does report payments made by check and all non-cash payments. Payments made by check are an excellent proxy for payments made by mail, because at the point of sale, checks are rarely used anymore, having been displaced by credit and debit cards. People write checks to pay bills that come in the mail, and send those checks back by mail.

[5] Banwart, J., Wells, VP, Fargo Home Mortgage, "From 81 Percent Paper to 88 Percent E-Payments in Four Years", in E-Payments, 2004 Electronic Payments Review and Buyer's Guide, p. 39.

Table 2 – Number of Payments for the Years 2000 and 2003 (Millions)

Payment Instrument	2000	2003	CAGR 2000-2003
General Purpose Credit Cards	12,300.2	15,212.1	7.3%
Private Label Credit Cards	3,300.6	3,753.2	4.4%
Signature Debit	5,268.6	10,262.9	24.9%
PIN Debit	3,010.4	5,337.9	21.0%
ACH[1]	6,211.3	9,061.8	13.4%
EBT	537.7	826.8	15.4%
Electronic Total	**30,628.8**	**44,454.7**	**13.2%**
Total Checks	41,900.0	36,700.0	-4.3%
Checks and Electronic Total	**72,528.8**	**81,154.7**	N/A
Commercial Checks	16,994.0	15,806.0	-2.5%
Memo: ACH CCD Payments	1,060.7	1,459.6	11.2%
Total EP w/o CCDs[2]	29,568.2	42,995.1	13.3%
Emerging Payments	76.2	1,383.3	Not Meaningful

[1]These figures include ACH Corporate Cash Concentration and Disbursement Standard Entry Class code (CCD) volumes, which had been excluded in 2001 EP Study.

[2]Cash back at the POS was not accounted for in the 2001 EP Study.

[2]Total Electronic Payments (EP) without ACH CCD are shown for compairson with the 2001 EP Study.

Source: Federal Reserve Bank of Atlanta, 2004 Electronic Payments Study, Study Methods and Results Summary Report

Using the FED database in **Table 2**, one can clearly see that the market share of mail has seriously eroded in the U. S. payments market, unlike the conclusion that can be drawn from **Table 1**. In fact USPS market share in the U.S. payments market is now well under 50%. In 1995, checks comprised 77% of all payments.[6] In 2000, the market share of checks in the payments market had dropped to 58%. In 2003, checks comprised only 45% of all payments. Between

[6] R2006-1, USPS-T7, Table b. page 47.

2000 and 2003, this is a 4.3% compound annual rate of decline.[7] That decline is not a gradual erosion of market share, but a rapid one.

The Atlanta Fed payments data are a strong indication that the Postal Service has little remaining market power – or none at all – in the U. S. payments system, whether the comparison is made using the number of checks or the number of bills and bill payments made by mail.[8] Yet, in the R2005-1 rate case, the single piece demand model elasticity numbers showed a marked reduction for single piece mail own-price elasticity since the R2000-1 rate case, the very time period during which the intensity of competitive pressure from market substitutes for single piece mail was increasing![9]

[7] The use of credit cards for payments also indirectly helps USPS volume as a monthly payment for all credit card transactions will typically involve workshared or bulk mail sent from the credit card issuer to the card-holder, and may involve payment of that bill by return postage.

[8] The FED's Vice Chair, Roger W. Ferguson, Jr., in a November 14, 2001 press release accompanying the first comprehensive study of the payments system, noted "The data show strong growth in electronic payments since the early 1980s and lower than expected check volumes." While this fact is still obscured in postal rate case proceedings and USPS–sponsored research on demand and elasticity, it appears to becoming recognized belatedly through USPS forming a "Remittance Mail Task Force" as reported on February 28, 2005, 3 ½ years after the first FED study and a quarter century since the phenomenon began. "Bill and payment mail represents nearly one-half of First-Class Mail volume and a significant portion of overall U. S. Postal Service revenue," the USPS vice president of product development indicated in the February 28th press release. "Recent developments in technology and the changing behavior of bill payers are forcing the industry to reevaluate long-term strategies, address change, and adapt to the new environment that will emerge over the coming years." In Table A2, Appendix A of the "2005 Mail Volume Forecast Scenario" provided by USPS witness Bernstein in response to GCA/USPS-T8-8 (Exhibit No. GCA/USPS-T-8-8), in the pessimistic scenario FCLM volumes are shown to decrease to 70 billion pieces by 2014 .

[9] The fact that both notions are taken seriously spells a very troubled future for the Postal Service with respect to single piece first class letter mail. At current rates of decline, FCLM can be expected to fall to between 8 and 20 billion pieces within twenty years, depending upon what type of linear or exponential power curve is fitted to current behavior.

C. Descriptive Statistics on Price Sensitivities in the U. S Payments Market

In attempting to capture Internet diversion and the substitution of electronic payments systems for payments mail and extra ounce statements mail over the years, USPS witness Thress has used equations of the form:

$$(1) \quad \log (Q) = a - b \log (P) + Z(t)$$

Z(t) has at times been a vague, lump-sum logistics time trend variable, a dummy variable, or in more recent years an Internet Service Provider (ISP) cumulative expenditures variable, or some combination of the foregoing. In 2006, witness Thress is no longer using a cumulative ISP variable, but rather the number of users, number of users interacting with the long-term time trend and number of users interacting with short-term time trend (T2002Q4). (See R2006-1, USPS-T-7, pages 48-50).

A more direct approach for examining the impact of electronic payments system on single piece payments mail in particular would be an equation such as (2) below. The second variable would be the direct price of the competing substitute(s), P_2, and the sign of the associated coefficient, b_2, would be positive for a competing substitute. A direct estimate of that cross price elasticity, b_2, would greatly sharpen the estimate for b, the own-price elasticity of demand for single piece payments mail.[10] Other things being equal, a further property of the

[10] Through the R2000-1 rate case, USPS–sponsored research did not include explicit variables for competitive substitutes outside the family of postal product subclasses themselves. Instead a time trend variable and trend squared were used to approximate the impact over time of competitive substitutes. In R2001-1, an explicit variable intended to represent the Internet was

demand specification in equation (2) is that when the cross price elasticity b_2 is high, the absolute value of the own price elasticity, b, will also tend to be high.[11]

$$(2) \qquad \log(Q) = a - b \log(P) + b_2 \log(P_2)$$

Unfortunately, such price data for competing substitutes in the payments market for single piece mail is not as readily available as data on postal prices [12] However, quantity data on competing substitutes is available. Therefore, we can draw inferences as to whether postal demand functions should exhibit high cross elasticities with respect to the prices of competing substitutes by exploring whether competing substitutes exhibit strong cross elasticities of demand with respect to postal prices. The postal and electronic competing substitute demand curves should exhibit symmetry with respect to own price and cross price estimates.

What I estimate in **Table 3** are descriptive statistics indicative of cross elasticities of demand, $dQ/Q \div dP_2/P_2$, in which I make some assumption about the trend value of P, the price of competing electronic substitutes for mail. This estimation assumes short run economic conditions, where ceteris paribus

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added to the two trend variables. In R2005-1, a broadband subscribers variable is added to the ISP expenditures variable, and the logistic time trend variable is constrained to influence just the past few years. Arguably, this superior functional form within a short period between the two estimations of R2000-1 and R2001-1 helped sharpen the own price elasticity estimate, and for single piece mail the elasticity increased from 0.261 to 0.311.

[11] See Carlton, Dennis W. and Perloff, Jeffrey M., Modern Industrial Organization, fourth edition (2005), p. 648. Where there are many substitutes, the own price elasticity may be high, but no individual cross price elasticity need be, only the sum total for all substitutes must exhibit an elastic response. For postal services the number of competing substitutes for FCLM is relatively small, but the intensity of that competition is very strong.

[12] The best approximations we have are time series deflators of computer prices.

conditions are presumed to hold for all other factors affecting the demand for electronic payments other than their own prices and postal prices. Using electronic payments quantity data as dependent variables, it is possible to calculate these descriptive statistics approximating arc cross elasticities of demand between postal prices and quantities demanded of competing electronic substitutes for postal payments mail. If these goods are in the same market, there should be a basic symmetry between the two sets of cross elasticities. High values of these should be associated with high values of the cross elasticity of demand for payments mail with respect to the prices of electronic substitutes. And from this we can infer that the own-price elasticity for postal payments mail is likely high.

Table 3 – Descriptive Statistics Estimating Arc Elasticities for Single Piece Mail and Electronic Payments

Arc Elasticities: 2000 - 2003

Number of payments (millions)	Annual Data				Cross Price Elasticities With Respect to Single-Piece Price			Own Price Elasticities With Respect to GDP Computer Price Deflat		
Payment Instrument	2000	2001	2002	2003	2000-2003	2001-2003	2002-2003	2000-2003	2001-2003	2002-2003
General Purpose Credit Cards	12,300	13,203	14,172	15,212	4.63	3.20	4.53	-0.62	-0.62	-0.6
Private Lable Credit Cards	3,301	3,445	3,596	3,753	2.68	1.88	2.70	-0.36	-0.37	-0.3
Signiture Debit	5,269	6,580	8,218	10,263	18.54	11.78	15.37	-2.50	-2.29	-2.0
PIN Debit	3,010	3,644	4,410	5,338	15.12	9.78	12.99	-2.04	-1.90	-1.7
ACH	6,211	7,045	7,990	9,062	8.98	6.02	8.28	-1.21	-1.17	-1.1
EBT	538	621	716	827	10.52	6.99	9.52	-1.42	-1.36	-1.2
Total	30,629	34,678	39,263	44,455	8.83	5.93	8.16	-1.19	-1.15	-1.1
Checks (Own Price)	41,900	40,090	38,357	36,700	-2.43	-1.78	-2.67			
Commercial checks	16,993	16,905	16,586	15,805	-1.37	-1.37	-2.91			
Bill Payments by SP mail			11,996	11,096			-4.63			
Bill paymenst Per Household Per Week	2.9	3.2	3.4	3.2	2.02	0.00	-3.63			
Statements Per Household Per Week	1.1	1.4	1.2	1.1	0.00	-4.51	-5.14			
SP Volume /Pop/Days	3.53669	3.36397	3.23447	3.04258	-2.73	-2.01	-3.66			
WS Volume /Pop/Days	3.12386	3.19835	3.14605	3.08765	-0.23	-0.73	-1.15			
SP Real Price	0.40889	0.41030	0.42295	0.42980						
GDP Deflator for Computers	100.00	82.19	70.54	62.10						

Note: USPS quarterly SP volume & price are converted to regular annual data to correspond to other annual data given in above table

Sources:

Payment Instruments data are obtained from 2004 Electronic Payments Study

Commerrcial checks are obtained from the Bureau of Economic Analysis & various The Household Diary Study reports.

SP Volume and SP prices are obtained from Thress R2005-1.

GDP deflator and BLS price index for computers are obtaiend from BEA & BLS.

The two periods around which the estimates are made are 2000 and 2003.[13] This period happens to span two rate increases in postal products of concern and further econometric variation exists as a result of the application of quarterly inflation indices to create real price data. Descriptive statistics approximating arc cross price elasticities are estimated using electronic payments data from the FED studies for 2000 and 2003, and using CAGR techniques we interpolate for in–between years in the linear regressions. While direct price data are hard to come by for each of these electronic substitutes, I tested both the BLS series for computer prices and the BEA deflator in the GDP accounts for computer and peripherals prices. The latter series performed appreciably better, and I adopt it as a proxy for the prices of electronic substitutes.

Postal volumes are available for each of the quarters over the period 2000 – 2003. They are also available on an annual basis for very specific FCLM mailstreams, including bank, S&L and credit union statements and credit card bills, as well as nine other categories.

The descriptive statistics approximating arc own-price and cross-price elasticities are reported in **Table 3.** We discuss some of the highlights here. First, changes in demand for electronic payments substitutes for FLCM with respect to changes in the price of single piece mail exhibit the correct positive sign and are very high for all payments alternatives except the mature product of credit cards.

[13] Based on extrapolations of the FED studies, we are also able to fill in 2001 and 2002 data for competing substitutes volume, and estimate elasticities via linear demand curve assumptions and regression techniques for small samples.

Even so, the changes in demand for credit card payments with respect to changes in price for single piece mail all exhibit values well in excess of 1.0, but at smaller numerical estimates than, for example, signature debit cards. Debit cards exhibit values of between 15.37 and 18.54 depending on which two times are selected.

Continuing with the results from **<u>Table 3</u>**, the descriptive statistics, approximating own-price elasticities estimated for payments alternatives to postal services have absolute values in excess of 1.0 other than for the mature product category of credit cards. The own-price numerical values as a group are significantly less, however, than the cross-price numerical values. Imperfections in the GDP price deflator as a proxy for electronic payments systems price may explain this. It also may be that the choice to abandon Postal Service payments mail and opt instead for electronics payments methods is driven much more by postal rate <u>increases</u> than it is driven by electronic payments price <u>decreases</u>, which are by now well built into expectations for electronic payments methods. These descriptive statistics are suggestive evidence that there may be high price elasticities and high cross price elasticities in the U. S. payments market.

I do not claim great precision for these results, but clearly this is the direction in which econometric research concerning postal price elasticities should go if meaningful market information is to be conveyed to the Commission for the purpose of advising it in setting rates. The current elasticity approach for single piece mail is far too aggregative to be useful in assessing the market conditions faced by First Class single piece letter mail. What I have shown in this section is that to measure such elasticities one has to start with a correct definition of the market, in this case the payments market, before one can assess whether it is self-defeating for the USPS to raise First Class letter mail single piece rates.

D. Price Competition from the Internet: Statements Mail and Descriptive Statistics on Price Sensitivity Surrounding the Extra Ounce Rate

If the payments system may be said to be a defined market in which lower cost electronic substitutes appear to be rapidly displacing First Class Mail volume, the Internet is more a defined technology which cuts across more than one market in which various postal products compete.[14] The displacement of postal products that results from increasing utilization of the Internet appears to be more gradual and evolutionary than what is occurring in the payments market.

Examining the direct elasticity between changes in the First Class letters extra ounce rate and changes in the volume of checks is, I believe, one specific way of investigating the impact of Internet diversion of, and electronic alternatives to First Class Letter Mail. Statements mail exceeding one ounce has fallen because of electronic alternatives to checks and because broadband more recently has made on-line banking an attractive alternative to paying by check.

[14] An explicit variable for internet expenditures was introduced in R2001-1, and in the R2005-1 rate case, other Internet variables were tried and a derivative of internet services expenditures called “Internet Experience” was adopted.

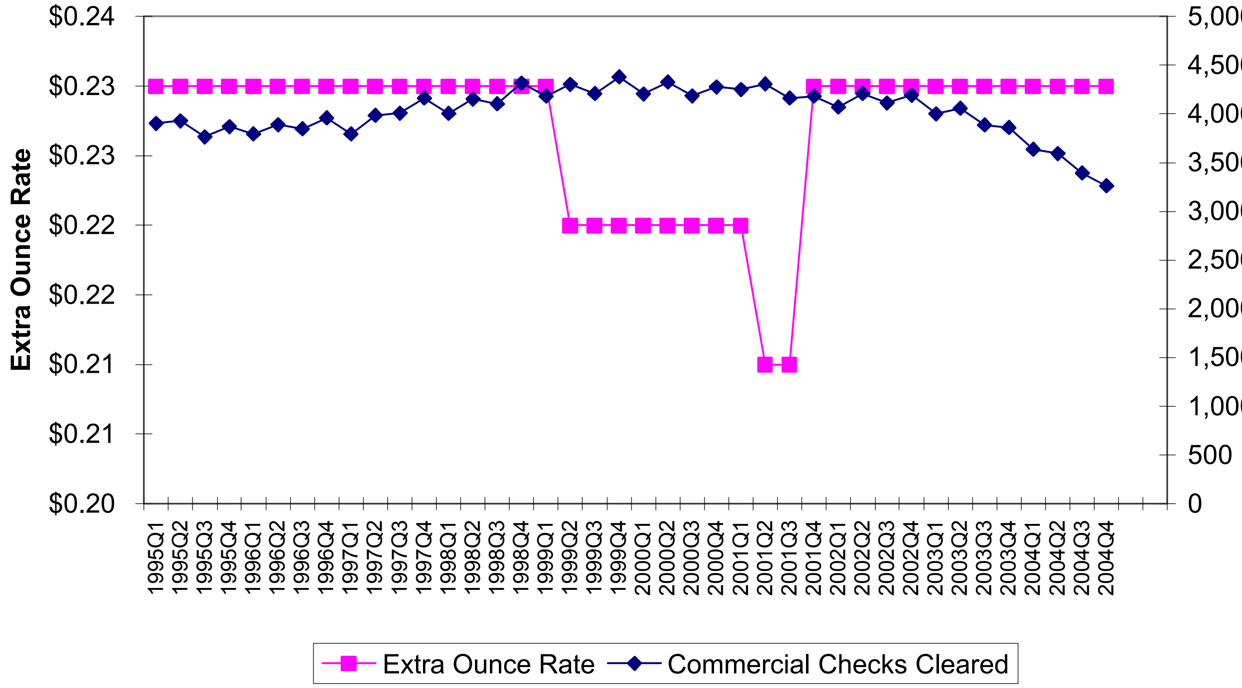
This proceeds from the observed close correlation between extra ounce volume within postal services and check volumes, as represented by quarterly commercial check data, which comprises about 40% of total check volume.[15] I employed a shorter period than the ones used for USPS – sponsored research, 1995 – 2003. Differences in estimated elasticities for the two periods can reasonably be ascertained to represent short period influences between price and quantity demanded.[16] The regressions and associated significance of the elasticity estimates in t – values are reported in **Table A1** in Appendix A**.** In a more intuitive sense, **Figure 1** shows the strong correlation between Postal Service additional ounce volume in FCLM and commercial check volumes, as well as between commercial check volumes and extra ounce rates.

With nine years of quarterly observations, the own-price elasticity of demand for extra ounce volume was found to approximate a unitary elasticity, at –0.95799. This spans a period in which extra ounce rates were constant for a period, cut and later increased.

[15] Ideally, we would like to have this quarterly data for all checks, but commercial checks do represent 40% of total check volume and are the only quarterly series available against which we can compare quarterly extra ounce volume.

[16] While this does not relieve one of the burden of further refining the estimation of demand for additional ounce mail through the introduction of additional variables, it is a starting point that does exclude such "long period" factors from 1983-1994 in the USPS database. Further, we performed the same log – log estimating procedure for an additional year, 2004.

Figure 1 – Volume of Commercial Checks Processed vs. Extra Ounce Rates



Source: GCA-LR-L-2, Workpaper 1.

The expected impact of the 2002 hike in extra ounce rates would be felt not only in 2003, but also the adaptation to it would be felt as greatly or more in succeeding years as adaptation takes time and expense. When we add 2004 data to the exercise, the estimated own price elasticity increases to –1.27, firmly in the price elastic range, and with a t – statistic that is highly significant at –3.51.[17]

[17] Further refinements must be made. The extra ounce rates can be measured in real terms, not nominal as in these exercises. Second, postal rate changes in the extra ounce rate are but one of

V. USPS WITNESS THRESS' THEORY AND ESTIMATION OF SINGLE PIECE DEMAND IS PROBLEMATIC, AND HIS ATTEMPTS TO MODEL INTERNET AND ELECTRONIC PAYMENTS COMPETITION WITH SINGLE PIECE MAIL ARE FUNDAMENTALLY FLAWED

A. The Postal Service's Competitors Are Competing on Price, It Is Only USPS that Is Not

When asked if the markets within which postal products compete with electronic alternatives are characterized by price competition, USPS witness Thress answered as follows:

> Q: If the incumbent firm did decide to try competing on price, would the prices of the incumbent product and the substitute product be correlated?
>
> A: Probably.
>
> Q: Do you think it's likely that single piece first class letter mail is migrating to electronic substitutes to some extent because of the relative prices of these two different media?
>
> A: I think it's true that this migration is because of the relative prices, but what's driving the change in relative prices is that the price of electronic alternatives is declining so that it's the price of the electronic alternative that is driving the substitution much more so, in my opinion, than the price of first class single piece stamps, which essentially in the long run are unchanged relative to inflation.
>
> (R2006-1, Tr. at 1320, lines 5-21)

This is an interesting admission because most of the arguments the Postal Service has mounted concerning "Internet diversion" of First Class Mail have emphasized that it is conducted on non-price grounds.[18] Clearly, the competitors

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a series of costs associated with utilizing check technology as opposed to other alternatives. Unfortunately, data on the total costs of check technology and changes in those costs are not available, nor are the costs of alternative technologies such as EFT, debit cards and the like.

[18] As with our payments mail example, witness Thress' statement is an admission that, if we in fact had a useable time series for the prices of electronic alternatives, there would probably be a relatively high cross-price elasticity between the "electronic alternatives' to single piece mail and

are competing on price, as well as non-price grounds. The Postal Service is at best competing only on non-price grounds, such as the convenience of having mail boxes at every address in the nation, the ease of using adhesive backed stamps, and the proximity of post offices.

Table 4 – Nature of Competition in Markets Where Single Piece Mail Competes

	Price Competition	Non-Price Competition
USPS	No	Yes
Competitors	Yes	Yes

In general one expects that the own-price elasticity of a demand curve for a market is less elastic than the own-price elasticity faced by an individual competitor. The reverse appears to be the case here. Firms offering electronic substitutes for single piece letters are competing aggressively on price, the sole exception to the pattern of price-competitive behavior in this market being the Postal Service. When an estimate of the own price elasticity for single piece mail is made, because the USPS chooses not to compete on price, little correlation is found between variations (i.e. declines) in single piece volumes and variations in single piece prices. However, the market demand curve, which is the aggregation of all individual demand curves, is not single piece mail. It is single piece mail plus all competing substitutes. The own-price elasticity that single piece mail

single piece volumes. From that one could infer a high own-price elasticity for single piece mail in the presence of electronic alternatives made possible by the Internet.

faces in its problematic areas such as payments mail, statements mail and on-line banking derives from conditions in those markets.

Behaviorally, just because USPS has <u>chosen</u> to not compete on price, it does not follow that the market demand curve is price inelastic. The implications of current USPS pricing behavior are clear in a statement made by Postmaster General Potter in 2005.

> "Electronic diversion continues to erode First-Class Mail volume, this product will become more price–sensitive than ever. Higher rates will likely increase the pace of change, accelerating the volume decline, resulting in falling revenue and the need, again, to increase rates."
>
> --- Jack Potter, Postmaster General, United States Postal Service, April 14, 2005, in testimony before the U. S. Senate Committee on Homeland Security and Governmental Affairs

This is not a statement that is consistent with rate case estimates made by Mr. Thress that the own-price elasticity of First Class Letter Mail is highly price inelastic. It is a statement that is consistent with the view that the result of USPS refusing to compete on price with electronic substitutes is a death spiral of postal volumes in First Class Letter Mail. Is such a death spiral for First Class single piece letters based on rational, or entirely irrational, pricing behavior by the Postal Service?

It has long been recognized in the literature of pricing under oligopolistic conditions that the response to a market price increase by a firm is not necessarily the same as the response to a market price decrease, and that therefore the price elasticities may not be the same for the two situations.[19] Nonetheless, the claim is often made that cutting prices of stamps would not change the calculated own-price elasticity derived from years of measuring the impact of increases in stamp prices, would not reduce Internet diversion, and is therefore self-defeating. In fact nobody knows, because we simply have no historical record of the nominal First Class stamp price being cut.[20] There are no statistical data that would allow one to calculate an own price elasticity for single piece mail when prices are cut.

B. <u>Witness Thress' Many Approaches to Competing Substitutes for First Class Letter Mail</u>

<u>Table 4</u> below summarizes the various econometric approaches that have been employed in the attempt to capture in the single piece demand equation the impact of electronic substitutes generally and the Internet in particular. The table makes clear that witness Thress has changed his approach in every rate case, often radically, which suggests that he has had trouble modeling the impact of the new competing substitutes for First Class single piece mail.

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[19] See, for example, F. M. Scherer, <u>Industrial Market Structure and Economic Performance, Rand-McNally, Chicago, 1970, pp. 145-152, and more modern game theoretic approaches.</u>

[20] The success of worksharing discounts since 1977 has not been viewed as an example of cuts in the nominal price of a stamp. However, it is plausible to view it this way especially for the early years where single piece mail was converting to workshared mail. Worksharing discounts cut the basic price of First Class letters, and stimulated a strong growth in workshared volume, a relatively elastic price response. While this discounted mailstream has been differentiated from single piece mail increasingly over the years as it has matured, it is the closest empirical example we have of what happens when the single piece stamp prices are cut.

The table also gives a brief description of what each variable is expected to capture in the demand equation. One important observation concerns the case of the R2006-1 model, where Mr. Thress has included the interaction between his ISP variable and the short-term time trend, T2002Q4. The trend variable is entered to capture the accelerating effect of Internet use since 2002. The timing of the trend actually corresponds to the post-2002 period during which broadband has become more widely used because its cost has been declining for consumer use. Rather than using any explicit variable of Broadband,[21] Thress is simply using a generic time trend interactive variable, evidently not to select the most empirically significant variable but instead to experiment with sundry variables to get the one that generates a model with the lowest MSE. (Tr. op. cit. 1332. lines 10-15.)

[21] As noted above, Thress did use a broadband variable with respect to workshared mail, but this makes little empirical sense because businesses have had high speed T1 Internet service for many years before 2002..

Table 5 – Ongoing Experimentation with Time Trend and Explicit Internet Variables in First Class Single Piece Mail Demand Equation

- R94-1:
  - Introduction of Z-variable to capture market penetration:

    $$Z = (d1*param1)/(1+param2*e^{(-param3*t)}$$

  This variable is a special time trend which was introduced to capture the effects of enhanced profitability of direct mail advertising, made possibly by improvements in computer-driven technology.

- R97-1: No Z-variable and No Time Trend

- R2000-1:
  - Introduction of Logistic Time Trends: Time Trend and Time Trend Squared

  These variables are included to capture the declining trend in Single Piece letters due to factors such as increasing use of First Class mail for direct-mail advertising, the declining use of First-Class mail due to electronic diversion, and shifts of mail from single-piece to workshared First-Class mail over time.

- R2001-1:
  - Logistic Time Trends: Time Trend and Time Trend Squared
  - Introduction of Internet Variable: Consumption Expenditures, Internet Service Providers with Box-Cox Transformation: ISP^{λ} , where ISP is Internet consumption expenditure divided by adult population. (The estimated coefficient for Box-Cox was λ = 0.560)

  The ISP variable was introduced to explicitly account for the Internet diversion rather than doing so through the time trend variable. The logistic time trends are included to capture other factors that affected letter mail over time.

- R2005-1:
  - No Logistic Time Trends
  - Time Trend Since 2002Q4
  - Introduction of Internet Experience Variable with Box-Cox Transformation: ISP_CUM^{λ} , where λ is the Box-Cox Coefficient. (The estimated coefficient for Box-Cox was λ = 0.326)
  -

  The cumulative values of ISP variable (Internet expenditures divided by adult population) were included rather than ISP variable to capture the breath and deepening of the Internet use. Time Trend sine 2002Q4 was included to account for increasing drop in the single-piece mail since 2002Q4, possibly due to terrorist attacks, bioterrorism scare, technologies snowball effect, among others.

- R2006-1:
  - No Logistic Time Trends and no separate Time Trend since 2002Q4
  - Internet Experience Variable was redefined as the sum of:
    - CS_ISP^{λ}
    - $CS\_ISP^{\lambda}*Trend$
    - $CS\_ISP^{\lambda}*Trend_{2002Q4}$

  Where CS_ISP is the ISP variable divided by the Internet Price Index to obtain the number of Internet users and then divided by the adult population. λ is the Box-Cox Coefficient. (The estimated coefficient for Box-Cox was λ = 0.122)

The weakest element of witness Thress's single piece demand equation is, that he purports to employ a "Box-Cox" transformation but in fact does not do so. His transformation is not a Box-Cox transformation. The weakest element of witness Thress' choice among estimations of this model is his intuitive use of a one-dimensional selection criterion: lowest mean-squared-error (MSE). I discuss each of these in turn, and rely in part on the declaration of Prof. Harry Kelejian dated September 5, 2006, appended to this testimony.

The Internet transformation utilized in Mr. Thress' single piece demand model is simply an arbitrary non-linear version of his ISP variable, ISP to the power of lambda. For a correct specification of the Box Cox transformation[22], see the declaration of Prof. Harry Kelejian noted above. The Thress model uses this transformation more as a matter of mathematical preference and conformity since the use of logarithms for all other variables other than seasonal variables renders those non-linear.[23]

Why is this issue important for correctly estimating the own price elasticity of single piece letters? The impact of witness Thress' arbitrary imposition of a non-linearity on his ISP variable in the R2005-1 model is that it creates a heavily downward biased estimate of the own price elasticity of First Class single piece letters. As I explain more fully in later sections of this testimony, without witness

[22] Box, G. and D. Cox, "An Analysis of Transformation," *Journal of The Royal Statistical Society, Series B*, 1964, pp. 211-264.

[23] What is his rationale for so transforming the ISP variable? For the first several years of data in his model, the value of the ISP variable is zero. As Thress himself states, in a constant elasticity of substitution (CES) model such as his, one cannot take the logarithm of a variable whose value is zero. However, it is not necessary to make such a non-linear transformation. The Thress model solves without such a transformation in E-Views using his program.

Thress' mis-specification of Box- Cox, the own-price elasticity of single piece letters using the ISP variable as specified in R2005-1 is substantially higher. This is a material issue of economic accuracy and relevance of the model, not an issue of "preference" or "conformity".

In R2001-1, the estimated coefficient, lambda, for witness Thress' non-linear transformation of the Internet variable was 0.560; in R2005-1, it was 0.326; and in R2006-1, the value has fallen to 0.122. His non-linear transformation of the Internet variable is tending to a lambda of zero. In terms of mathematics, any variable to the power of zero equals one. This is the same as saying the Internet has no impact on the demand for single piece letters. This is an a priori absurd result which further points to the weakness of Mr. Thress' approach to the demand for single piece mail in the presence of strong competing substitutes.

Equally problematic is Mr. Thress' choice criterion among twenty three different models. Mr. Thress chose among these models the one with the lowest mean-squared-error,. However, as Prof. Kelejian has pointed out in his Declaration, Mr. Thress' choice criterion "could very well lead to an incorrect model". (Declaration, page 9.) Because Mr. Thress did not employ any formally accepted procedure in his choice among models and instead used an intuitive approach, one cannot rely on the model he chose as being the best model estimating the single piece demand equation, even if we accepted his non-linear approach to modeling with several problematic transformations. The likelihood that Mr. Thress chose an incorrect model form is strong, because as Prof.

Kelejian points out his procedures for imposing his symmetry conditions are such "that the resulting estimates are unreliable." (Declaration, page 6.)

C. Thress Estimates Long Run Price Elasticities, Which Leads to Inefficient Rate-Setting in the Presence of Changing Short Run Market Conditions

As Mr. Thress has stated about his own price elasticities: "In general the price elasticities cited in this testimony and elsewhere refer to long-run price elasticities." (R2000-1, USPS-T-7, p. 12.) Under oral cross examination, Mr. Thress elaborated about one of the properties of such long run estimates.

> If your focus is on forecasting then there becomes a trade off of the further back in time you go you get more data which gives you more information, which gives you more reliable estimates, but the further back in time you go you get data that may be less applicable to the way the world is today, so there's that trade off and I employ that trade off in my work here.
> (R2006-1, Tr. at 1338, lines 6-13.)

In my view, witness Thress' single piece demand equation does not properly capture the "way the world is today" because the phenomena of Internet diversion and electronic payments substitutes for single piece mail are relatively recent – first modeled by Mr. Thress in the 2000-2001 period, whereas his model data goes all the way back to 1983, well over a decade before the impact of these competing substitutes began to be felt in single piece mail volumes.[24]

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[24] The nature of postal ratemaking with relatively infrequent price changes has effectively constrained USPS-sponsored research to gather time series data, and with each passing rate case, the long run of that time series in essence grows longer. Does that additional data improve or refine the estimation of the demand curve? If these were additional observations covering the same time period, the answer would be an unambiguous "yes". But this is not the case. Each postal rate case brings with it a new estimate of own--price elasticity based on all the data of the previous case plus additional observations from a new time

The influence of emerging competing substitutes in recent years is largely "washed out" of the USPS-sponsored research because the recent data is simply homogenized by being added to all prior time series data in Mr. Thress' model, which includes prolonged periods in the 1970s and 1980s where there were few if any competing substitutes for FCLM.

For postal rates to be efficient, they clearly must be informed by short run own-price elasticities that accurately capture current competitive conditions, not longer run conditions going back to 1983, like those the current calculations of demand elasticities depend upon. The use of long run own-price elasticities to influence short run rates can be efficient only when competitive market conditions today more or less resemble those of yesteryear as far back as the model data go. However, if current market conditions are impacted by major changes such as Internet diversion or intense competition from new electronic payment substitutes for the mail, the use of long run own-price elasticities cannot be claimed to lead to an efficient price determination process in the setting of short run postal rates. I believe this has been a problem in rate setting since the R2000-1 rate case, the last litigated case. The problem should not be ignored in the rates that the Commission recommends in R2006-1.

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period. Essentially, the most recently estimated demand curve incorporates the most complete set of "long period" factors, while the most distantly estimated demand curve incorporates—from today's perspective—the least complete set of long period factors. The specification of the USPS-sponsored demand curve may always be correcting for long run factors that are more or less varying continuously through time such as population growth and income changes. Not every such long run demand curve, however, corrects for the impact of innovations such as fax machines or the Internet, because these do not happen very often. Only the set of CES demand curves of varying elasticities along a very long run demand curve would capture the impact of innovations such as these.

In summary, a sharp distinction must be drawn between short period and long period approaches to the study of demand and demand elasticities. While postal rate case demand elasticities are estimated from ever lengthening "long period" CES demand functions, the direct study of FCLM postal product dynamics in markets which include competing substitutes should mainly focus on shorter run demand functions and shorter run own-price elasticities that are more relevant for rate making today than the long run own-price elasticities witness Thress calculates.

D. What is Witness Thress Saying about Long Run Single Piece Elasticities with His CES Models?

One interpretation of witness Thress' models over the span of several rate cases is that demand is not simply inelastic for the FCLM subclass, but becoming increasingly price inelastic over time. (**Figure 2**) This is a conclusion at odds with economic theory and, I believe, the empirical reality concerning the emergence of competing substitutes for transactions, payments and statements. Witness Thress defends such an interpretation by claiming that customers who stop using single piece mail are at any point in time the marginal customers, the ones whose own individual price elasticities are higher, on average, than those of the customers who continue to use the mail.[25]

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[25] Under oral cross examination USPS witness Thress stated correctly that the prices of single piece stamps "essentially in the long run are unchanged relative to inflation." (R2006-1, Tr. at 1320, lines 20-21.) This fact is inconsistent with his rationale for why the own-price elasticities he

A major problem is in ascertaining what statement witness Thress is making about the long run demand curve(s) for single piece mail. Is it **Figure 2** below or **Figure 3**? If it is the former, his argument fails to account for the new customers who come into the system. Customers leaving the system would lead the demand curve to shift over time as portrayed in **Figure 2**, but new customers coming into the system would lead it to shift back. The net result is not clearly any increasing inelasticity over time, as witness Thress' model results show. If his argument is portrayed instead in **Figure 3**, we have the a priori theoretical problem of trying to figure out where on the long run demand curve witness Thress' inelastic and increasingly inelastic range is supposed to be.

A second interpretation that can be made of witness Thress' models and that he himself makes is that elasticities that he calculates have not changed at all over time, including his models for single piece. They have remained constant since he began his work. He has simply refined and increasingly perfected his estimate of the single piece elasticity, with each successive rate case model being an improved estimation of all prior approaches taken.

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calculates for single piece letters have fallen over time. That argument is that those consumers who move away from mail and adopt competing substitutes exhibit a greater elasticity with respect to price than the remaining consumers. Therefore, over time, one would expect the own price elasticity to be lower and lower as only the most die-hard devotees of mail stick with the mail. If this were true, there is no reason why the real prices of stamps should not also be increasing over time. The fact that they have not been – in the presence of competing substitutes due to Internet diversion and electronic payments substitutes for the mail – demonstrates that the own (real) price elasticity of single piece mail is higher than what witness Thress has calculated over recent rate cases

> Further, my current First – Class letters demand equations are estimated using sample periods which begin in 1983Q1 (single piece) and 1991Q1 (workshared). Looking at your Exhibit A and removing those rate changes which took place prior to 1983Q1 (R80-1 and earlier), about which I have never provided any testimony regarding price elasticity, there appears to me to be no evidence of any discernible trend in the estimated own-price elasticity of First Class letters presented in Postal Service rate cases.
>
> (R2005-1, Response of USPS witness Thress to GCA/USPS-T7-11. a.)

One major problem with this contention is that before the Internet was invented Thress did not need to, and indeed could not, incorporate it into his model. To imply that major structural changes in market conditions faced by single piece mail have not changed the elasticity of single piece mail at all is as incredible as claiming that such innovations have reduced postal own price elasticities for single piece mail. In the case of this interpretation of his work, witness Thress has no rebuttal. But which interpretation of his work by the witness himself is the correct one? They cannot both be right. But, they both can be, and in fact are, wrong.

Figure 2 – Stylized Representation of Growing Inelasticity of USPS Demand Curves over Successive Rate Cases

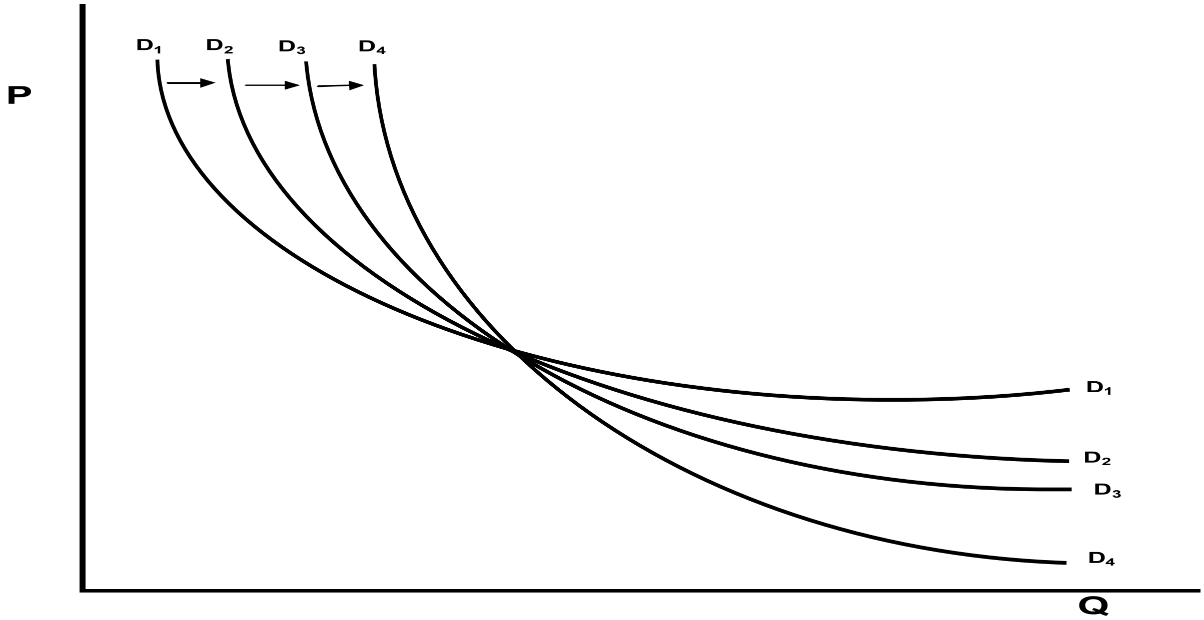
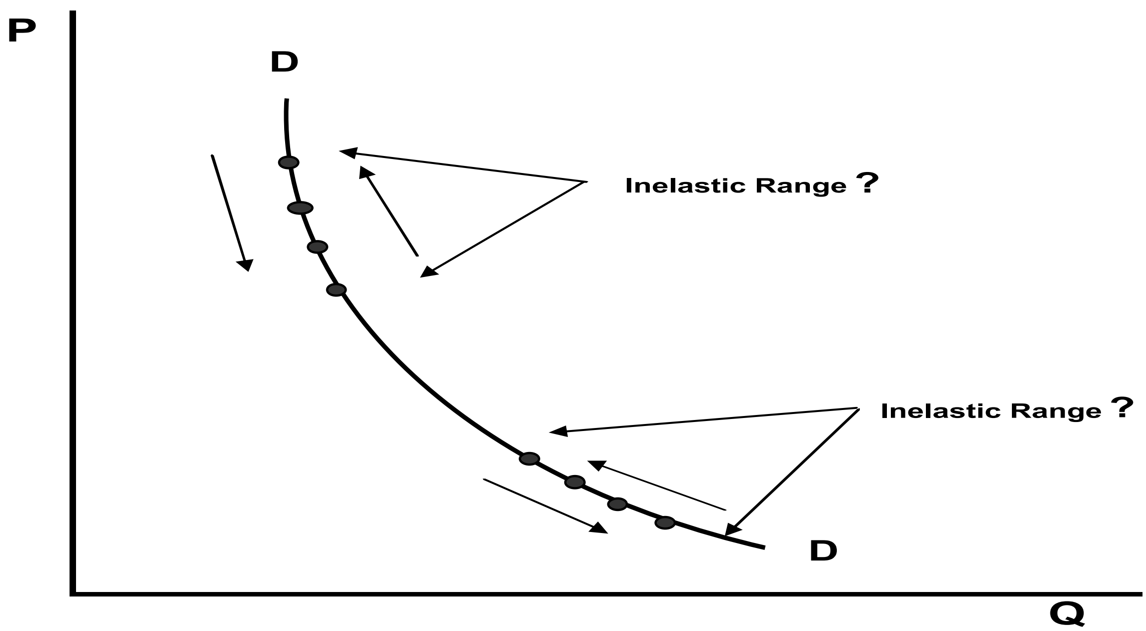


Figure 3 – Stylized Representation of Growing Inelasticity along USPS Longer Run Demand Curve



E. Actual FCLM Volumes Versus Predicted Volumes Using Witness Thress' Models Suggest His Elasticities Are Too Low

Differences between volume forecasts made within a rate case versus actual volumes that unfold after rates are increased are suggestive of a downward bias in PRCE model elasticities for FCLM.

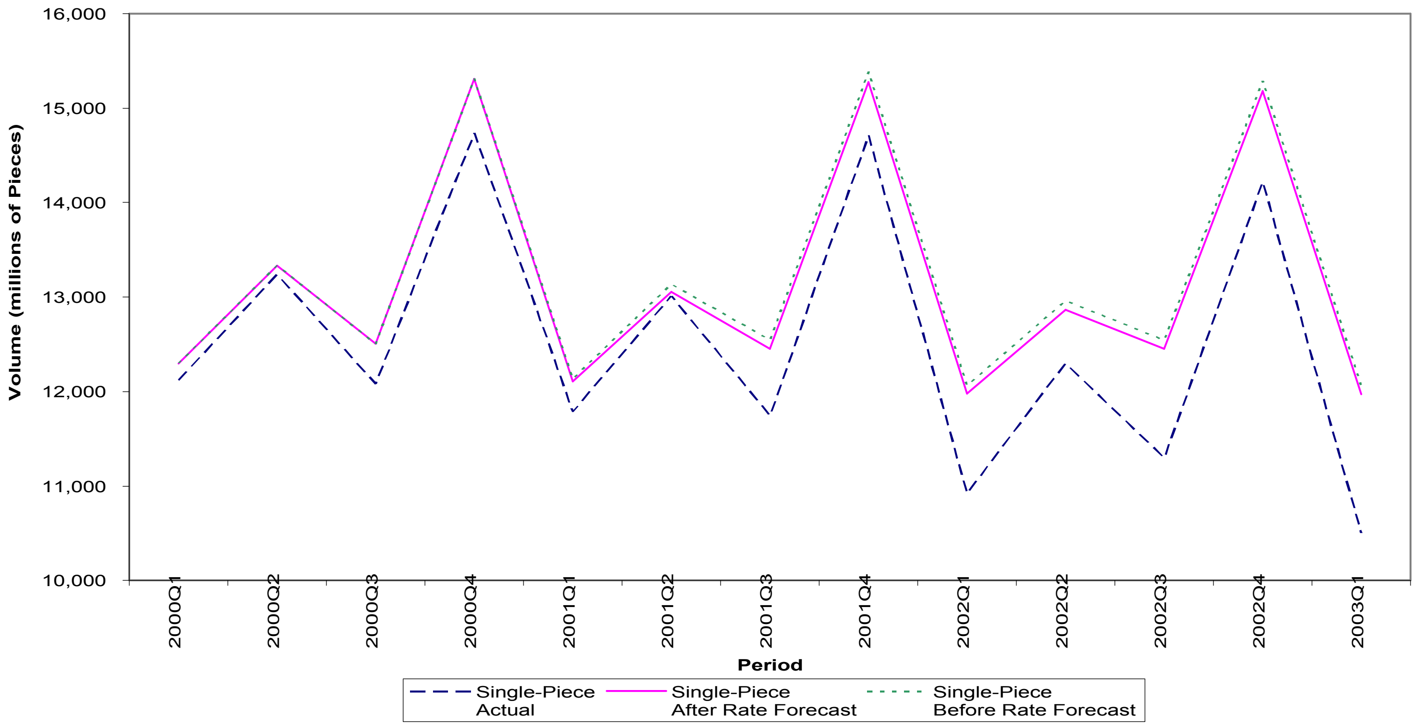
One litmus test of whether USPS-sponsored rate case own price elasticity of demand estimates for FCLM are accurate, or too high or too low, comes from the volume forecasts that are made with those estimates. This is an especially good test because the estimated elasticities are represented as being long run elasticities, as would be most appropriate for forecasting purposes. Indeed, the purpose for which demand curve estimation exists in USPS sponsored research is, sine qua non, before and after rate change volume forecasts, not the estimation of demand curves throughout their entire ranges per se.[26]

Figures 4 and 5 indicate the general bias that appears to exist with respect to USPS–sponsored volume forecasts in rate cases that are based on, among other things, their own price demand elasticity parameters that are estimated in order to do the forecast. **Figure 4**, for example, shows that estimated volumes from the elasticity used for single piece FCLM in the R2001-1 rate case substantially exceeded actual volumes. One can correct for these

[26] In the context of forecasting volume, the inclusion of a logistics time trend variable to capture the inclusion of emergence and growth of various competing substitutes may make sense. But, if the object of estimating demand curves is to understand better the market(s) in which specific postal services compete, the explicit inclusion of each competing substitute in the demand equation(s) for FCLM and the calculation of associated cross elasticities would appear to be the best way by far, arguably the only way, of constructing a precise and reliable own price elasticity for FCLM.

forecasting errors by changing the numerical value of the own price elasticity of demand in the USPS-sponsored models. To bring the forecasted volume curve to the actual volume curve requires a highly elastic value greatly exceeding 1.[27]

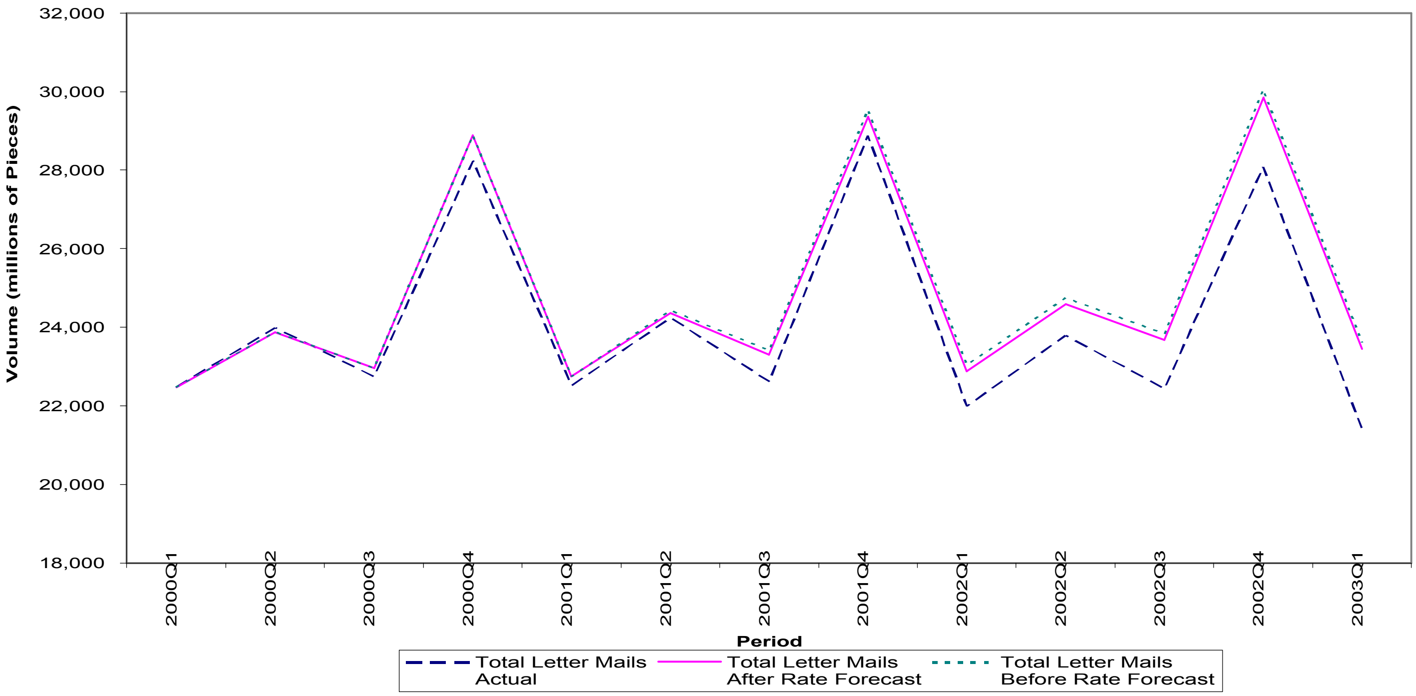
Figure 4 – R2000-1 Single Piece Letter Mail Actual vs. Before & After Rate Volume Forecasts



Source: GCA-LR-L-2, Workpaper 1.

[27] In the experiments we conducted, the exponential specification of the elasticity and functional form of the equations produced the wrong sign associated with the high absolute value. This circumstance does not alter the conceptual merit of the critique, however.

Figure 5 – R2000-1 Total Letter Mail Actual vs. Before & After Rate Volume Forecasts



Source: GCA-LR-L-2, Workpaper 1.

F. My Approach Avoids the Demand Theory and Estimation Problems of Witness Thress' Approach

It is universally recognized in economics that a sound econometric model is one for which the investigator has spent a great deal of time developing the theoretical underpinnings of the model, rather than spending most or all of his time pursuing alternative estimations of weakly conceived models or ad hoc variations on those models. "Scientific econometrics" stresses the application of sound principles from economic theory and entails relatively little time pursuing alternative estimations of that equation. This is to be contrasted with "cookbook econometrics" that stresses ad-hoc estimation ad infinitum without much or any principles of theory, or that offer ex-post theoretical justification for a model only after a good fit has been found.

A second criterion of good econometric modeling is well expressed by Prof. Gujarati in his basic econometrics text.

> The Occam's razor (see Chapter 3), or the principle of parsimony, states that a model be kept as simple as possible or, as Milton Friedman would say, "A hypothesis [model] is important if it 'explains' much by little…". What this means is that one should introduce in the model a few key variables that capture the essence of the phenomenon under study and relegate all minor and random influences to the error term u_t.
>
> (Gujarati, Damodar N., Basic Econometrics, third edition, McGraw-Hill, 1995, p. 454)

My VES linear demand approach to estimating the demand equation for First Class single piece letters follows the above criteria. It avoids most of the problem areas with Mr. Thress' model that Prof. Harry Kelejian discusses in his Declaration dated September 5, 2006. I do not use a Box-Cox transformation in my model, or other non-linear treatment of the Internet variable. Box-Cox was not necessary because I used a linear demand function, within which it made no sense to introduce any other non-linear specification of the Internet variable. In doing so I believe I avoided some of the most serious problems encountered by witness Thress' approach.

I also do not run into the symmetry issues noted by Prof. Kelejian in his critique of Thress's model because I adopted an endogenously determined value and sign to the worksharing discount variable. Finally, I did not run use witness Thress' subroutine program to estimate my linear demand curve because as Prof. Kelejian also indicates, contrary to one of its intended purposes, it does not remove all autocorrelation from his model. Nowhere in witness Thress' model does he give critical values for his Durbin Watson statistics, whose numerical values place them in the range where autocorrelation may be present.

G. <u>A Linear Variable Elasticity of Substitution (VES) Demand Specification is More Likely to Capture Changes in Short Run Market Conditions than Thress' Long Run CES Elasticity Approach</u>

The constant elasticity of substitution (CES) model restriction used by witness Thress in his single piece demand equation is promoted as a "desirable property".

> The second desirable property of equation (III.7) is that the B_i parameters are exactly equal to the elasticities with respect to the various explanatory variables. Hence, the estimated elasticities do not vary over time, nor do they vary with changes in either the volume or any of the explanatory variables. For this reason, this demand function is sometimes referred to as a constant-elasticity demand specification.
>
> Docket No. R2000-1, Postal Rate and Fee Changes, "Direct Testimony of Thomas E. Thress on behalf of the United States Postal Service", p. 105.

The CES assumption, while convenient, is also <u>highly restrictive</u>, and the significance of results stemming from its use can be misinterpreted or overdrawn. For example, the Thress econometric specification and estimation techniques, which yielded an own price elasticity for all First Class Mail Letters of –0.229 in the R2000-1 rate case, implies not just that the demand elasticity around the rates proposed by the Postal Service is highly price inelastic, but that the entire demand curve at much higher or much lower rates is equally and identically price inelastic. Furthermore, as the above quote makes clear, the entire demand curve mapping under different incomes or by relaxing other ceteris paribus factors is restricted to be a set of demand curves that are equally and identically price inelastic throughout all price or rate ranges.

The constant-elasticity-of-substitution or “CES” specification of witness Thress’ estimated single piece demand equation is not a conclusion of empirical research, rather it is a model restriction that must be imposed for the natural log linear (log-log) econometric estimation techniques of demand curves utilizing time series data to make sense. **<u>Figures 6</u>** and **7** illustrate the difference between CES and VES demand curves.

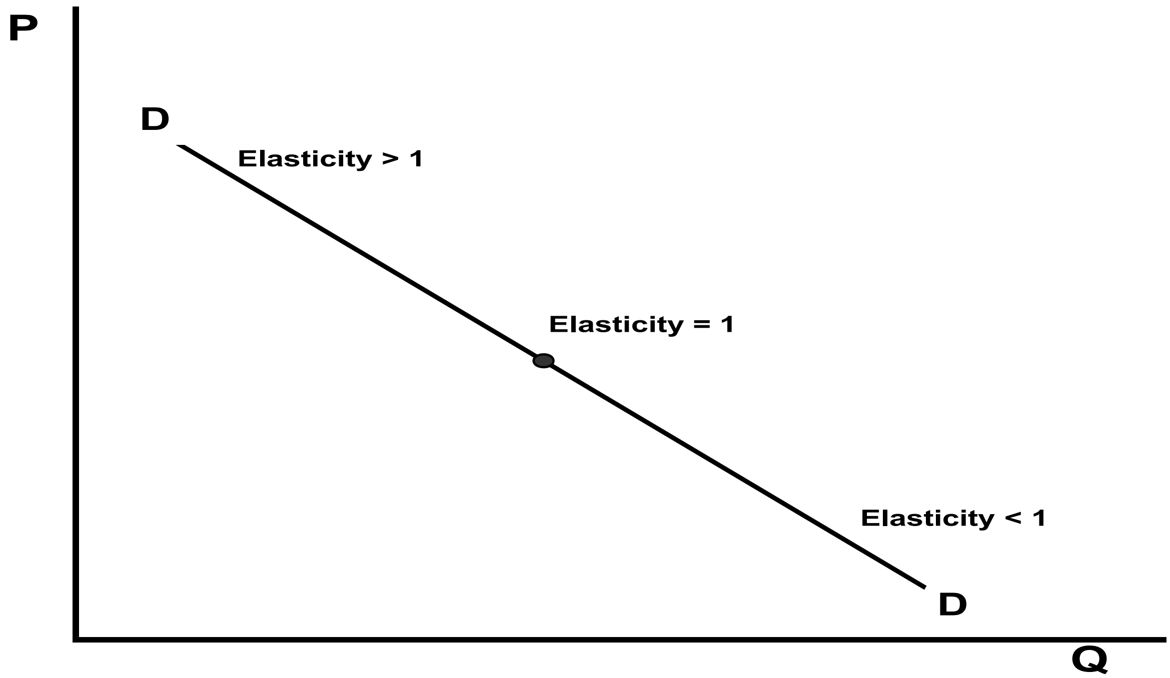
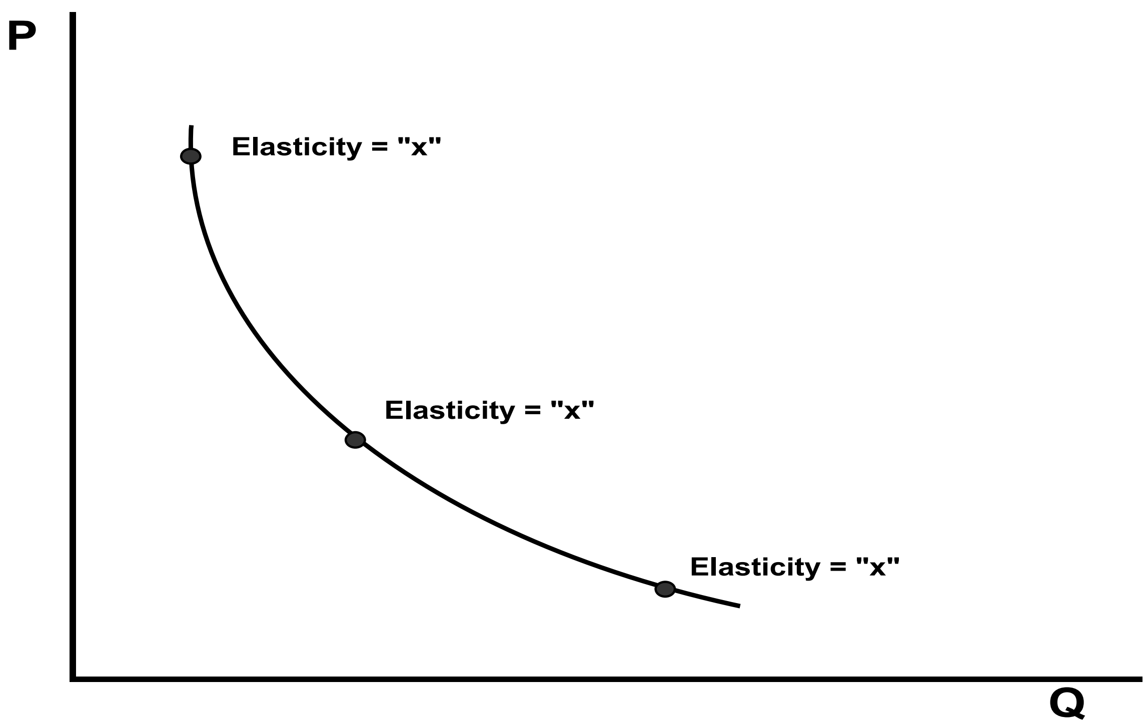


Figure 6 – Varying Elasticities along a Linear (VES) Demand Curve

Figure 7 – Constant Elasticity along a CES Demand Curve



As distinct from econometric estimation techniques, a normal hypothesis from the theory of demand is that the elasticity varies with the level of prices. The most straightforward equation that incorporates a variable elasticity of substitution (VES) assumption from economic theory is the linear demand curve used in basic textbooks. A range of higher and lower elasticities associated with higher and lower prices at different points along the demand curve is illustrated above in **Figure 7**. While there is no reason to believe that real world demand curves are linear, any more than there is any reason to believe they are CES, what we capture with this specification is the simplest demand function that accommodates our expectation of varying elasticities due both to the changing level of postal rates and the changing availability and strength of competing substitutes. One also avoids with a VES approach the estimation difficulties noted earlier that plague Mr. Thress' arbitrary non-linear transformation of his Internet variable.

Just as the log-log estimation technique captures a unique property for estimators under the CES constraint, namely that the estimated coefficients are elasticities – and that the same value of that double log coefficient applies along the full range of the demand curve, so too the linear demand curve is the simplest theoretical construct that captures the unique property of varying elasticities that in our view is central to the analysis of competing substitutes and their impact on postal own price elasticities.

I reject the CES formulation model as being largely inadequate to the direct study of changing short run market conditions associated with Internet and electronic payments substitutes for single piece letter mail. Constrained CES model specifications exclude the very VES demand assumption that seems central to the direct study of emerging competitive substitutes, namely that the changing scope and intensity of competition from substitutes does and should impact the price elasticity of market demand curves in areas where single piece mail competes.

VI. THE ELASTICITY OF SINGLE PIECE MAIL IS HIGHER THAN USPS WITNESS THRESS CLAIMS AND IS HIGHER THAN STANDARD A REGULAR MAIL IN THE PRESENCE OF INTERNET DIVERSION

In Section V. above, I have explained why USPS witness Thress' approach to competing substitutes in his First Class single piece demand equation fails to capture the impact of the Internet on single piece mail, especially its impact on alternative electronic bill payment methods to the mail. In Section V., I have set forth the conceptual reasons why a linear VES demand equation approach is superior for exploring the expected impact competing substitutes would have on the own price elasticity of First Class single piece volume. In this section, I present the results of my econometric estimates of own-price elasticity using the general models of Thress from the R2005-1 and R2006-1 rate cases, but with VES rather than CES demand specifications. I examine both rate cases because, as explained earlier in Section III., part of the problem with the Thress approach is that rate case by rate case, extra data is added to an overly complex and, consequently, highly unstable model, which itself is changed rate case by rate case in largely arbitrary ways. Comparing the results from 2005 and 2006 is a good way to illustrate this criticism, while at the same time sharpening the estimates of elasticities beyond what the Thress model can achieve.

<u>Table A2</u> in Appendix A summarizes the results of the model runs using the E-Views software and regression package rather than Mr. Thress' own software program. The model is similar to Thress, the only exception being the VES specification. With VES we do not need Mr. Thress' so-called "Box–Cox" transformation, and we solve for the sign and magnitude of the worksharing discount elasticity endogenously, rather than imposing any sign that is an <u>a priori</u> assumption about the conversion of single piece mail to workshared mail. The model exhibits high statistical significance in all the standard formulations within the E-Views software. The own price elasticity is -0.602, compared to witness Thress' -0.175. (See **<u>Table A3</u>** in Appendix A for a statistical summary of the Thress model that corresponds to **<u>Table A2</u>**).

This is a substantial difference. In the context of the R2005-1 data and model structures, what factors explain the difference between Thress' results and mine? It turns out that 74% of the difference is explained by Thress' use of his so-called "Box–Cox" transformation (See **<u>Table A5</u>** in Appendix A for the derivation of this percentage). I have explained in earlier sections that this transformation was not needed for Thress to solve his demand equation for single piece volumes and that, in any event, he did not use a correct Box-Cox transformation on the data when he did employ it. It should come as no surprise then that this further issue with his Box-Cox transformation arises. However, the significance of this issue goes well beyond the criticisms with his use of "Box–Cox" addressed earlier.

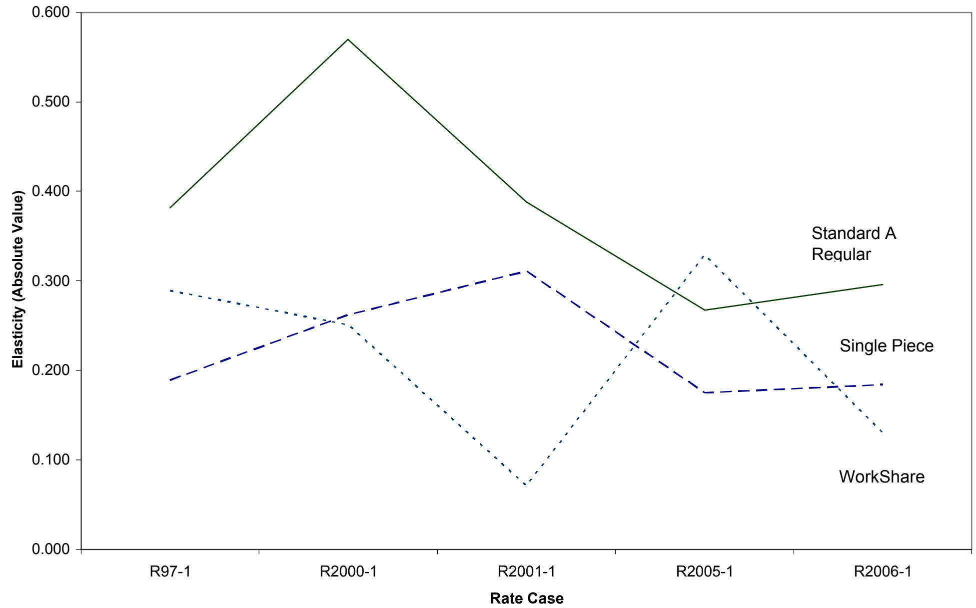
In Mr. Thress' R2005-1 model runs, there is an extraordinary downward bias in the estimated own-price elasticity for single piece mail because he used a CES demand specification where non-linearity prevailed from the double log formulation. As noted above, because his Internet expenditures variable has zeroes for several of the early years in his database starting with 1983, he could not derive the log of that variable, for one cannot take the log of zero. Use of Box–Cox was optional in Mr. Thress' own model runs, but he decided to concoct a non-linear, albeit not logarithmic, approach to his Internet expenditures variable, what he mislabeled a "Box-Cox" transformation. Since I do not take the log of any variable in my VES linear approach, there is no problem incorporating the Internet expenditures variable directly into my model without any transformation of the data such as Thress employed.

Before the explosion of Internet diversion of single piece mail, the prevailing view in postal circles was that the elasticity of Standard A Regular mail, while absolutely inelastic, was markedly higher than the elasticity for the First Class letters subclass due to the prevalence of long-established competing substitutes for advertising mail. **Figure 8** shows that this prevailing viewpoint has been wrong since at least the R2001-1 rate case even if one accepts the Thress and Tolley/Thress approaches to measuring elasticities. Since the R97-1 rate case, a date that approximates the onset of Internet diversion of First Class Mail, the Tolley/Thress modeling shows the own-price elasticity of Standard A Regular has fallen to the point where it is clearly now within the same range of recent USPS elasticity estimates for First Class single piece and First Class workshared mail. What is questionable about **Figure 8** is why Internet diversion would have had no demonstrable impact on First Class elasticities, which vary around a fairly constant trend that is not materially different between single piece and workshared. What does my VES approach show?

I employed the same VES linear approach used in estimating the own-price elasticity of the single piece demand equation to the estimation of the own-price elasticity of Standard A Regular mail. Over the entire time period, 1988 Q:1 – 2005 Q:1 the own-price elasticity for Standard A Regular mail is -0.276 (See **Table A6** in Appendix A), compared to witness Thress's estimate of -0.296. Two observations should be made. First, our estimate does not exhibit the extreme variation from Thress' estimate the way the results in the First Class single piece demand equation do, but is actually fairly close to Thress' estimate. Second, our estimate indicates greater inelasticity within Standard A Regular mail than Thress' estimate.[28]

[28] I believe these findings add to the weight of evidence that while Thress' approach to measuring elasticities may be adequate for other mail classes where there are no new major dynamic factors such as the Internet diversion impacting First Class Mail, his approach to date is

Figure 8 – USPS Own-Price Elasticities for Single-Piece, Workshare & Standard A Regular: R97-1 to R2006-1



Source: GCA-LR-L-2, Workpaper 1.

In Figu ticities of single piece mail with Standard A Regular mail over time using my VES approach. As with the Postal Service's own findings in **Table A7,** in Appendix A, I find that Standard A Regular mail has exhibited a declining elasticity over the 1990-2005 period, but unlike USPS witness Thress' findings, I also conclude that as a result of Internet diversion given the time periods under study, the own-price elasticity of single piece mail is without question higher than that for Standard A Regular mail. **Figure 9** data and modeling is from the R2005-1 rate case, and **Figure 10** data incorporates additional data from R2006-1 and the modeling of this rate case.

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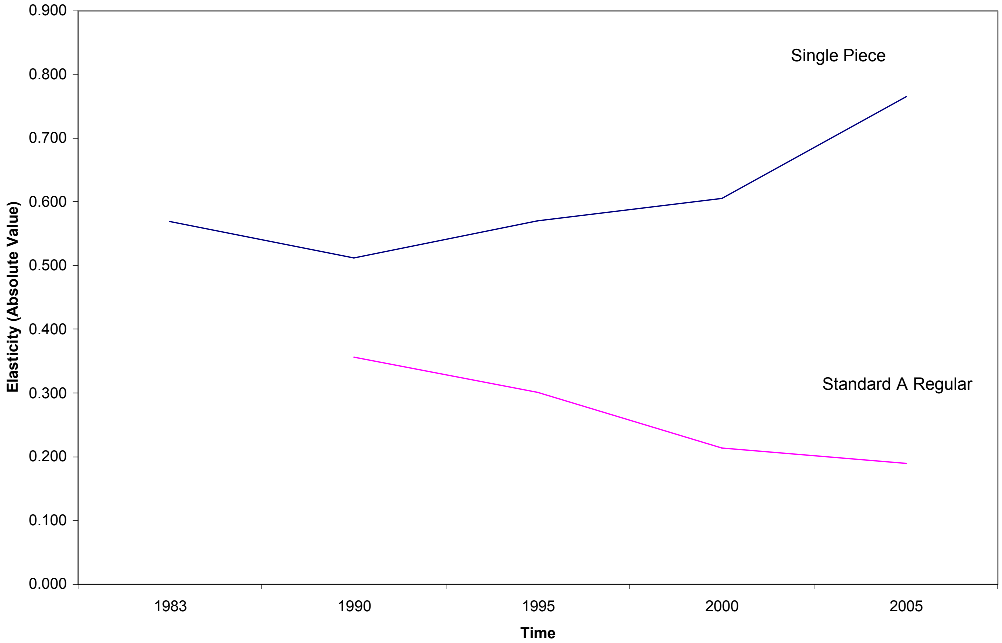
highly inadequate to estimating accurate elasticities for First Class Mail, and in particular single piece mail.

The elasticity levels for single piece vary as between the R2005-1 and R2006-1 rate cases in my linear VES approach primarily because of witness Thress' changes to his Internet variable. Over the entire time period, the elasticity for single piece mail I estimated using the R2006-1 rate case materials with my VES approach was -0.456 (See **Table A8** in Appendix A) compared to witness Thress' estimate of -0.184. My estimate for Standard A Regular mail using the VES approach was -0.254 (See **Table A9** in Appendix A) compared to witness Thress' estimate of -0.296.

To correct for possible biases in elasticity caused by the Box-Cox transformation, I once again applied a linear VES approach to the R2006-1 data and the Thress model used in this case. The results lead to the same conclusions I reached from working with the R2005-1. The own-price elasticity of single piece mail is clearly above that for Standard A Regular mail, -0.456, compared to -0.254 over the entire time period estimated for each. Moreover, in the face of Internet diversion, while the elasticity of Standard A Regular mail is becoming more inelastic, the elasticity of single piece mail is becoming less inelastic. At the margin for the R2005-1 rate case, the difference appears to be -0.765 in 2005 for First Class single piece compared to -0.190 for Standard A Regular. Using the approach from R2006-1 with more data available for 2005, the difference appears to be -0. 565 for single piece compared to -0.173 for Standard A Regular.

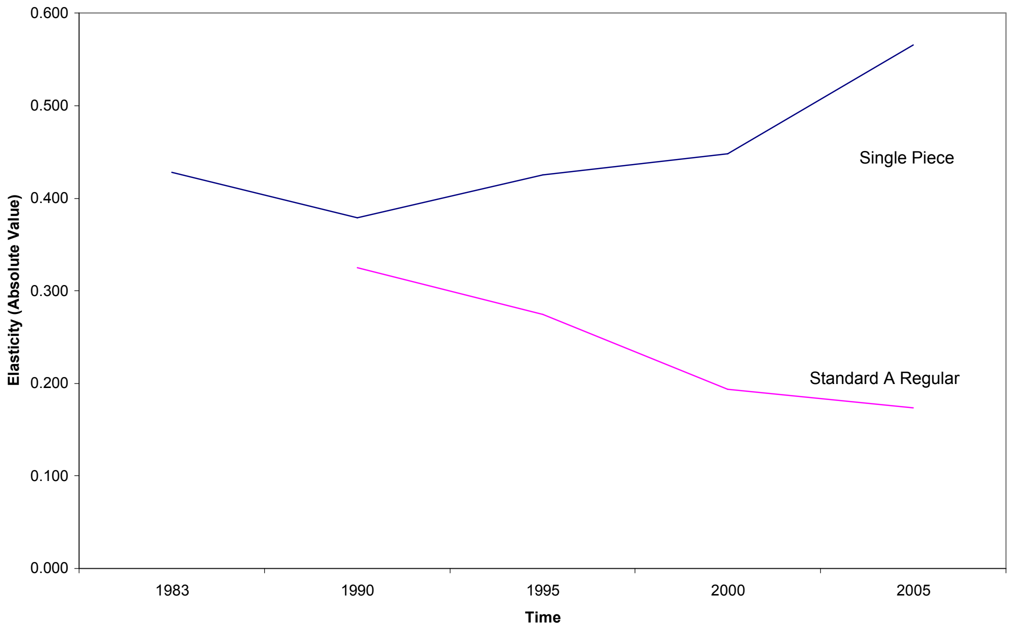
Figure 9 – R2005-1 Linear Demand Elasticities for Single Piece & Standard A Regular:

1983-2005



Source: GCA-LR-L-2, Workpaper 3.

Figure 10 – R2006-1 Linear Demand Elasticities for Single Piece & Standard Regular A: 1983-2005



Source: GCA-LR-L-2, Workpaper 4.

VII. RECOMMENDATION FOR A ONE CENT RATE CHANGE FOR FIRST CLASS SINGLE PIECE LETTERS IN THIS CASE

The Postal Service has not been reticent in attempting to stem the flow of First Class workshared advertising letters to Standard A Regular with its NSAs. That was a relative rate issue between First Class and Standard mail. In this rate case, the Postal Service's rate proposals in addition substantially reduce from current rates the total postage that First Class workshared financial statements letter mail in excess of one ounce would pay. Why should the efforts to keep First

Class letter mail in the system by competing aggressively on price be limited to worksharing letters alone? It is an irrational focus because the more single piece volume that is lost to the system from competing substitutes, the higher the institutional cost burden on both First Class workshared and Standard A Regular mail becomes.

Given the relatively low own-price elasticity of Standard A Regular mail, given its healthy volume performance and given the falling volumes in First Class Mail, the case for changing the relative rates of First Class single piece letters and Standard A Regular letters is more compelling than it has ever been before[29]

[29] Raising the rates of Standard A Regular mail to make single piece letter mail more price competitive in a dynamic market environment is not the only way to address the issue, though it is the only option the Commission can under-take. Another way to cut single piece rates would be to make a classification change that creates a "P stamp", and incentivizes not only presort mailers but also retail postal customers to presort single piece mail in the upstream operations. Much as FEDEX now has separate mail boxes outside post offices, "P stamp" mail boxes would be placed by presort bureaus at places of public convenience such as Wal-Mart. The "P stamp" would be non-denominated and could be sold in bulk rolls of 100 using a fractional rate based on the mail processing and in-office delivery costs avoided by such collection mail being entered for processing first at a presort bureau. I introduced this concept in the R2000-1 rate case in testimony for the National Association of Presort Mailers and the American Bankers Association. The P stamp would keep First Class collection box mail in the USPS system by offering a somewhat lower price than the full single piece rate. That lower price could be offered because P stamp mail would be processed in the private sector in initial stages much as "workshared" bulk business mail is today. It would be entered downstream at outgoing stages of the Postal Service's mail processing network for delivery. USPS would thereby keep some mail in the system that would otherwise be diverted to electronic substitutes. A third option for cutting the prices of single piece mail would be for the Postal Service to implement a value added rebate (VAR) on fully paid First Class letter mail postage. There is little or no incentive at present for presort bureaus to, for example, gather all the collection mail in urban office buildings or other office locations in the geographical areas served by presort bureaus. Such a proposal would favorably impact commercial, metered letter mail more than it would impact household correspondence or greeting cards. But, by cutting the upstream mail processing costs of a considerable proportion of collection box mail, a VAR on fully paid postage would cut the First Class postage costs of many small businesses and make mail more price competitive with other options. Some of the savings could be passed on in the form of a lower single piece stamp rate for all. A fourth option for cutting the prices of single piece letters is to offer a lower rate if the stamps are purchased outside "brick and mortar" post offices. Estimates are that each stamp sold across a post office retail counter costs the Postal Service between 3 and 4 cents. See Lawrence Buc, John Panzar, & Sander Glick, "Expanding the Scope of Work-Sharing.," Paper was presented at the 14th Conference on Postal and Delivery Economics in Bern, Switzerland, May 31 – June 3, 2006. The

In light of my findings in Section VII. above, no valid argument can be made any longer that it is preferable to raise revenue by raising rates of First Class single piece mail covered by the statutory monopoly rather than raising the rates of Standard A Regular Mail, which I have shown in this testimony is clearly more price inelastic than single piece letters in today's competitive market environment. While I have focused on single piece letters in the analysis, I believe the entire First Class letters subclass is likely less price inelastic than Standard A Regular mail. Furthermore, the trend in comparative own price elasticities is that Standard A Regular mail is becoming more price inelastic while single piece letters are becoming less price inelastic. Standard A Regular mail should, therefore, be looked at first as a source of extra revenue when there is a general revenue deficiency in postal finances.

There may come a future period where the impact and effects of these electronic substitutes for First Class Mail settle down and exhibit better predictability and stability from maturation like competing substitutes for Standard A Regular mail exhibit now. However, current own-price elasticities for First Class letter mail are extremely dynamic and unsettled in light of the emergence of

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Postal Service already distributes stamps to thousands of outlets outside the network of retail post offices. The usage of these is based purely on convenience as the prices are essentially the same as the prices at post offices. In the context of this rate case, if the single piece rate were raised to 42 cents when sold at a post office, but cut from the current 39 cents to 38 cents when sold elsewhere, there would be a substantial shift away from the use of retail counters at post offices for this purpose, with consequent savings to the Postal Service and all rate payers. The last option is perhaps the easiest one to implement in order for the Postal Service to aggressively compete on price to retain single piece mail in the system in the face of Internet competition and electronic payments substitutes, or at least retard its current rate of erosion. Such a decision would be greeted with great publicity and its success ensured. Implementing all four options would be better. If the Commission is not enabled to implement options two through four, however, it certainly is enabled and should at least implement the first option.

strong competing electronic substitutes for postal services. Under current competitive conditions, the Postal Service increasingly risks losing more revenue than it gains when it raises single piece rates at all for the problem areas: (1) payments; (2) statements; and (3) other transactions mail. Until competitive market conditions become more predictable, the Commission should consider any rate increase from First Class single piece letters to be a last resort in raising general revenue, not a first resort.

In light of my critique and that of Prof. Harry Kelejian in his Declaration, sound ratemaking would be better achieved by ignoring USPS-sponsored own-price elasticity estimates altogether in considering rates for First Class single piece letters rather than relying on inaccurate USPS long-run elasticities for short-run ratemaking. Given the competitive realities, the rule of thumb for postal pricing on the demand side in the face of intense competition is quite simple: cut nominal single FCLM prices so that real prices do not remain constant, but fall over time.

For this case, I propose that the Commission increase the unit contributions made by Standard A Regular Mail sufficiently to reduce the rate increase on First Class single piece letters from 42 to 41 cents. Under de-linking, this proposal should not impact the rates or discounts proposed by the Postal Service for First Class workshared mail at all, and I do not propose any change in those rates from what USPS has proposed.

There is a longstanding inequity in institutional unit cost contributions between First Class and Standard Mail that calls for such a redistribution of unit cost contributions even in the absence of the own price elasticity comparisons presented in Section VII. above. In GCA/USPS-T31-1, USPS witness O'Hara was asked to confirm that the gap between the unit cost contributions of First Class single piece mail and Standard A Regular mail had grown "from a 12.7 cent difference in R2000-1 to a 13.5 cent difference in R2006-1," a 0.8 cent increase in the gap. Witness O'Hara used revised USPS data in his response, which showed that the gap in unit cost contributions between First Class single piece and Standard A Regular has grown even more between R2000-1 and R2006-1, from 12.7 cents to 14.2 cents, a 1.5 cent increase in the gap. On these grounds, I could justify cutting the single piece rate proposed by the Postal Service in this case by two cents. My proposal to raise rates on Standard A Regular mail to maintain revenue neutrality for my proposed one cent reduction in the USPS rate proposal for single piece letters from 42 to 41 cents is therefore reasonable, and would still leave the relative unit cost contributions ½ cent less favorable for single piece mail in this case than it was in the last litigated case in R2000-1!

APPENDIX A

Statistical Output

Table A1

Elasticities Associated with Changes in the Extra Ounce Rate:
Double Log Regressions

SUMMARY OUTPUT

Log-Log Commercial Checks vs Extra Ounce Rate
1995Q1 - 2004Q4

Regression Statistics	
Multiple R	0.49440775
R Square	0.24443902
Adjusted R Square	0.22455584
Standard Error	0.05754482
Observations	40

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	0.04070962	0.04071	12.29376	0.001183929
Residual	38	0.12583343	0.003311		
Total	39	0.16654305			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	6.40905034	0.538396095	11.90397	2.17E-14	5.31912444	7.49897625	5.31912444	7.498976248
log of rate	-1.2726453	0.362965273	-3.506245	0.001184	-2.00743009	-0.53786054	-2.00743009	-0.53786054

SUMMARY OUTPUT

Log-Log Commercial Checks vs Extra Ounce Rate
1995Q1 - 2003Q4

Regression Statistics	
Multiple R	0.58592735
R Square	0.34331086
Adjusted R Square	0.32399647
Standard Error	0.03544477
Observations	36

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	0.022331137	0.022331	17.77488	0.000173606
Residual	34	0.042715267	0.001256		
Total	35	0.065046404			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	6.89042961	0.337393795	20.42251	1.15E-20	6.204763373	7.57609585	6.204763373	7.576095848
log of additional ounce	-0.9579922	0.227226342	-4.216026	0.000174	-1.41977142	-0.49621305	-1.41977142	-0.49621305

Source: GCA-LR-L-2, Workpaper 1.

Table A2

R2005-1 SINGLE PIECE LINEAR MODEL

Dependent Variable: BGVOL01SP
Method: Least Squares
Sample: 1983Q1 2005Q1
Included observations: 89
BGVOL01SP = C(101) + C(102)*EMPLOY(-1) + C(103)*EMPL_T(-1) +
C(104)*ISP_CUM+C(105)*T02Q4 + C(106)*GDIST + C(107)
*MSADJ + C(108)*MC95 + C(109)*D1_3WS + C(110)*PX01SP +
C(111)*PX01SP(-1) +
C(112)*SEP1_15 + C(113)*SEP16_30 +
C(114)*(OCT+NOV1_DEC10) + C(115)*(DEC11_12+DEC13_15
+DEC16_17+DEC18_19) + C(116)*(DEC20_21+DEC22_23
+DEC24) +
C(117)*(DEC25_JAN1+JAN2_FEB) + C(118)
*MARCH + C(119)*APR1_15 + C(120)*APR16_MAY + C(122)
*GQTR1 + C(123)*GQTR2 + C(124)*GQTR3 + (0-C(122)-C(123)
-C(124))*GQTR4

	Coefficient	Std. Error	z-Statistic	Prob.
C(101)	1.232892	0.214218	5.755304	0
C(102)	0.779501	0.364671	2.137546	0.0363
C(103)	-0.006188	0.001176	-5.262863	0
C(104)	-1.15E-01	2.04E-02	-5.645846	0
C(105)	0.002599	0.00247	1.052417	0.2964
C(106)	0.064015	0.011892	5.382898	0
C(107)	-0.005496	0.012232	-0.449365	0.6546
C(108)	-0.049852	0.014791	-3.370523	0.0013
C(109)	3.228261	0.818054	3.946267	0.0002
C(110)	-1.118622	0.315149	-3.549499	0.0007
C(111)	-0.289689	0.294375	-0.984082	0.3287
C(112)	-0.221096	0.317454	-0.696466	0.4886
C(113)	-0.175508	0.085241	-2.058955	0.0434
C(114)	0.125142	0.049544	2.525905	0.0139
C(115)	0.487964	0.122987	3.967624	0.0002
C(116)	-0.162043	0.192002	-0.843963	0.4017
C(117)	0.115177	0.050081	2.299802	0.0246
C(118)	-0.06105	0.076322	-0.799902	0.4266
C(119)	0.29966	0.365337	0.820229	0.415
C(120)	-0.0803	0.120981	-0.66374	0.5092
C(122)	-0.025139	0.010871	-2.312408	0.0239
C(123)	-0.01731	0.017396	-0.995069	0.3233
C(124)	-0.007516	0.02017	-0.372636	0.7106

R-squared	0.985774	Mean dependent va	0.986019
Adjusted R	0.981032	S.D. dependent var	0.133542
S.E. of reg	0.018392	Akaike info criterion	-4.935937
Sum squar	0.022325	Schwarz criterion	-4.292807
Log likelihc	242.6492	Durbin-Watson stat	2.014759

px01sp	C(110)	-1.1186
px01sp(-1)	C(111)	-0.2897

	1983	1990	1995	2000	2005	AVERAGE 1983-2005
Price lag0	0.4367	0.4161	0.4107	0.4154	0.4174	0.4214
Price lag1	0.4401	0.4205	0.4132	0.4188	0.4198	0.4216
Volume lag0	1.0685	1.1908	1.0296	1.0019	0.8033	0.9843
Volume lag1	1.1335	1.0020	0.9633	0.8576	0.6620	0.9881
Elasticity	-0.570	-0.512	-0.570	-0.605	-0.765	-0.602
Absolute Elasticity	0.570	0.512	0.570	0.605	0.765	

Source: GCA-LR-L-2, Workpaper 3.

Table A3

R2005-1 Thress MODEL

1983:1 To 2005:1

Non-Seasonal Variables

	Coefficients	Std. Error	T-Ratio
CONSTANT	-0.001421	0.130298	-0.010904
EMPLOY(-1)	0.672518	0.116066	5.79428
EMPL_T(-1)	-0.002299	0.000903	-2.545767
T02Q4	-0.002796	0.001779	-1.571715
ISP_CUM_LCOE	-0.491406	0.032531	-15.10576
GDIST	0.018346	0.010519	1.744147
MSADJ	0.008365	0.00903	0.926388
MC95	0.068799	0.012726	5.406313
D1_3WS	-0.102425	0.018416	-5.561583
PX01SP	-0.046031	0.115157	-0.399721
lag 1	-0.128711	0.110552	-1.164263
lag 2	0	0	0
lag 3	0	0	0
lag 4	0	0	0

Long-Run Price Elasticities	
Current	-0.046031
Lag 1	-0.128711
Lag 2	0
Lag 3	0
Lag 4	0
Sum	-0.174742
T-Statistic on Sum	-2.175511

Seasonal Variables

	Coefficients	Std. Error	T-Ratio
SEP1_15	-0.539109	0.319251	-1.688664
SEP16_30	-0.229601	0.082323	-2.789013
OCT	0.088381	0.047723	1.851961
NOV1_DEC10	0.088381	0.047723	1.851961
DEC11_12	0.323773	0.118008	2.743641
DEC13_15	0.323773	0.118008	2.743641
DEC16_17	0.323773	0.118008	2.743641
DEC18_19	0.323773	0.118008	2.743641
DEC20_21	-0.178728	0.177421	-1.007366
DEC22_23	-0.178728	0.177421	-1.007366
24-Dec	-0.178728	0.177421	-1.007366
DEC25_JAN1	0.085863	0.048501	1.770329
JAN2_FEB	0.085863	0.048501	1.770329
MARCH	-0.148545	0.07342	-2.023219
APR1_15	0.537633	0.337968	1.590783
APR16_MAY	-0.19487	0.116812	-1.668235
JUNE	0	0	0
GQTR1	-0.002271	0.010014	-0.226789
GQTR2	-0.005327	0.016019	-0.332541
GQTR3	-0.036956	0.019476	-1.897495
GQTR4	0.044554	0.013576	3.281879

Source: R2005-1, USPS-LR-K-64, demandequations.txt.

Table A4

PANEL A
R2005-1 USING THRESS PROGRAM
NO BOXCOX & WS DISCOUNT ENDOGENOUS

Mail Category: Single-Piece First-Class Letters
R2005-1 Demand Equation
Sample Period: 1983:1 TO 2005:1

Non-Seasonal Variables

	Coefficient	Std,. Error	T-Ratio
CONSTANT	-0.043561	0.167078	-0.260725
EMPLOY(-1)	-0.405019	0.149525	-2.708699
EMPL_T(-1)	0.00347	0.000899	3.859394
T02Q4	0.003428	0.002375	1.443673
ISP_CUM	-0.172136	0.017606	-9.776977
GDIST	0.065568	0.013632	4.80994
MSADJ	-0.02067	0.011656	-1.773369
MC95	-0.049054	0.015295	-3.20722
D1_3WS	0.202503	0.054183	3.737356
PX01SP	-0.448984	0.143311	-3.132931
lag1	-0.164598	0.135448	-1.215208
lag2	0	0	0
lag3	0	0	0
lag4	0	0	0

Long-Run Price Elasticities

	PX01SP
Current	-0.448984
Lag 1	-0.164598
Lag 2	-0.000000
Lag 3	-0.000000
Lag 4	-0.000000
Sum	-0.613582
T-Statistic on Sum	-5.738862

Seasonal Variables

	Coefficient	Std,. Error	T-Ratio
SEP1_15	-0.372362	0.333239	-1.117402
SEP16_30	-0.136162	0.089018	-1.529597
OCT	0.098084	0.049805	1.969356
NOV1_DEC10	0.098084	0.049805	1.969356
DEC11_12	0.418472	0.127659	3.27804
DEC13_15	0.418472	0.127659	3.27804
DEC16_17	0.418472	0.127659	3.27804
DEC18_19	0.418472	0.127659	3.27804
DEC20_21	-0.172651	0.21881	-0.789043
DEC22_23	-0.172651	0.21881	-0.789043
24-Dec	-0.172651	0.21881	-0.789043
DEC25_JAN1	0.102667	0.050988	2.013573
JAN2_FEB	0.102667	0.050988	2.013573
MARCH	-0.112639	0.085634	-1.315354
APR1_15	0.372049	0.380087	0.978853
APR16_MAY	-0.11115	0.127564	-0.871331
JUNE	0	0	0
GQTR1	0.002571	0.011556	0.222532
GQTR2	-0.006526	0.018458	-0.353585
GQTR3	-0.025857	0.022688	-1.139688
GQTR4	0.029812	0.014233	2.094569

REGRESSION DIAGNOSTICS

Sum of Sq Resids	0.024089
Mean-Squared Error	0.000395
Durbin-Watson	1.716203
R-Square	0.986020
Adj. R-Square	0.979832
Degrees of Freedom	61

AR-Coefficients

	Coefficient	Std,. Error	T-Ratio
Rho-1	0	0	0
Rho-2	0	0	0
Rho-4	-0.190842	0.108941	-1.751788

PANEL B
R2005-1 USING THRESS PROGRAM
WS DISCOUNT ENDOGENOUS

Mail Category: Single-Piece First-Class Letters
R2005-1 Demand Equation
Sample Period: 1983:1 TO 2005:1

Non-Seasonal Variables

	Coefficient	Std,. Error	T-Ratio
CONSTANT	0.059617	0.140656	0.423852
EMPLOY(-1)	0.408754	0.156004	2.620151
EMPL_T(-1)	-0.000698	0.001008	-0.692723
T02Q4	-0.002553	0.001872	-1.363788
ISP_CUM_LCOEF	-0.412292	0.03484	-11.83395
GDIST	0.025842	0.013536	1.909048
MSADJ	0.006299	0.009474	0.664822
MC95	0.039498	0.017705	2.230853
D1_3WS	-0.00308	0.052666	-0.05848
PX01SP	-0.162211	0.124812	-1.299635
lag1	-0.128691	0.110937	-1.160038
lag2	0	0	0
lag3	0	0	0
lag4	0	0	0

Long-Run Price Elasticities

	PX01SP
Current	-0.162211
Lag 1	-0.128691
Lag 2	0.000000
Lag 3	-0.000000
Lag 4	-0.000000
Sum	-0.290902
T-Statistic on Sum	-3.383080

Seasonal Variables

	Coefficient	Std,. Error	T-Ratio
SEP1_15	-0.496442	0.317055	-1.565794
SEP16_30	-0.218121	0.081504	-2.676207
OCT	0.092332	0.047288	1.952537
NOV1_DEC10	0.092332	0.047288	1.952537
DEC11_12	0.341347	0.116721	2.924479
DEC13_15	0.341347	0.116721	2.924479
DEC16_17	0.341347	0.116721	2.924479
DEC18_19	0.341347	0.116721	2.924479
DEC20_21	-0.173016	0.17602	-0.982935
DEC22_23	-0.173016	0.17602	-0.982935
24-Dec	-0.173016	0.17602	-0.982935
DEC25_JAN1	0.089716	0.048042	1.867463
JAN2_FEB	0.089716	0.048042	1.867463
MARCH	-0.139772	0.072723	-1.92197
APR1_15	0.516576	0.334246	1.545497
APR16_MAY	-0.181338	0.115785	-1.566167
JUNE	0	0	0
GQTR1	-0.001878	0.009897	-0.189705
GQTR2	-0.005481	0.015838	-0.346099
GQTR3	-0.034896	0.019278	-1.810192
GQTR4	0.042256	0.013472	3.136535

REGRESSION DIAGNOSTICS

Sum of Sq Resids	0.018569
Mean-Squared Error	0.000281
Durbin-Watson	2.114486
R-Square	0.989432
Adj. R-Square	0.985910
Degrees of Freedom	66

Source: GCA-LR-L-2, Workpaper 1.

Table A5

% of Elasticity Reduction Due to Box-Cox Transformation
R2005-1, First-Class Single-Piece Letters

		SP Elasticity
Model0	Thress Model	0.1747
Model1	WS-Discount Endogenous	0.2909
Model2	No Box-Cox & WS-Discount Endogenous	0.6136
Difference1	Model2 - Model0	0.4388
Difference2	Model2 - Model1	0.3227
	% Reduction Due to Box-Cox Transformation (Difference2/Difference1)	74%

Source: Elasticity values are from Tables A3 & A4.

Table A6

R2005-1 STANDARD REGULAR LINEAR MODEL

Dependent Variable: BGVOL3R_NCR
Method: Least Squares
Date: 08/16/06 Time: 18:06
Sample: 1988Q1 2005Q1
Included observations: 69

LAG 2 OF VOLUME WAS INCLUDED TO CORRECT FOR AUTOCORRELATION.

BGVOL3R_NCR = C(101) + C(102)*STR + C(103)*INVR(-1) + C(104)
*TREND + C(105)*MC95 + C(106)*D_R97 + C(107)*D2002Q1 +
C(108)*XOD4_7 + C(109)*XOD_TREND90 + C(110)*D3R_NCR_L
+ C(111)*PX3R_NCR + C(112)*PX3R_NCR(-1) +
C(113)
*SEP1_15 + C(114)*SEP16_30 + C(115)*(OCT+NOV1_DEC10)
+ C(116)*(DEC11_12+DEC13_15+DEC16_17+DEC18_19) +

C(117)*(DEC20_21+DEC22_23+DEC24) +
C(118)
*(DEC25_JAN1+JAN2_FEB) + C(119)*MARCH + C(120)
*APR1_15 + C(121)*APR16_MAY +
C(122)*GQTR1 + C(123)
*GQTR2 + C(124)*GQTR3 ++ (0-C(122)-C(123)-C(124))*GQTR4
+ C(170)*BGVOL3R_NCR(-2)

C(111)	PX3R_NCR	-0.4779
C(112)	C(112)*PX3R_NCR(-1)	-0.3261

	Coefficient	Std. Error	t-Statistic	Prob.
C(101)	-0.320461	0.148752	-2.15433	0.0367
C(102)	0.261028	0.146577	1.780832	0.0818
C(103)	0.007996	0.006385	1.252369	0.2171
C(104)	0.002876	0.001223	2.350561	0.0233
C(105)	-0.039296	0.018093	-2.1719	0.0353
C(106)	0.02576	0.012417	2.074587	0.0439
C(107)	-0.042764	0.01834	-2.331693	0.0244
C(108)	-0.003245	0.01905	-0.170353	0.8655
C(109)	0.001111	0.002198	0.505453	0.6158
C(110)	1.436688	1.372841	1.046507	0.301
C(111)	-0.477929	0.491169	-0.973044	0.3359
C(112)	-0.326106	0.311805	-1.045865	0.3013
C(113)	0.380846	0.303293	1.255702	0.2159
C(114)	0.030501	0.101966	0.299131	0.7662
C(115)	0.147691	0.052475	2.814493	0.0073
C(116)	-0.16572	0.142671	-1.161557	0.2517
C(117)	-0.684442	0.546448	-1.252529	0.217
C(118)	0.17279	0.0607	2.846599	0.0067
C(119)	0.191348	0.108367	1.765737	0.0844
C(120)	-0.706507	0.344603	-2.050204	0.0463
C(121)	0.248262	0.102472	2.422735	0.0196
C(122)	0.050609	0.031407	1.611387	0.1142
C(123)	-0.080111	0.041071	-1.950557	0.0575
C(124)	0.045727	0.031436	1.454603	0.1529
C(170)	0.288391	0.114748	2.513264	0.0157

R-squared	0.992908	Mean dependent va	0.590564
Adjusted R	0.98904	S.D. dependent var	0.134227
S.E. of regı	0.014052	Akaike info criterion	-5.417392
Sum squar	0.008688	Schwarz criterion	-4.607933
Log likelihc	211.9	Durbin-Watson stat	1.968475

	1983	1990	1995	2000	2005	AVERAGE 1988-2005
Price lag0		0.1972	0.2039	0.1871	0.2014	0.2024
Price lag1		0.1993	0.2051	0.1887	0.2025	0.2019
Volume lag0		0.4709	0.5780	0.7397	0.8771	0.5921
Volume lag1		0.4159	0.5033	0.6620	0.8228	0.5864
Elasticity		-0.356	-0.301	-0.214	-0.190	-0.276
Absolute Elasticity		0.356	0.301	0.214	0.190	

Source: GCA-LR-L-2, Workpaper 3.

Table A7

Own Price Elasticities (Absolute Value)	R97-1	R2000-1	R2001-1	R2005-1	R2006-1
Single Piece	0.189	0.262	0.311	0.175	0.184
WorkShare	0.289	0.251	0.071	0.329	0.130
Standard Regular	0.382	0.570	0.388	0.267	0.296

Sources: R97-1, USPS-T-6, R2000-1, USPS-T-7, R2001-1, USPS-T-8, R2005-1, USPS-T-7, R2006-1, USPS-T-7.

Table A8

R2006-1 SINGLE PIECE LINEAR MODEL

CS_ISP*TREND WAS DROPPED.

LAG 2 OF VOLUME WAS INCLUDED TO CORRECT FOR AUTOCORRELATION.

Dependent Variable: BGVOL01SP
Method: Least Squares
Date: 08/18/06 Time: 15:49
Sample: 1983Q1 2005Q4
Included observations: 92
BGVOL01SP = C(1) + C(2)*EMPLOY(-1) + C(3)*EMPL_T(-1) + (C(4)
+C(25)*T02Q4)*(CS_ISP) + C(7)*MSADJ + C(8)*MC95 + C(9)
*D2004_05Q1 + C(31)*D1_3WS + C(10)*PX01SP + C(11)
*PX01SP(-1) +
C(12)*SEP1_15 + C(13)*SEP16_30 + C(14)
(OCT+NOV1_DEC10) + C(15)(DEC11_12+DEC13_15
+DEC16_17+DEC18_19) + C(16)*(DEC20_21+DEC22_23
+DEC24) +
C(17)*(DEC25_JAN1+JAN_FEB) + C(18)
*MARCH + C(19)*APR1_15 + C(20)*APR16_MAY +
C(22)
*GQTR1 + C(23)*GQTR2 + C(24)*GQTR3 + (0-C(22)-C(23)
-C(24))*GQTR4 + C(50)*BGVOL01SP(-2)

px01sp	-0.9076
px01sp(-1)	-0.1476

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.880804	0.216012	4.077564	0.0001
C(2)	0.797911	0.362667	2.200122	0.0312
C(3)	-0.001948	0.000925	-2.105902	0.0389
C(4)	-2.285783	0.420508	-5.435769	0
C(25)	-0.029543	0.016566	-1.783376	0.079
C(7)	-0.019519	0.011194	-1.743762	0.0857
C(8)	-0.032684	0.016183	-2.019621	0.0474
C(9)	0.02682	0.018071	1.484125	0.1424
C(31)	1.268284	0.759178	1.670602	0.0994
C(10)	-0.907629	0.320683	-2.830296	0.0061
C(11)	-0.147597	0.315261	-0.468173	0.6412
C(12)	-0.616883	0.358667	-1.719932	0.09
C(13)	-0.166008	0.098021	-1.693599	0.0949
C(14)	0.101512	0.05331	1.904199	0.0611
C(15)	0.471877	0.132561	3.559688	0.0007
C(16)	-0.175531	0.199071	-0.881747	0.381
C(17)	0.094716	0.054722	1.73084	0.088
C(18)	-0.028025	0.087734	-0.319431	0.7504
C(19)	0.371787	0.381006	0.975806	0.3326
C(20)	-0.21606	0.138173	-1.563692	0.1225
C(22)	-0.037044	0.012107	-3.059643	0.0032
C(23)	-0.035431	0.019666	-1.80158	0.076
C(24)	-0.000934	0.022607	-0.041317	0.9672
C(50)	0.205787	0.112627	1.82715	0.0721

R-squared	0.987123	Mean dependent var	0.975399
Adjusted R	0.982767	S.D. dependent var	0.143747
S.E. of regr	0.01887	Akaike info criterion	-4.883013
Sum squar	0.024214	Schwarz criterion	-4.225155
Log likeliho	248.6186	Durbin-Watson stat	1.802414

	1983	1990	1995	2000	2005	AVERGAE 1983-2005
Price lag0	0.4366	0.4160	0.4106	0.4153	0.4174	0.4208
Price lag1	0.4399	0.4203	0.4130	0.4187	0.4198	0.4211
Volume lag0	1.0685	1.1908	1.0296	1.0019	0.8033	0.9737
Volume lag1	1.1335	1.0020	0.9633	0.8576	0.6620	0.9792
Elasticity	-0.428	-0.379	-0.425	-0.448	-0.565	-0.456
Absolute Elasticity	0.428	0.379	0.425	0.448	0.565	

Source: GCA-LR-L-2, Workpaper 4.

Table A9

R2006-1 STANDARD A REGULAR LINEAR MODEL

LAG 1 OF VOLUME WAS INCLUDED TO CORRECT FOR AUTOCORRELATION

Dependent Variable: BGVOL3R_NCR
Method: Least Squares
Date: 08/17/06 Time: 17:20
Sample: 1988Q1 2005Q4
Included observations: 72
BGVOL3R_NCR = C(1) + C(2)*STR + C(3)*INVR(-1) + C(4)* TREND + C(5)*MC95 + C(6)*D_R97 + C(7)*D2002Q1 + C(8)*XOD5_7WS + C(9)*D3R_NCR_L + C(10)*PX3R_NCR + C(11)*PX3R_NCR(-1) + C(12)*SEP1_15 + C(13)*SEP16_30 + C(14)*(OCT +NOV1_DEC10) + C(15)*(DEC11_12+DEC13_15+DEC16_17 +DEC18_19) + C(16)*(DEC20_21+DEC22_23+DEC24) +

C(17)*(DEC25_JAN1+JAN_FEB) + C(18)*MARCH + C(19) *APR1_15 + C(20)*APR16_MAY +
C(22)*GQTR1 + C(23) *GQTR2 + C(24)*GQTR3 + (0-C(22)-C(23)-C(24))*GQTR4 + C(50)*BGVOL3R_NCR(-1)

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.271796	0.100938	-2.692713	0.0097
C(2)	0.182435	0.102119	1.786493	0.0803
C(3)	0.004724	0.005373	0.879289	0.3836
C(4)	0.00264	0.000897	2.942997	0.005
C(5)	-0.039817	0.017682	-2.251785	0.0289
C(6)	0.020433	0.009659	2.11551	0.0396
C(7)	-0.033075	0.017114	-1.932655	0.0592
C(8)	-0.000749	0.013883	-0.053966	0.9572
C(9)	1.299438	1.082769	1.200107	0.236
C(10)	-0.673112	0.399651	-1.684249	0.0986
C(11)	-0.090526	0.27975	-0.323596	0.7476
C(12)	0.586325	0.276001	2.12436	0.0388
C(13)	0.236087	0.120701	1.955968	0.0563
C(14)	0.1334	0.047708	2.796197	0.0074
C(15)	0.070461	0.148608	0.474137	0.6376
C(16)	-0.41823	0.503042	-0.831401	0.4099
C(17)	0.106001	0.05825	1.819767	0.075
C(18)	0.379857	0.0969	3.920091	0.0003
C(19)	-0.751258	0.339433	-2.213274	0.0317
C(20)	0.204784	0.108069	1.894931	0.0641
C(22)	0.0542	0.029392	1.844009	0.0714
C(23)	-0.106931	0.036862	-2.900869	0.0056
C(24)	0.098477	0.027573	3.571517	0.0008
C(50)	0.457342	0.104911	4.359349	0.0001

R-square	0.994302	Mean dependent va	0.601794
Adjusted	0.991571	S.D. dependent var	0.142139
S.E. of re	0.01305	Akaike info criterion	-5.578915
Sum squ	0.008174	Schwarz criterion	-4.820026
Log likeli	224.8409	Durbin-Watson stat	2.314313

Standrad Regular	Slope
PX3R_NCR	-0.6731
PX3R_NCR (-1)	-0.0905

	1983	1990	1995	2000	2005	AVERAGE 1988-2005
Price lag0		0.1972	0.2039	0.1848	0.1975	0.2009
Price lag1		0.1993	0.2051	0.1863	0.1990	0.2005
Volume lag0		0.4709	0.5780	0.7397	0.8789	0.6034
Volume lag1		0.4159	0.5033	0.6620	0.8236	0.5981
Elasticity		-0.325	-0.274	-0.194	-0.173	-0.254
Absolute Elasticity		0.325	0.274	0.194	0.173	

Source: GCA-LR-L-2, Workpaper 4.

Table A10

R2006-1, Thress MODEL

Mail Category: First-Class Single-Piece Letters
R2006-1 Demand Equation
Sample Period: 1983:1 TO 2005:4

Non-Seasonal Variables

	Coefficients	Std. Error	T-Ratio
CONSTANT	0.01562	0.12514	0.124816
EMPLOY(-1)	0.679296	0.108038	6.287547
EMPL_T(-1)	-0.002214	0.000793	-2.792445
CS_ISP_L01SP	0.753205	0.04588	16.41696
CS_ISP_L01SP	-0.011087	0.000583	-19.00949
CS_ISP_L01SP	-0.008142	0.001708	-4.767933
MSADJ	0.020463	0.007945	2.57555
MC95	0.058612	0.010761	5.446687
D2004_05Q1	0.043488	0.01496	2.907003
D1_3WS	-0.095656	0.00993	-9.633519
PX01SP	-0.071147	0.106363	-0.668909
lag1	-0.112593	0.101894	-1.105008
lag2	0	0	0
lag3	0	0	0
lag4	0	0	0

Long-Run Price Elasticities

Current	-0.071147
Lag 1	-0.112593
Lag 2	0.000000
Lag 3	-0.000000
Lag 4	0.000000
Sum	-0.183741
T-Statistic on Sum	-2.354013

Seasonal Variables

	Coefficients	Std. Error	T-Ratio
SEP1_15	-0.511254	0.294857	-1.733904
SEP16_30	-0.241493	0.075984	-3.178195
OCT	0.093485	0.044094	2.120123
NOV1_DEC10	0.093485	0.044094	2.120123
DEC11_12	0.32943	0.109468	3.009384
DEC13_15	0.32943	0.109468	3.009384
DEC16_17	0.32943	0.109468	3.009384
DEC18_19	0.32943	0.109468	3.009384
DEC20_21	-0.19982	0.165593	-1.206692
DEC22_23	-0.19982	0.165593	-1.206692
24-Dec	-0.19982	0.165593	-1.206692
DEC25_JAN1	0.090213	0.044798	2.013747
JAN_FEB	0.090213	0.044798	2.013747
MARCH	-0.148536	0.067485	-2.201023
APR1_15	0.560427	0.310586	1.804415
APR16_MAY	-0.197822	0.107465	-1.8408
JUNE	0	0	0
GQTR1	-0.011858	0.00994	-1.192985
GQTR2	-0.001221	0.014703	-0.08304
GQTR3	-0.036048	0.017936	-2.009809
GQTR4	0.049127	0.012451	3.945485

REGRESSION DIAGNOSTICS

Sum of Sq Resids	0.016744
Mean Square Error	

Full Sample	0.000246
Last 5 Yrs	0.000261
Last 4 Yrs	0.000176
Last 3 Yrs	0.000090
Last 2 Yrs	0.000105
Last 1 Yr	0.000089
Durbin-Watson	2.381878
R-Square	0.992428
Adj. R-Square	0.989867
Degrees of Freedom	68

Source: R2006-1, USPS-LR-L-64, demandequations.txt

APPENDIX B

The dramatic drop in the price of computing power since 1990 and indeed over a much longer period is shown in **Figures B1** and B**2.**[30] Further, while this "fixed cost" aspect of using Internet technology has come down dramatically, the "variable or marginal cost" aspect of Internet features like e-mail remains effectively zero. The post-2000 period, during which the emergence of strong competing substitutes for First Class letter mail has become even more apparent in USPS volume and RPP data, is reinforced as a demarcation date in consumer expenditure data in **Figure B3**. Expenditures on Internet Service Providers (ISP) have exceeded expenditures on postal services since 2001. From 2001, ISP expenditures have continued to rise at their rapid historical rate except for the 2001 recession, whereas expenditures on postage have flattened out and fallen from the 1990s growth trend line.

[30] The drop is far more substantial when viewed from the 1970 period forward, but it is not until the late 1980s/early 1990s that Internet expenditures took off, as shown in **Figure B1.**

Figure B1 –GDP Deflator for Computers & Peripheral Equipments 1970-2004 (Base Year 2000 = 100, Quarterly Data)

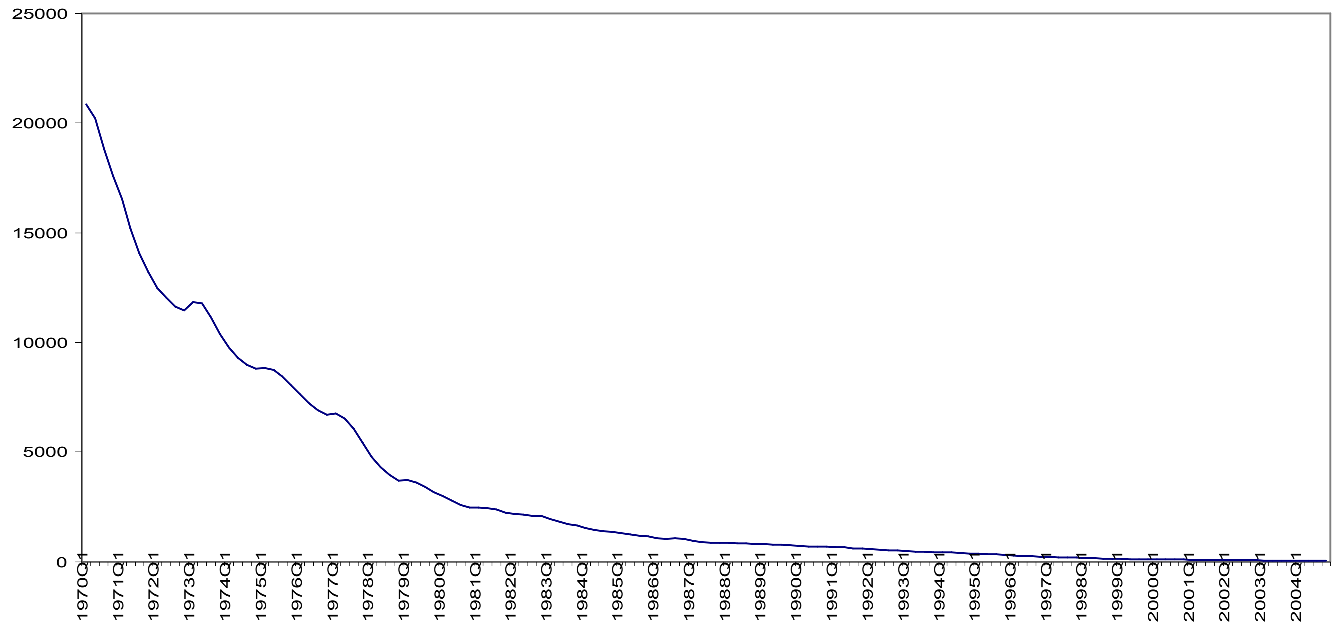


Figure B2 – Price of Competing Substitutes (GDP Deflator for Computers and Peripheral Equipment - 1990-2004 Since Impact of Partial Volume Became Apparent) (Base Year 2000 = 100, Quarterly Data)

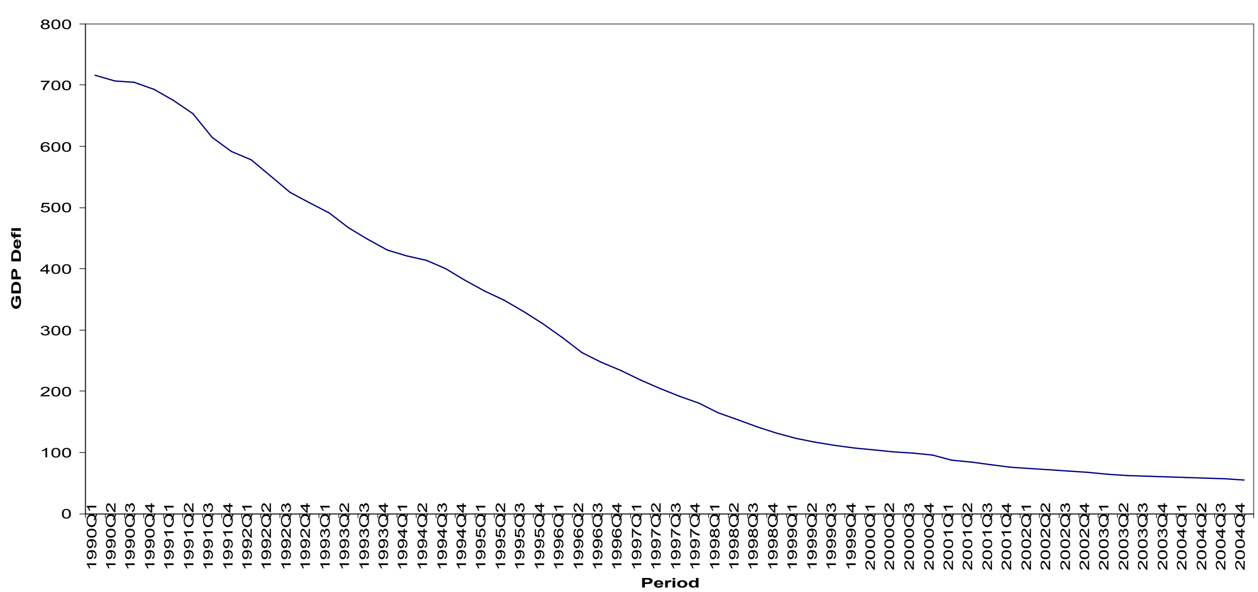
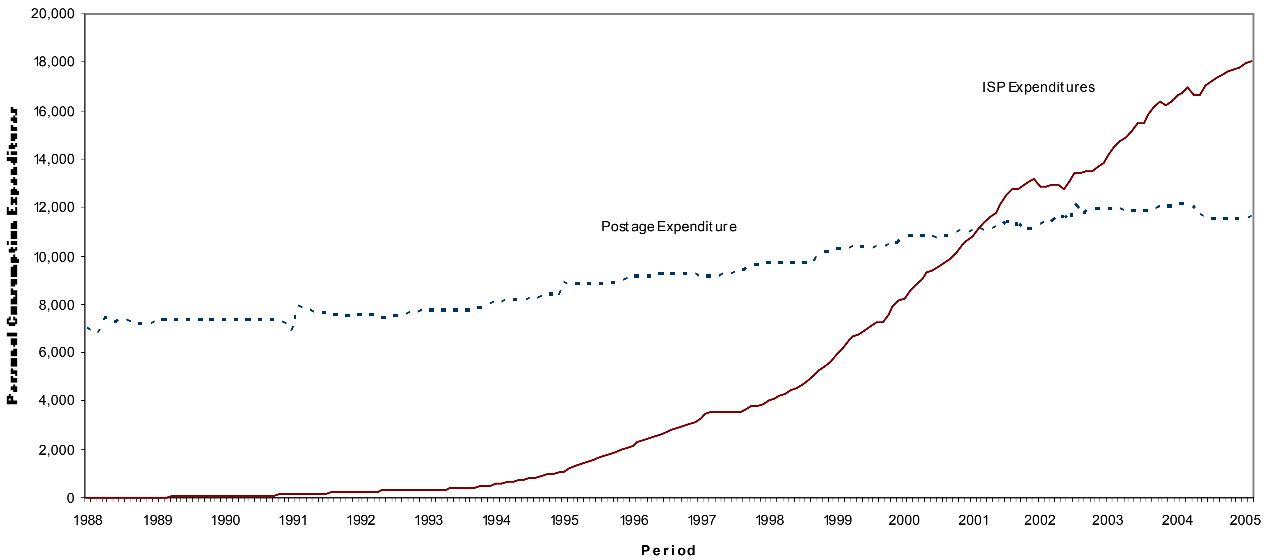


Figure B3 – Personal Consumption Expenditures on Internet Service Providers (ISP) vs. Postage (Millions of Dollars, Seasonally Adjusted Monthly Data)



Of all the major Internet activities tracked by the Pew Research Center Internet project since March of 1990, online banking has grown the fastest.[31] This growth has coincided with the growth of Internet broadband technology. Between 2000 and 2002, online banking grew by 164% in terms of users and grew another 47% between 2002 and 2004. Over 13 million Americans perform online banking chores on a typical day and 53 million now say they use on-line banking, up from 37 million in 2002 and 14 million in 2000. Consumers who bank online report "convenience" and "saving time" as the top two of several reasons, but also report lower cost ("saves money") as among the top seven reasons. Other top answers include cost aspects (e.g., "better control over finances").

Such surveys confirm that Internet technology competes with postal services on both price and non-price grounds. On the supply side, banks have found their on-line customers make fewer customer service calls and switch banks less often, so they have promoted on-line banking more aggressively at low cost or no cost relative to off-line services, as it is profitable for them to do so.[32] Thus, supply side as well as demand side considerations involve comparative cost and price issues as between FCLM postal services and competing substitutes, and not exclusively non-price issues. As extra ounce rates have increased, businesses sending extra ounce mail to households, notably

[31] The other online activities tracked by Pew since March of 2000 include purchasing or reserving travel, buying a product, participating in an auction, playing a game, trading stocks, getting hobby information and getting financial information.

[32] See also U. S. Department of Commerce, ESA and NTIA, "A Nation Online: Entering the Broadband Age", September 2004, pages 8-9, which also shows online banking as the fastest growing activity on the Internet from 2001-2003, up 60%.

bank statements with originals of all checks written and paid in a month, have made innovations such as check imaging and accounts with no return checks in order to keep bank statements under one ounce. The peaking and initial decline of check volume in the 1999-2000 time period corresponds closely to the peaking and decline of extra ounce mail volume in FCLM.

APPENDIX C

Kelejian Declaration

Mr. James A. Clifton September 5, 2006
President
Washington Economics Consulting Group, Inc.
P.O. Box 60654
Potomac, MD. 20859

Dear Mr. Clifton:

As my vita below will make clear, I have had academic positions at Princeton University, at New York University, and at the University of Maryland. I taught econometrics at the graduate level at all three of these universities. I have also been a visiting professor at the Institute for Advanced Studies in Vienna, Austria (two times), at the Australian National University in Canberra, Australia, and at the University of Konstanz, in Konstanz Germany. I have published a good number of articles in professional journals, an econometric text with my coauthor W. Oates, and have served as a guest editor, along with B. Baltagi, and I. Prucha, of a special issue of the Journal of Econometrics which deals with the analysis of spatial data. That special issue is forthcoming. I have also served on the editorial boards of three professional journals. My publications are varied, but a large fraction of them relates to theoretical econometric issues.

I am writing to you in reference to the testimony given by Thomas E. Thress which was written on behalf on the US Postal Service. I focused on the parts of that testimony which describe the econometric procedures he used. The purpose of this letter is to express my concerns. In a nut-shell, in that testimony Thress describes a number of econometric procedures he used to estimate elasticities in the context of his model. In my opinion, some of these procedures were not used properly and so the results obtained are subject to question. In other cases, some rather intuitive procedures were used that have no formal basis. This lack of a formal basis is important and not just a concern raised by an "ivory-tower" academic. Details are given below.

At this point it may be helpful to give an illustration which will clearly indicate the importance of implementing procedures which are based on formal results rather than just on intuition. This illustration should help clarify some parts of the more detailed discussion below.

An Illustration

It may seem intuitively obvious that there are twice as many numbers between 0.0 and 2.0, as there are between 0.0 and 1.0. If inferences are made based on this assumption they would be "suspect" because mathematicians can show that there are the same number of numbers between 0.0 and 1.0, as there are between 0.0 and 2.0 ! In this case the conflict between one's rather strong intuition and "mathematical" reality arises because "funny things" can happen when one makes less-than formal comparisons which involve the concept of infinity - e.g., there are an infinite number of numbers between 0.0 and 2.0, as well as between 0.0 and 1.0.

Specific Details on Some of the Econometric Procedures Used

(A) The Box-Cox Procedure

Thress modeled his mail volume demand equation in terms of the logarithms of the explanatory variables involved except for those variables which, at times, took on a value of zero. Because the logarithm of zero does not exist, these variables had to be considered in a different form. One of the variables which took on zero values was an internet experience variable that Thress constructed to account for the electronic diversion from the volume of first-class single piece mail. Because the value of this internet experience variable was zero for periods prior to 1988, this was one of the variables whose logarithm could not be taken.

Thress entered the internet variable in a way that he describes as a Box-Cox transform; he also describes certain properties of the Box-Cox transform. As I will describe below, the transformation that Thress used in formulating the internet variable was not the Box-Cox transform. Furthermore, even if it were, the estimations that followed were not done properly.

To clearly see the issues involved, let X denote the internet variable, and let the volume of first-class single piece mail be V. Then on page 37, the way in which Thress specified his model was

$$Thress\ Model\ (A) : Ln(V) = a + b(X^{\gamma}) + ...$$

However, the Box-Cox transform of the variable X is not X^{γ}, but instead is

$$\frac{X^{\gamma} - 1}{\gamma}$$

and so his model should have been formulated as

$$Box - Cox\ Model\ (B) : Ln(V) = a + b \left[\frac{X^{\gamma} - 1}{\gamma}\right] + ...$$

For example, on page 37 Thress states that as γ approaches zero, the internet variable in a model such as Thress Model (A) above approaches a logarithmic form. This is not true. For example, as γ approaches zero, X^γ approaches 1.0. However, the correct form of the Box-Cox transform in Model (B) above will approach a logarithmic form.

Ignoring shortcomings of the transform in Thress Model (A), there are still problems with the way in which Thress proceeded. For example, again on page 37, Thress states

> "Values for γ are estimated using nonlinear least squares. A transformed internet variable, equal to [Internet Variable]$^\gamma$ is then introduced as an independent variable in Equation (1_L) instead of the untransformed internet variable."

The implication of this statement is that γ was first estimated in a **preliminary step** which was prior to full model estimation which, I assume, would incorporate his stochastic symmetry conditions, etc. Now this may seem to be a very intuitive thing to do, but on a formal level problems are raised. For example, suppose the estimated value of γ is $\hat{\gamma}$. This statement then suggests that the internet variable that was used in the full estimation of the model was $X^{\hat{\gamma}}$. If this is true, problems arise! Actually, one's intuition may lead one to think that problems should not arise if γ is **properly estimated** in that preliminary step. Unfortunately this is not the case. That is, even if γ is properly estimated in a preliminary step, the explanatory variable $X^{\hat{\gamma}}$ is not an ordinary explanatory variable because it is based on an estimated coefficient and therefore has a random component. This random component should be obvious since Thress himself on page 37 gives t-ratios relating to it! If an explanatory variable has such a random component that randomness can not be ignored in the model's estimation, nor can it be ignored in the inferences that come from that model! Assuming there are no other problems with the model, all of this suggests that the estimation of γ must be done in the final model considered which should incorporate all the other parameter restrictions that are considered. On a somewhat intuitive level, problems arise because the randomness in such a model would not only come from the model's error terms, but also from the explanatory variable, $X^{\hat{\gamma}}$.

The discussion above casts serious doubt on the empirical results Thress obtained. This relates to both the estimated elasticities, as well as to his tests of significance concerning those elasticities. These doubts will be strongly reinforced by the discussions below relating to Thress's imposed symmetry conditions, his procedure for handling autocorrelation and, very importantly, his model selection procedure.

(B) The Imposed Symmetric Conditions

As indicated, Thress used a number of econometric procedures in the estimation of his model. One of these is a symmetry condition which relates to the effect that worksharing discounts have on the demand for first class single-piece and workshared mail. This symmetry condition was imposed in order to lessen the extent of multicollinearity between competing postal prices. In his testimony, Thress argued on page 53 that "Holding all other factors constant, the total volume leaving First-Class single piece mail due solely to changes in worksharing discounts should be exactly equal to the volume entering First-Class workshared mail". I will focus below on the econometric procedure used to implement this symmetry condition. However, at this point it should be noted that the statement relating to these **equal but opposite volume flows** between First-Class single piece mail and First-Class workshare mail rests on the assumption that there are no spill-over effects with respect to any other forms of mail! For example, among others, changes in worksharing discounts could induce changes in standard mail. Such a spill-over would negate the symmetry condition assumed by Thress.

I will now turn to the econometric procedure which was used to implement the symmetry condition, and which is illustrated on pages 53-56 of his testimony. On page 54 Thress postulates log-log demand equations for the volumes of first class single piece mail, V_{sp}, and for workshare mail, V_{ws} in terms of the workshare discount, d_{ws}. The equations in his testimony, namely II.4 are

$$II.4 : Ln(V_{sp}) = a + \beta_{sp} Ln(d_{ws}) + ...$$
$$Ln(V_{ws}) = a + \beta_{ws} Ln(d_{ws}) + ...$$

Based on his assumption concerning the equal but opposite mail volume flows, Thress deduced in his equation II.3 that

$$II.3 : \beta_{ws} = -\beta_{sp}/(V_{ws}/V_{sp})$$

Thress then substitutes his equation II.3 into the second equation of his II.4 to get his equation II.5

$$II.5 : Ln(V_{ws}) = a - \beta_{sp}[Ln(d_{ws})/(V_{ws}/V_{sp})] + ...$$

so that the elasticity coefficient in the single piece equation, namely β_{sp}, now also appears in the workshare equation. The goal of course would be to estimate an equation corresponding to II.5 in order to obtain an estimate of β_{sp}, and then use this estimate to better estimate an equation corresponding to the volume of first-class single piece mail, which in this case relates to the first equation in II.4 above.

However, problems exist! For example, Thress notes that in equation II.5, the logarithm of the workshare discount is deflated by the ratio of the mail volumes. One of these volumes is V_{ws}. In other words, equation II.5 is partially circular in that V_{ws} is, in part, explained in terms of itself!

Although it may appear to be an insurmountable problem, proper procedures exist in the literature for the estimation of a model such as II.5. A simplified discussion of one of these procedures is given in a text by Kelejian and Oates.[1] Essentially, the model would be looked upon as a non-linear model in the volume variable V_{ws} which has two-way causality because the variable V_{ws} appears on both sides of the equation. This two-way causality is typically referred to as an endogeneity in the literature. In the literature, one way to properly estimate a model such as II.5 is by the generalized method of moments technique, which is typically abbreviated as GMM.[2] A special case of this technique is two stage least squares. As might be evident from the illustration given above, it is important to estimate models such as II.5 in terms of formal procedures which have been established in the literature if proper inferences are to made!

Noting that problems of estimation concerning equation II.5 arise because of the ratio involving the mail volumes, Thress replaced this ratio by something else. In doing this other problems were introduced. Specifically, Thress assumed an ad-hoc equation in which the logarithm of the volume ratio, $Ln(V'_{ws}/V'_{sp})$, where V'_{ws} and V'_{sp} are seasonally adjusted values of V_{ws} and V_{sp}, was regressed on a dummy variable, the time trend variable, and its square. Thress then indicates that he obtained a calculated value from this ad-hoc equation and used it to replaced the ratio (V_{ws}/V_{sp}) in equation II.5 above.[3] In such a procedure, the calculated value of the log of the volume

[1] Harry Kelejian and Wallace Oates, Introduction to Econometrics, (third edition), New York: Harper and Row Publishers, 1989.

[2] A good discussion of this technique is given in Paul Ruud, *An Introduction to Classical Econometric Theory*, New York: Oxford University press, 2000.

[3] Actually, Thress indicates on page 55 that he replaced the ratio V_{ws}/V_{sp} appearing in his II.5 by the calculated value of $Ln(V'_{ws}/V'_{sp})$. It is not clear to me why Thress used the

ratio would involve the dummy variable he used, the time trend variable, and the square of that time trend; hence, the partial circularity problem is no longer there.

However, this method of estimating a model such as II.5 contains problems which I will interpret in two ways. Both ways, however, suggest that the resulting estimates are unreliable.

The first interpretation is that the calculated value of the volume ratio, or the log of that ratio, is not equal to the actual ratio of volumes appearing in II.5 and so a specification error is introduced. That is, both equations can not be correct at the same time! This specification error would imply that estimates obtained from the resulting now mis-specified form of equation II.5 would not have proper statistical properties -e.g., they would have biases, etc. Continuing with this "first" interpretation of Thress's procedure, there is still another problem that is less obvious. Specifically, the calculated value of the ratio of volumes is in terms of the estimates of the parameters corresponding to the dummy variable, the time trend, and its square. Let $\hat{r}$ be the calculated value of the volume ratio obtained in terms of this ad-hoc equation. Then since $\hat{r}$ is based on estimates of parameters, an explanatory variable which is formulated in terms of $\hat{r}$ can not be viewed as an ordinary explanatory variable because, in part, it is random. Thress even implicitly notes this randomness because on page 55, he gives t-ratios which relate to the parameter estimates which are used to calculate $\hat{r}$. If a regressor is random, that randomness must be considered if proper inferences are to be made. Thress apparently did not consider this randomness in his estimations.

A second view of the problem is somewhat more abstract in that it involves estimation issues relating to non-linear models.[4] That is, as already indicated, Thress's model II.5 involves an endogeneity because the variable V_{ws} appears on both sides of the equation. One way of consistently estimating such a model is by the instrumental variable technique. In this technique the endogenous variable **appearing on the right hand side of the model** would be regressed on a set of variables, called instruments, and its calculated

calculated value of $Ln(V'_{ws}/V'_{sp})$ when the actual "troublesome" variable that appears in his equation is not in log terms.

[4] A good reference concerning the estimation of non-linear models is T. Amemiya, *Advanced Econometrics.* Cambridge: Harvard University press, 1985. See especially his chapter 8. A simpler presentation of some of this material is given in chapter 8 of Harry H. Kelejian and W. E. Oates, *Introduction to Econometrics*, third edition, New York: Harper & Row Publishers, 1989.

value would be obtained from that regression. Then, assuming the absence of other problems for simplicity of presentation, the endogenous variable in the model would be replaced by its calculated value and the model would be estimated by ordinary least squares.

In Thress's Model II.5 the endogenous variable which appears on the right hand side of his equation is z where

$$z = [Ln(d_{ws})/(V_{ws}/V_{sp})]$$

Therefore, a proper implementation of the instrumental variable procedure would have been to regress z on the set of instruments and then obtain the calculated value of z, say $\hat{z}$.[5] In Thress's case, the instruments would be the dummy variable, the time trend, and its square. Let $w = Ln(V'_{ws}/V'_{sp})$. Then apparently Thress replaced z by $Ln(d_{ws})/\hat{w}$. It should be clear that

$$\hat{z} \neq [Ln(d_{ws})/\hat{w}] \qquad (1)$$

where $\hat{w}$ is the calculated value of w obtained in terms of the regression on the instruments. Actually, even if $\hat{w}$ were the calculated value of V_{ws}/V_{sp} in terms of the regression on the instruments, the inequality in (1) would hold. If the variable $z = [Ln(d_{ws})/(V_{ws}/V_{sp})]$ appearing in a model such as II.5 is replaced by a variable such as $[Ln(d_{ws})/\hat{w}]$, the resulting parameter estimates will not be consistent, i.e., on an intuitive level, there would be biases.

A number of concerns have already been raised in the way Thress implemented his symmetry conditions. A final point should be noted which relates to the particular way in which Thress used the estimated value of β_{sp}, say $\hat{\beta}_{sp}$, obtained via an equation corresponding to II.5 to estimate the equation for First-Class single piece mail, which corresponds to the first equation of II.4. Thress recognized that $\hat{\beta}_{sp}$ and β_{sp} are **not identical** because $\hat{\beta}_{sp}$ is an estimate, and therefore has a random element which, e.g., is described by its estimated variance. When Thress used $\hat{\beta}_{sp}$ to help estimate his equation for First-Class single piece mail, he accounted for this randomness in terms of what he describes as a stochastic restriction. However in doing this he implicitly assumed that the error terms in the First Class single piece and

[5]This would be the two stage least squares procedure which is applied to a model which actually contains an non-linearity in the endogenous variable. Again, a simplified presentation is given in chapter 8 of Harry H. Kelejian and W. E. Oates, *Introduction to Econometrics*, third edition, New York: Harper & Row Publishers, 1989.

worksharing equations are uncorrelated. This statement is based on his discussion on pages 311-312. This assumption concerning the lack of correlation may not be reasonable. After all, these two forms of mail are partial substitutes and so one would expect that various shocks which impact first class single piece mail, may also partially influence workshare mail.

Taken together, my comments above suggest that I have serious concerns which relate to the procedures that were used to implement the symmetry conditions. I also have further concerns which are described below.

(C) The Autocorrelation Testing Procedure

It is important to check for autocorrelated errors when estimating a model. The reason for this is that if the errors are autocorrelated this must be accounted for in some manner if proper inferences are to be made. On pages 320-323 Thress describes his procedure for testing, and then accounting for autocorrelation.

Thress considers three cases involving autocorrelation. To simplify the presentation, let ε_t be the model's error term at time t which is measured in calender quarters. Then, the three cases considered by Thress are that, if there is autocorrelation so that ε_t is related to its past values, it may be related to

(a) its immediately preceding value, namely ε_{t-1}:
(b) its immediately preceding two values, namely ε_{t-1} and ε_{t-2}
(c) its immediately preceding two values, and its values four quarters earlier; namely $\varepsilon_{t-1}, \varepsilon_{t-2}$, and ε_{t-4}

For reasons which were not stated, the obvious case between (b) and (c) above, namely the one in which the model's error term, ε_t, is related to all three of its immediately preceding values, namely ε_{t-1}, ε_{t-2}, and ε_{t-3} was not considered.

Concerning his testing procedure, on page 320 Thress states (bold emphasis added)

"An OLS regression (**with outside restrictions as outlined above**) is initially run. The residuals from this regression are then inspected to assess the presence of autocorrelation"

The residuals are the estimated values of the model error terms. To simplify the discussion, let e_t, e_{t-1}, e_{t-2},and e_{t-4} be the residuals corresponding to the model errors: ε_t, ε_{t-1}, ε_{t-2}, and ε_{t-4}. Then, on his page 321 Thress indicates that he tested for autocorrelation via the model which is his equation III.12,

$$III.12 : e_t = \rho_1 * e_{t-1} + \rho_2 * e_{t-2} + \rho_4 * e_{t-4} + u_t$$

and assumed that the error term u_t in equation III.12 satisfies the OLS assumptions - see page 321. Now if the estimated residuals are obtained from a model which incorporates the **outside restrictions as mentioned above**, the error term in his equation III.12 would not satisfy the OLS restrictions. Indeed, since the parameter γ in Thress's version of the Box-Cox procedure was estimated **prior** to the full estimation of his model, and given the errors in the way he imposed the stochastic symmetry conditions, it is difficult to deduce just how to make proper inferences in terms of a model such as III.12.

One procedure for making proper inferences concerning autocorrelation in a model which contains a Box-Cox type variable, and stochastic symmetry conditions is the one in which the parameters of the autoregressive structure are estimated along with **all** of the other model parameters, including the Box-Cox parameter γ. This could be in a maximum likelihood framework, or by the generalized method of moments technique.

(D) The Mean Squared Error Model Selection Procedure

Thress considered a large variety of possible models involving various specification of the variables involved. He also indicates that he selected his model from this wide variety as the one which minimized the mean squared errors, see e.g. (See R2006-1, USPS-LR-L-65, Page, 65-827).

Of course, model selection via a minimization of a mean squared error is an intuitive thing to do; however, it could very well lead to an incorrect model. There are a variety of reasons for this. One is the case in which the various models considered have different numbers of parameters. This case will arise if, among other things, if the model's error terms are assumed to be autocorrelated in various ways. Another is the case in which a variety of complicated estimation procedures are considered. This case is relevant for Thress's model selection procedure because of the way in which the symmetry conditions were imposed, and the way in which Thress estimated, and then used the estimated value of the γ parameter in his version of the Box-Cox procedure. Still another reason for possible shortcomings in Thress's mean square error model selection procedure is that the complete set of models that are being considered is supposed to be specified in the beginning, and that set must include the correct model. This, I thnk, is unlikely to be the case for the set of models considered by Thress if all of the models considered in that set involve replacing the variable $z = [Ln(d_{ws})/(V_{ws}/V_{sp})$ by a variable such as $[Ln(d_{ws})/\hat{w}]$.

There are, of course, many formal procedures which relate to model selection. Some of these are nicely described in the econometric text by Greene[6] on pages 152-160. One of these is a Bayesian method which involves posterior odds. This method is described in more detail in a classic text by Zellner in his chapter 10. [7] This method is particularly appealing because it accounts for different numbers of parameters in the various models which are being considered, as well as for other model complications in a unified approach.

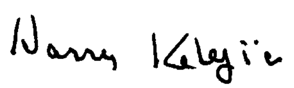
In concluding I note that I have raised serious concerns concerning Thress's model selection procedure, as well as his procedures for estimating the parameters of those models. I would therefore seriously doubt the validity of his estimated elasticities which are in terms of his estimated models.

My name is Harry Kelejian. I am a professor of economics at the University of Maryland, College Park. I am providing this declaration in support of James Clifton and his testimony on behalf of the Greeting Card Association for use in Postal Service rate case proceeding R2006-1.

Declaration made in accordance with 28 U.S.C. Section 1746.

I hereby declare under penalty of perjury that the foregoing is true and correct.

Executed on September 5, 2006



Harry Kelejian

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Employment Record:

Instructor in Economics, University of Wisconsin
June, 1966-August, 1966.
Lecturer in Economics, Princeton University
September, 1966-June, 1968.
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October 1, 1978-January 31, 1979. Also in January 2005.
Visiting Professor, Australian National University, Canberra, Australia
September 2, 1982-October 28, 1982.
Visiting Scholar, Institute for Water Resources, Army Corps of Engineers, 1989-1999
Visiting Professor, University of Konstanz, Konstanz, Germany, April 1-May 31, 1997

Consulting Activities and Approximate Dates:

W.R. Grace and Company, New York City (1972)
Econ. Inc., Princeton, N.J. (1973-75)
C&P Telephone Company, Washington, D.C. (1976)
Arthur Young & Company, Washington, D.C. (1977-1980)
Sciometrics, New York City (1979-80)
The Federal Trade Commission, Washington, D.C. (1979)
AT&T Communications (1980-1990)
Booz, Allen, and Hamilton, Inc. (1980)
The World Bank (1982)
Wilkes, Artes, Hedrick and Lane (1983)
Glassman-Oliver (1988-1990, 1994-1995)
Association of American Railroads (1991)
D.C. Public Service Commission (1991-1992)
InterAmerican Development Bank (1998-1999)
Interindustry Economic research Fund, Inc. 2006
Washington Economics Consulting group, Inc. 2006

Journal Editorial Work

(a) **Editorial Board Member**
(1) Papers in Regional Science: 1999-2004
(2) Journal of Regional Science : 2003-
(3) Spatial Economic Analysis: 2005-

(b) **Guest Editor**
(1) Guest Editor, along with I. Prucha and B. Baltagi of a special spatial econometrics edition of the Journal of Econometrics, which is forthcoming.

Publications:

Articles and Notes:

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1. An Introduction to Econometric Analysis (with W. Oates), Harper and Row Publishers, 1974.

   Second Edition, Harper and Row Publishers, 1981.

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   Foreign Editions: Translated into Portuguese (1978); Korean Student Edition (1984), translated into Spanish (1988).

2. An Analysis of Spatially Dependent Data : (Guest Editor with Badi Baltigi, and Ingmar Prucha)

This is a forthcoming special issue of the Journal of Econometrics .

Papers Submitted for Publication:

"Prediction Efficiencies in Spatial Models with Spatial Lags," with I. Prucha. Submitted to Regional Sciences and Urban Economics.

"Specification and Estimation of Spatial Autoregressive Models with Autoregressive and Heteroskedastic Disturbances," (with I. Prucha), submitted to: The Journal of Econometrics.

Work in Progress:

1. Spatial Models with Endogenous Weighting Matrices (with Ingmar Prucha)

2. Spatial Aspects of Contagion Among Emerging Economies (with G. Tavlas and G. Hondroyiannis)

3. Spatial Interdependencies and Relative Geographic Location as Determinants Of Institutional Development (with Peter Murrel and Oleksandr Shepotylo)

4. Issues relating to Contagion and Direct Foreign Investment in Emerging Economies.

Miscellaneous:

(1) I have written other papers which have not been published and so are not listed above.

(2) I was selected for the Prentice Hall of Fame economist card series.

References:

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