USPS-T-8



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

POSTAL RATE AND FEE CHANGES, 1997

Docket No. R97-1

# DIRECT TESTIMONY OF GERALD L. MUSGRAVE ON BEHALF OF THE UNITED STATES POSTAL SERVICE

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DIRECT TESTIMONY
OF
GERALD L. MUSGRAVE

AUTOBIOGRAPHICAL SKETCH

My name is Gerald Musgrave. I am an economist and President of Economics America, Incorporated, a consulting company in Ann Arbor, Michigan. My primary responsibilities are to develop econometric models and economic analyses. I am the Book Review Editor and a general associate editor of BUSINESS ECONOMICS, The Journal of the National Association of Business Economists.

I have a B.A. in economics from California State University, and an M.A. and Ph.D. in economics from Michigan State University. My dissertation was in applied econometrics.

I began my professional career in 1968, teaching senior military officers (Navy captains and Marine full colonels) at the United States Naval Postgraduate School. From 1968 to 1976, I was assistant professor of economics, academic associate, associate professor of administrative sciences and associate professor of economics. My teaching was in the graduate programs in economics, business administration, computer science, and operations research.

During the summers of 1974 and 1975, I was a visiting professor of economics at Michigan State University. In 1976, I accepted an appointment at Stanford University. My research was in the general area of economic models, applied econometrics and computational statistics. I designed and supervised the installation of the computer facility at the Hoover Institution, and was an economic advisor to the "Age of Uncertainty" television series on National Public Television.

In 1979, I accepted an appointment at the University of Michigan. I was a senior research associate in the Highway Safety Research Institute where I developed quantitative economic analyses of the motor vehicle system. I also taught graduate courses in the Department of Economics, Graduate School of Business, and the Institute of Public Policy Studies.

Since 1983, my full-time occupation has been the president of Economics America, Inc. Our work has generally been in the area of econometric models and analysis of the health care sector.

I have authored, or coauthored over 80 publications in the area of economic analysis. These include articles, monographs, reports and books. One is APL-Stat, A Guide to Computational Statistics with Professor Ramsey, the former department chairman of NYU. I am on the Board of Academic Advisors, The National Center for Policy Analysis and the Heartland Institute. I have held several offices in the National Association of Business Economists including chairman and now treasurer of the Health Economics Roundtable of the NABE. I have received awards from the National Association of Business Economists including a 1995 Abramson Award for a publication and in 1992, I was awarded the designation of Fellow, the organization's highest honor.

I am an economic advisor to the American Medical Association, the American Dental Association and the American Physical Therapy Association. I serve as consultant on econometric methods and economic models in work on postal prices, competition and demand markets of mail streams for the Postal Service. I testified on behalf of the Postal Service as a rebuttal witness in Docket No. R87-1, and presented

direct testimony concerning volume forecasts for Priority Mail and Express Mail in Docket Nos. R90-1 and R94-1.

## PURPOSE AND SCOPE OF TESTIMONY

One purpose of this testimony is to present forecasts of volumes for Express Mail service at the current and the new rates proposed by the United States Postal Service. In addition, my testimony includes similar volume forecasts for Priority Mail. For both Priority Mail and Express Mail two sets of forecasts are presented:

a) mail volumes that will occur in the Test Year if the current Postal Service rate and classification schedules remain in effect, referred to as the "before-rates" forecast;

and

b) mail volumes that will occur in the Test Year if the rates and classifications proposed by the Postal Service in this proceeding are adopted, referred to as the "after-rates" forecast.

The method used in forecasting mail volumes is to project changes in mail volumes between a Base Year and the Test Year. The Base Year used in the forecasts began on March 2, 1996 and the Test Year begins on October 1, 1997.

In the testimony, recent volume experience is reviewed. Factors determining Express Mail and Priority Mail volumes, which are taken into account in making the forecasts, are discussed. Detailed explanations of the econometric analyses and related studies used in making the volume forecasts are provided in the Technical Appendix and Workpapers accompanying this testimony.

## SUMMARY

The first part of my testimony presents the Test Year volume forecasts for Priority Mail. The second part of the testimony presents the Test Year volume forecasts for Express Mail. In the before-rates forecast the existing postal rate schedules for Express Mail and Priority Mail are projected to continue to prevail during the Test Year, whereas, in the after-rates forecast the new rates and classifications proposed by the Postal Service in this proceeding are projected to prevail during the Test Year.

The Base Year for these forecasts consists of four postal quarters starting at the beginning of the third postal quarter of the 1996 Postal Year (March 2, 1996). The Test Year coincides with Government Fiscal Year 1998 which begins on October 1, 1997 and ends on September 30, 1998. Thus, the Test Year begins approximately nineteen months after the beginning of the Base Year. After-rates Test-Year volumes are projected assuming that proposed rates and classifications become effective October 1, 1997, the same time as the beginning of the Test Year. Table 1 summarizes the projections of mail volumes for 1997 through quarter one of 1999, assuming first that Priority Mail and Express Mail nominal rates remain unchanged (before-rates), and second, that Priority Mail rates increase by 7.35 percent. The proposed Express Mail rates increase by approximately 3.43 percent in the after-rates forecast. The Base-Year Period volume for Priority Mail was 991 (991.266) million pieces and the Base-Year Period volume for Express Mail was 59 (58.718) million pieces.

The forecasts are based on projections of changes in factors affecting mail volumes between the Base Year and the Test Year. The first factor considered in projecting mail volumes is the price paid by the mailer. The effect of price on volume is

TABLE 1
VOLUME PROJECTIONS
(MILLION PIECES)

BASE YEAR: Postal Quarter 96:3 - 97:2

| | |
|---|---|
| Priority Mail | 991.266 |
| Express Mail | 58.718 |

Before-Rates

| Postal Qtr | Priority | Express | Postal Year | Priority | Express |
|---|---|---|---|---|---|
| 1997:3 | 249.589 | 14.390 | 1997 | 1050.139 | 60.474 |
| 1997:4 | 316.931 | 18.611 | 1998 | 1116.553 | 63.798 |
| 1998:1 | 261.851 | 13.781 | | | |
| 1998:2 | 258.935 | 15.037 | | | |
| 1998:3 | 262.918 | 15.299 | GFY | Priority | Express |
| 1998:4 | 332.849 | 19.682 | 1997 | 1058.741 | 60.813 |
| 1999:1 | 274.308 | 14.522 | 1998 | 1123.257 | 64.170 |

After-Rates

| Postal Qtr | Priority | Express | Postal Year | Priority | Express |
|---|---|---|---|---|---|
| 1997:3 | 249.589 | 14.390 | 1997 | 1050.139 | 60.474 |
| 1997:4 | 316.931 | 18.611 | 1998 | 1082.691 | 62.880 |
| 1998:1 | 258.969 | 13.707 | | | |
| 1998:2 | 252.519 | 14.818 | | | |
| 1998:3 | 252.780 | 15.037 | GFY | Priority | Express |
| 1998:4 | 318.423 | 19.317 | 1997 | 1058.151 | 60.798 |
| 1999:1 | 262.279 | 14.248 | 1998 | 1087.342 | 63.206 |

estimated as a response to price in real terms, i.e., nominal postal price deflated by an index of the general level of prices. Rather than occurring immediately, response to price occurs over a period of time. A change in deflated price is estimated to lead to a volume response in the quarter in which the price change occurs and the three following quarters. The volume responses to price are expressed as price elasticities (the price elasticity can be interpreted as the percent change in volume that would result from a one percent change in real price). Effects of real price changes on the Test-Year volume forecast are obtained by applying estimated price elasticities to percentage changes in real prices between the Base Year and the Test Year.

The Postal Service proposes changes in prices of Priority Mail and Express Mail. The proposals for Express Mail and Priority Mail are explained in detail by Postal Service witness Sharkey (USPS-T-33). The net impact is to increase rates, leading to decreases in volume, from what they would otherwise be in the Test Year.

A second factor considered is the growth in real income per adult. The effect of real income growth on Priority Mail volumes is projected by combining the long-run income elasticity (the percentage increase in volume that would result from a one percent increase in real long-run income per adult) for Priority Mail with the projected percentage increase in real income. Both long-run and short-run income measures were used. In the case of Express Mail, the real (per adult) nondurables personal consumption component of Gross Domestic Product was used as our measure of long-run macro economic activity.

Adult population is the third factor considered. The projected percentage increase in adult population is estimated to increase Express Mail and Priority Mail volumes by approximately 1.4 percent (0.0136), between the Base Year and Test Year.

Additional specific factors also affect demand for Express Mail, as well as Priority Mail. For those factors that are quantifiable, and for which predicted values are available, an elasticity is estimated and used in connection with the projected percentage change for that factor. All of the variables, except those noted in the testimony, are in natural logarithms.

The text of this testimony presents a discussion of factors that affect the demand for Express Mail, and Priority Mail. It also presents the resulting volume projections. A Technical Appendix and Workpapers are provided giving a detailed description of the methods used and the Choice Trail.

In the case of Priority Mail, Table 1 shows that volume is projected to increase from 991 million (991.266) pieces in the Base-Year period to 1,123 million (1,123.257) pieces in the before-rates environment in the Test Year. The increase is approximately thirteen percent (0.1332) for Priority Mail in the 19 month period, corresponding to an average annual compound growth rate of 8.2 percent (0.0822). The projection for Priority Mail volume in the after-rates environment is 1,087.342 million pieces, which totals a 3.2 percent (0.0320) decrease or a reduction of 36 million (35.915) pieces from what it otherwise would have been.

Table 1 shows that Express Mail volume is projected to increase from 59 million (58.718) pieces in the Base Year period to 64 million (64.170) pieces in the before-rates environment in the Test Year. The increase is approximately nine percent (0.0929) for Express Mail over the 19 month period, corresponding to an average annual growth rate of 5.8 percent (0.0577). The projection for Express Mail volume in the after-rates environment is 63.2 million (63.206) pieces, which totals a 1.5 percent (0.0150) decrease.

Express Mail volume would be reduced from 64.170 million pieces in the before-rates environment to 63.206 million pieces in the after-rates Test Year environment, a reduction of approximately one million pieces (0.964), which represents virtually no growth over the period.

## PRIORITY MAIL

### A. Characteristics

Priority Mail is an expedited service for mail weighing 70 pounds or less. Under current regulations, all First-Class Mail over 11 ounces must travel as Priority Mail. At the option of the mailer, First-Class matter weighing less than 11 ounces may travel as Priority Mail as well. The structure of the rates for Priority Mail is a combination of unzoned and zoned rates. Pieces weighing between 11 ounces and two pounds have a single unzoned rate, as does the flat-rate envelope. A flat-rate envelope was approved in the R90-1 general rate case. It is priced at the two-pound rate and comprises approximately 8.5 (0.0847) percent of Priority Mail total volume. Under the current rate structure, rates for pieces in excess of two pounds increase for each additional pound up to five pounds and are unzoned. Pieces exceeding five pounds are zoned, with the rates for zones 1, 2 and 3 combined, and rates increase for each additional pound up to the maximum of 70 pounds. Witness Sharkey (USPS-T-33) presents the Postal Service's proposed changes to the rates.

### B. Volume Since 1970

To simplify exposition, the Base Year Period, 1996:3 to 1997:2, is called BYP1997, for the Base Year Period 1996-1997. Table 2 displays Priority Mail volumes for Base Year periods from BYP1970 to BYP1997 in five year increments, and annually. These periods match the four quarters used in the Base Year Period 1997, postal quarters 1996:3, 1996:4, 1997:1 and 2. Volume increased by about thirteen percent (0.131) from

BYP1970 to BYP1975. From BYP1975 to BYP1980 it increased by about fourteen percent (0.137), and it increased almost twenty-three percent (0.227) over the following five years. From BYP1985 to BYP1990 volume increased by fifty-seven percent (0.570) and from BYP1990 to BYP1995 it increased by seventy-eight percent (0.783). Over the period from BYP1970 to BYP1997 the total volume of Priority Mail increased by about 429 percent (428.8%). On a pieces-per-adult basis, the percent increase over the BYP1970-BYP1997 period was 245 percent (245.1%).

Over the last five years, from BYP1992 to BYP1997, volume increased by ninety-four percent (0.944), and over the last three years, BYP1994 to BYP1997, it increased by forty-five percent (0.451). Figure 1 illustrates these and other historical volume changes. The figure also displays the before and after rates test year volumes.

An econometric model to determine factors affecting Priority Mail volume was estimated using quarterly data for volume, on a pieces-per-adult, per postal accounting period basis. Unless noted in the testimony, all variables are measured in natural logarithms. The econometric results are presented in Table 3, and the complete data set is presented in Appendix A. Regression files are contained in Library Reference H-120 and H-122. (The latter is a floppy disk.) Volume forecast multipliers are also contained in H-122. (For a general discussion of volume multipliers see Docket No. R94-1, direct testimony of witness Tolley, USPS-T-2, Technical Appendix II.)

TABLE 2
PRIORITY MAIL
Volume*

| Postal Qtrs | Volume (Millions) | Pieces per Adult |
|---|---|---|
| 69:3 - 70:2 | 187.459 | 1.572 |
| 74:3 - 75:2 | 211.950 | 1.624 |
| 79:3 - 80:2 | 240.908 | 1.666 |
| 84:3 - 85:2 | 295.538 | 1.868 |
| 89:3 - 90:2 | 463.937 | 2.747 |
| 90:3 - 91:2 | 502.600 | 2.943 |
| 91:3 - 92:2 | 509.802 | 2.946 |
| 92:3 - 93:2 | 579.239 | 3.303 |
| 93:3 - 94:2 | 683.206 | 3.847 |
| 94:3 - 95:2 | 827.222 | 4.609 |
| 95:3 - 96:2 | 868.880 | 4.797 |
| 96:3 - 97:2 | 991.266 | 5.424 |

Growth Rates

| BY Period | Volume | Pieces per Adult |
|---|---|---|
| 1970 - 1975 | 13.1% | 3.3% |
| 1975 - 1980 | 13.7% | 2.6% |
| 1980 - 1985 | 22.7% | 12.2% |
| 1985 - 1990 | 57.0% | 47.0% |
| 1990 - 1995 | 78.3% | 67.8% |
| 1995 - 1997 | 19.8% | 17.7% |
| 1970 - 1997 | 428.8% | 245.1% |
| 1980 - 1997 | 311.5% | 225.5% |
| 1990 - 1997 | 113.7% | 97.4% |
| 1991 - 1994 | 35.9% | 30.7% |
| 1992 - 1997 | 94.4% | 84.1% |
| 1994 - 1997 | 45.1% | 41.0% |

* Agency and Franked Mail Distributed from 1994:1 onwards.

C. Changes to the Model

1. No Fundamental Changes

There were no fundamental changes to the Priority Mail model as presented in the R94-1 general rate case. The changes which were made were generally in the areas of improving the measurement of the influence of general economic conditions, resulting from changes in the Department of Commerce macroeconomic data and changes to better measure the lag structure impact of the UPS prices. In addition, the permanent income elasticity was estimated via "Mixed Estimation". This is a well-known econometric technique and it allows us to estimate the parameter's value rather than entering it as a fixed value as in previous cases.[1]

a. Long-run Income

In the previous model, our measure of long-run economic activity was based on real disposable income and it continues to be based on that variable. In R94-1 the base period was 1987. In the current model, the base period for the permanent income variable is 1992. That is, the values of long-run income variable are now measured in real (inflation adjusted) 1992 dollars rather than 1987 dollars.

b. Estimating Long-run Income Elasticity

In the previous model, we used a fixed number for the long-run value of the income variable. The value was derived from the Household Diary Study. That income elasticity

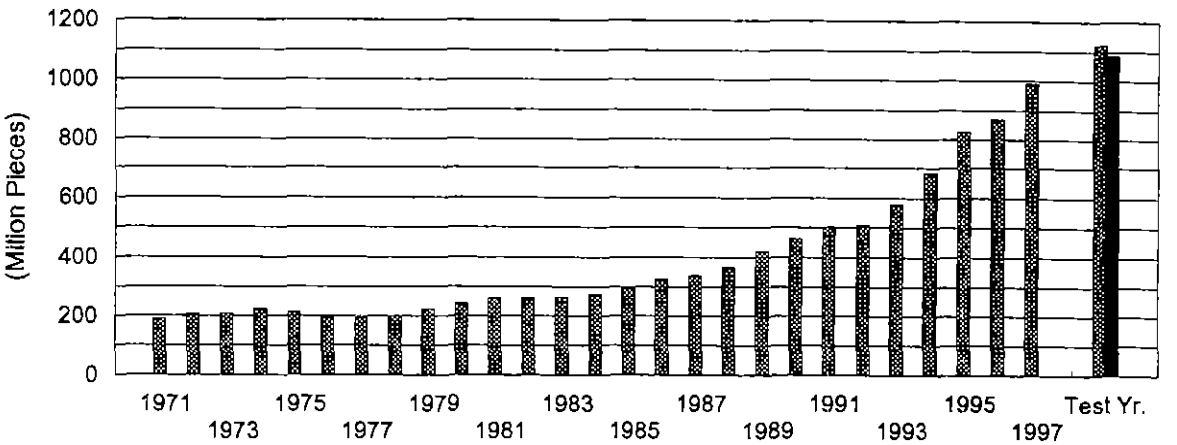
[1] See Jan Kmenta, Elements of Econometrics, Second Edition, Macmillian 1986, Pp.497-500.

was equal to 1.03. In the current model, we allow the income elasticity to be estimated within the econometric model. The income data are from a cross-section of households, the other data in the model are based on a time series. The "mixed estimation" allows us to mix these two forms of information. The econometric method we use is the same as presented by Professor Tolley in previous cases.[2]

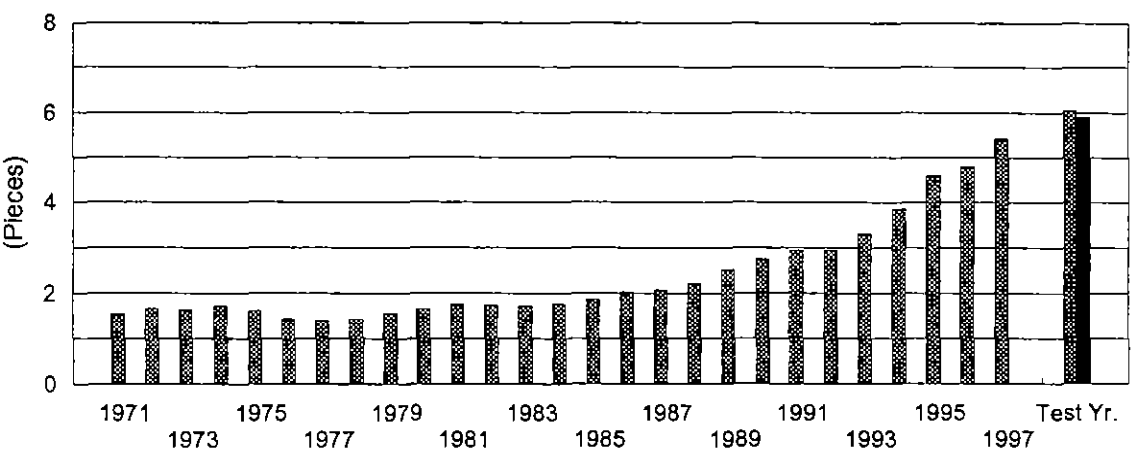
[2]For example see Docket No. R94-1, direct testimony witness Tolley, USPS-T-2, Technical Appendix I, pages 38-40.

FIGURE 1. HISTORICAL AND FORECAST PRIORITY MAIL VOLUME

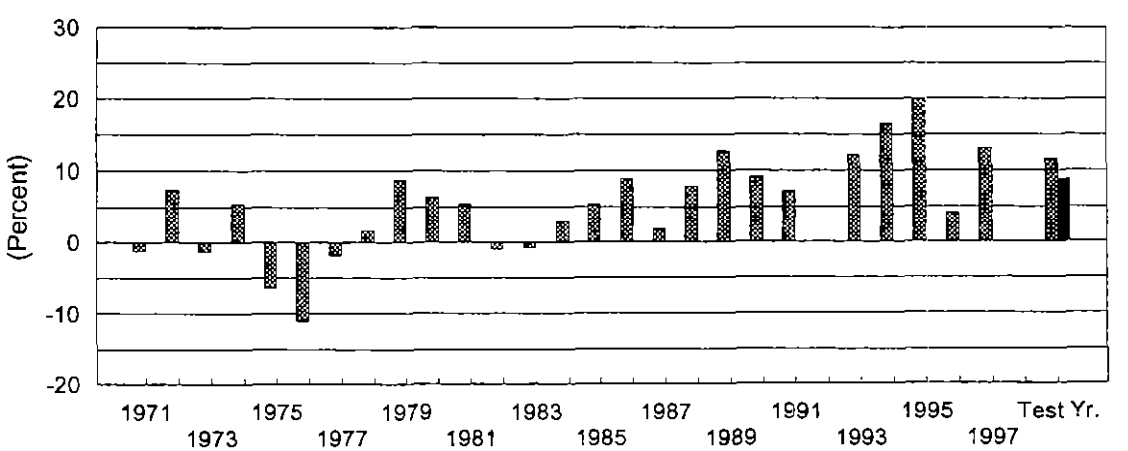
A. Total Volume




B. Volume Per Adult




C. Percent Change in Volume Per Adult




Test Year: GFY 19

# TABLE 3
# PRIORITY MAIL
## Econometric Results

Dependent Variable VOL8PA - Estimation by Restricted Regression
Quarterly Data From 1970:03 To 1997:02

| | | | |
|---|---|---|---|
| Usable Observatio | 108 | Degrees of Freedom | 83 |
| Centered R**2 | 0.99081 | R Bar **2 | 0.988153 |
| Uncentered R**2 | 0.999569 | T x R**2 | 107.953 |
| Mean of Dependent Variable | | | -1.78200182 |
| Std Error of Dependent Variable | | | 0.397270407 |
| Standard Error of Estimate | | | 0.043240523 |
| Sum of Squared Residuals | | | 0.155188657 |
| Durbin-Watson Statistic | | | 1.881118 |
| Q(27-0) | | | 31.013299 |
| Significance Level of Q | | | 0.27059295 |

| | Variable | Coeff | Std Error | T-Stat | Signif |
|---|---|---|---|---|---|
| 1 | Constant | -4.403 | 0.798 | -5.51472 | 3.9000E-07 |
| 2 | PX8 | -0.294 | 0.132 | -2.22515 | 0.02878394 |
| 3 | PX8{1} | -0.235 | 0.133 | -1.76223 | 0.0817122 |
| 4 | PX8{2} | -0.204 | 0.122 | -1.67361 | 0.09797221 |
| 5 | PX8{3} | -3.782e-002 | 0.113 | -0.33386 | 0.73932898 |
| 6 | PX8{4} | -2.776e-017 | 2.067e-009 | -1.34251e-008 | 1 |
| 7 | YPERM92 | 0.827 | 0.213 | 3.88958 | 0.00020169 |
| 8 | SI | 1.132 | 0.11 | 10.25134 | 0 |
| 9 | VOLWT | -0.714 | 0.244 | -2.92515 | 0.00443856 |
| 10 | UPSMDLS | 2.033e-002 | 6.465e-003 | 3.14431 | 0.00231011 |
| 11 | UPSPOTM | -0.291 | 4.291e-002 | -6.7711 | 0 |
| 12 | JS_PNS | 0.138 | 3.199e-002 | 4.32576 | 0.00004209 |
| 13 | PX25FWI96 | 6.544e-002 | 5.658e-002 | 1.15669 | 0.25071605 |
| 14 | PX25FWI96{1} | 2.437e-002 | 3.023e-002 | 0.8061 | 0.4224909 |
| 15 | PX25FWI96{2} | 1.710e-003 | 3.311e-002 | 0.05164 | 0.95893614 |
| 16 | PX25FWI96{3} | 6.445e-006 | 3.017e-002 | 2.13604e-004 | 0.99983008 |
| 17 | PX25FWI96{4} | 1.388e-017 | 9.958e-010 | 1.39357e-008 | 1 |
| 18 | UPSGCP | 0.133 | 8.988e-002 | 1.47734 | 0.14336931 |
| 19 | UPSGCP{1} | 6.167e-002 | 4.922e-002 | 1.25292 | 0.21375161 |
| 20 | UPSGCP{2} | 1.604e-002 | 5.099e-002 | 0.31468 | 0.75379328 |
| 21 | UPSGCP{3} | 2.226e-005 | 4.578e-002 | 4.86377e-004 | 0.99961309 |
| 22 | UPSGCP{4} | -4.163e-017 | 2.217e-009 | -1.87823e-008 | 1 |
| 23 | DUPS | -0.877 | 0.201 | -4.35289 | 0.00003806 |
| 24 | D_UPSL4 | 0.505 | 0.237 | 2.12729 | 0.0363642 |
| 25 | D_UPSL5 | 0.231 | 0.13 | 1.77623 | 0.0793593 |
| 26 | D_UPSL6 | 0.205 | 0.153 | 1.34496 | 0.18230202 |
| 27 | D_UPSL7 | 0.201 | 0.154 | 1.3103 | 0.19370983 |
| 28 | D_UPSL8 | 1.110e-016 | 4.614e-009 | 2.40613e-008 | 1 |
| 29 | DNOGOV | -6.917e-002 | 4.149e-002 | -1.66708 | 0.09926804 |

TABLE 3 (Continued)
PRIORITY MAIL
Econometric Results

| SHILLER SMOOTHNESS PRIORS | |
|---|---|
| Own Price | K = 0.006 |
| Parcel Post cross price | K = 0.797 |
| UPS Ground Service cross price lags 0 through 4 | K = 0.356 |
| UPS Ground Service cross price lags 4 through 8 | K = 0.018 |

Data Legend

| | |
|---|---|
| VOL8PA | Priority Mail quarterly volume per accounting period per adult. |
| Constant | Constant term. |
| PX8 | Priority Mail price index deflated by personal consumption expenditures price deflator (chained). |
| YPERM92 | Real permanent disposable income per adult. |
| SI | Seasonal index. |
| VOLWT | Minimum weight requirement to classify a piece of mail as Priority Mail. |
| UPSMDLS | United Parcel Service's mandays lost due to strike. |
| UPSPOTM | United Parcel Service's potential market. |
| JS_PNS | Standard and Poor's Index of 500 common stock prices. |
| PX25FWI96 | Parcel Post price index deflated by personal consumption expenditures price deflator (chained). |
| UPSGCP | United Parcel Service's Ground price index deflated by personal consumption expenditures price deflator (chained). |
| DUPS | Binary shift variable 0 up to and including 91:2 when R90-1 rate rate increase took effect, 1 thereafter. |
| D_UPSLx | Interaction-slope varaible, where UPS price is multiplied by DUPS, where x represents the lag. |
| DNOGOV | Binary variable for PM volume excluding Agency and Franked Mail equals 1 up to 1993:4 and 0 from 1994:1 onwards. |

c. Competitive Conditions

In the new model we were better able to measure the influence of competitive services in the model. Several experiments were conducted (see Choice Trail - Workpaper D). Our research found that United Parcel Service Ground Service prices had both a current year and a lagged year impact. Previously, only the current values were used. Both the current and lagged year values are now incorporated into the model and a binary variable formulation continues to be used to measure the continued competitive nature of the industry. These variables are discussed in Sections D.3.a. and D.3.b.

D. Factors Affecting Volume

1. Own Price

Priority Mail's own price is an important influence on volume. The own-price elasticity can be interpreted as the percentage change in volume that would result from a one percent change in price. Own-price elasticity is estimated to be equal to -0.77 (-0.770), and is statistically significant. From BYP1992 to BYP1997 the real price of Priority Mail decreased (on a weighted average basis) by 4.1 percent (0.0412) and is estimated to have increased per adult annual volume by approximately 3.2 percent (0.0318). The 3.4 percent (-0.0339) decrease in real price over the last three years, from BYP1994 to BYP1997 resulted in a 2.6 percent (0.0261) increase in volume, holding all of the other factors constant. The change in real (or inflation adjusted) price is not the only factor affecting volume.

2. Income

Long-run income measured by our permanent income variable, has an estimated elasticity equal to 0.827. It is statistically significant with a t-value of 3.93. For every one percent increase in (inflation adjusted) permanent income, Priority Mail volume is estimated to increase by 0.827 percent. From BYP1992 to BYP1997 per adult permanent income increased by about 4.7 percent (0.0466), and we estimate that per adult Priority Mail increased by 3.9 percent (0.0385) due to this factor alone. Over the most recent three years, the BYP1994 to BYP1997 period, real long-run income increased by 3.5 (0.0347) percent and resulted in, an increase of approximately 2.9 percent (0.827 x 0.0347=0.0287) in Priority Mail volume.

As in R94-1, short-run or transitory income is measured by the Standard and Poor's Index of stock prices, and is an independent factor influencing Priority Mail. It has an estimated elasticity of 0.14 (0.1384). From BYP1992 to BYP1997 this index increased by 79 percent (0.7898), and the resulting increase in per adult volume is estimated to be approximately 11 (0.1093) percent. For BYP1994 to BYP1997, the increase was 52 percent (0.5211) resulting in a 7.2 percent (0.0721) volume increase. These three factors, price plus long and short-run income changes amount to about a nineteen (0.1887) percent increase and a thirteen (0.1317) percent increase in volume over the last five and three years, respectively.

3. Prices of Alternative Services

a. Parcel Post

Mailers may choose to send some items via Parcel Post. The cross-price elasticity is estimated to be 0.092. A one percent increase in Parcel Post rates would

lead to a 0.09 percent increase in Priority Mail volume. From BYP1992 to BYP1997 the weighted average Parcel Post rates increase in real terms was 9.1 percent (0.0911), and we estimate that Priority Mail increased 0.8 percent (0.0083) due to this cross-price effect, holding all other factors constant. Over the most recent three years, from BYP1994 to BYP1997, the real rate increase was ten percent (0.1032) resulting in a 0.9 (0.0094) percent increase in volume.

b. United Parcel Service

Shippers may choose to send some items via UPS ground service. The cross-price elasticity is estimated to be 0.211. A one percent increase in UPS ground prices is estimated to increase Priority Mail volume by 0.21 percent. From BYP1992 to BYP1997 the weighted average, inflation adjusted, price of UPS ground service increased by 26.8 percent (0.2684) resulting in an estimated volume increase of 5.7 percent (0.0565) in Priority Mail. In the last three years the price increase was 9.3 percent (0.0932), resulting in a two percent (0.0196) volume increase.

In addition, the expedited delivery market continues to be highly competitive. One can expect shippers to continue to be sensitive to the price of competing services. As in the R94-1 case, we measure the impact of that highly competitive environment by constructing a binary shift variable having the value zero up to and including the quarter when the R90-1 Priority Mail rate increase took effect (1991:2). In the subsequent quarters (1991:3+) the value is one. At the same time, we also constructed an interaction-slope variable where UPS prices lagged one year are multiplied by the binary

variable.[3] The estimated coefficient of the shift variable is -0.877, and the sum of the four slope coefficients is 1.14 (1.143). Both the shift and slope variables are statistically significant. These two variables combined are estimated to have resulted in an increase in Priority Mail volume of 40 percent (0.3982) over the last five years (BYP1992 to BYP1997) and 18.4 (0.1837) percent over the last three years (BYP 1994 to BYP1997).

4. Additional Factors

a. Minimum Weight

As discussed in the Characteristics Section, the classification separation between First-Class and Priority Mail occurs at the minimum weight point. The weight minimum has varied over time, and is currently eleven ounces. A weight variable was used in the econometric analysis to account for these changes in minimum weight. As in R94-1, the variable was constructed by dividing the minimum weight by twelve. Thus, in 1970 when the minimum weight of a piece of mail required to be classified as Priority Mail was thirteen ounces, our variable was equal to 1.08 (13/12). In 1997 the minimum weight is eleven ounces, and our variable VOLWT is 0.917 (11/12). Its estimated elasticity is -0.714. One would expect this inverse result. That is, a decrease in the minimum weight would cause a reclassification of what would otherwise be First-Class Mail into Priority Mail. Thus, we would have more mail classified as Priority Mail. From a weighted average in 1988 of 0.96 to 0.917 in 1993, the variable dropped approximately 4.5 percent (-0.0449), and based on the -0.714 elasticity, it is estimated to have resulted in an increase in Priority Mail of approximately 3.2 percent (0.0321). No change in the current

[3] This is a standard econometric technique. See Jan Kmenta, Elements of Econometrics, Second Edition, Macmillian 1986, Pp 461-73.

volume-weight variable is proposed.

b. UPS Person Days Lost to Strikes

In addition to the traditional demand variables of price and income, two additional variables associated with competition are related to Priority Mail volume. The first variable is person days lost due to strikes at United Parcel Service. This firm provides services which compete with those provided by the Postal Service. When strikes occur, it is plausible that the volume in Priority Mail would increase. That is, if UPS service were not available or if strike activity increased the risk of delay in a UPS shipment, some customers would shift to Priority Mail.

Our results are consistent with this hypothesis, and the estimated parameter is statistically significant and positive. Since there are quarters in the sample with zero days lost due to strikes, and the logarithm of zero is undefined in those cases, we used the level of the variable rather than its logarithm. One implication of our formulation is that the coefficient is not the elasticity. The elasticity can be computed in a straight forward manner. The method to perform these calculations and the results are presented in Workpaper A. One result is that the elasticity is not a constant. This result is similar to the linear demand case, where the slope, or price coefficient, is constant, but the elasticity varies along the demand curve.

Our model estimates that the almost 57.8 thousand person days lost in quarter four of 1970 resulted in an increase in Priority Mail volume of approximately 0.612 million pieces. The largest strike quarter was quarter one of 1977 where approximately 630 thousand person days were lost. In this quarter Priority Mail volume is estimated to have increased by 6.120 million pieces, holding all other factors constant. Since 1983 there

has been only one work stoppage. It occurred on February 7, 1994, and was a partial one-day labor dispute concerning the increase in the UPS maximum weight limit from 70 to 150 pounds. It amounted to 40 thousand person days lost and resulted in an increased volume of 1.432 million pieces of Priority Mail, or nine tenths of one percent (0.0085) of that quarter's volume. Our forecasts assume that no strikes will take place in the Test Year. Therefore, Priority Mail volume would not be increased by UPS person days lost in the Test Year.

c. UPS Market Potential

This variable measures the market penetration of United Parcel Service. Our sample period began in 1970, and at that time it was estimated that UPS had penetrated, or had a potential to serve, about 50 percent (0.5) of the national market. That is, its services were available to about half of the U.S. households. That potential grew to 100 percent in 1981.

One would expect the sign of this variable to be negative in our model. That is, as UPS was able to serve a larger proportion of the national market they became a more effective competitor. The estimated elasticity is statistically significant, and equal to -0.291.

Over the sample period the measure of market penetration, or national market potential increased by 97.6 percent. The net result is that Priority Mail decreased by approximately 28 percent (-0.2837) due to the increased competition from United Parcel Service. Since the potential grew to 100 percent in 1981, it had no additional impact thereafter. In our forecast we assume that UPS will continue to have a 100 percent

market service potential.

d. Seasonal Patterns

A pattern of moving seasonal fluctuations in Priority Mail volumes was found to exist in the R90-1 and also in the previous general rate case, R94-1. To account for this pattern of seasonal influences we used a statistical technique called X-11. The technique is widely used by Federal Agencies in making seasonal adjustments to data series. The computer program we used is from the national statistics office of Canada called Statistics Canada. Our Workpaper B provides an outline of how we utilized the technique and the computer program we used.

Table 4 of partial autocorrelations shows the residual pattern after the X-11/ARIMA process is completed. Based on that table, the Durbin-Watson statistic, and the autoregression diagnostic regressions in Library Reference H-120 pages 43-45, indicates that no adjustments at this stage such as those for autocorrelation were necessary. Table 5 and the Durbin-Watson statistic in Table 3 confirms that no further autocorrelation adjustments were necessary. The impacts of the X-11/ARIMA adjustments are converted to seasonal factors in the forecasts. The method of computing these factors is the same as that used in the other mail classifications. The final values used in the forecasting program are: Fall = 1.038784, Winter = 1.012782, Spring = 1.011968, and Summer = 0.952349.

e. Population

The dependent variable is quarterly Priority Mail per postal accounting period divided by the adult population 22 years of age and older. From BYP1992 to

TABLE 4
**Priority Mail**
After X-11/ARIMA

PARTIAL AUTOCORRELATIONS AND 95 % CI AROUND ZERO

| LAG | LOWER BOUND | PAC* | UPPER BOUND | SIGNIFICANT |
|---|---|---|---|---|
| 0 | 0.0000 | 1.0000 | 0.0000 | 0 |
| 1 | -0.1933 | 0.0515 | 0.1933 | 0 |
| 2 | -0.1943 | 0.0009 | 0.1943 | 0 |
| 3 | -0.1952 | 0.0367 | 0.1952 | 0 |
| 4 | -0.1961 | -0.0571 | 0.1961 | 0 |
| 5 | -0.1971 | -0.0907 | 0.1971 | 0 |
| 6 | -0.1980 | -0.0104 | 0.1980 | 0 |
| 7 | -0.1990 | 0.0147 | 0.1990 | 0 |
| 8 | -0.2000 | -0.2110 | 0.2000 | 1 |
| 9 | -0.2010 | 0.0174 | 0.2010 | 0 |
| 10 | -0.2020 | 0.0890 | 0.2020 | 0 |
| 11 | -0.2031 | 0.0751 | 0.2031 | 0 |
| 12 | -0.2041 | -0.3099 | 0.2041 | 1 |
| 13 | -0.2052 | 0.1280 | 0.2052 | 0 |
| 14 | -0.2063 | -0.1321 | 0.2063 | 0 |
| 15 | -0.2074 | -0.1184 | 0.2074 | 0 |
| 16 | -0.2085 | -0.0097 | 0.2085 | 0 |
| 17 | -0.2097 | 0.0002 | 0.2097 | 0 |
| 18 | -0.2108 | -0.0720 | 0.2108 | 0 |
| 19 | -0.2120 | -0.1172 | 0.2120 | 0 |

*Partial Autocorrelation Coefficient

TABLE 5
Priority Mail
Final Estimates

PARTIAL AUTOCORRELATIONS AND 95 % CI AROUND ZERO

| LAG | LOWER BOUND | PAC* | UPPER BOUND | SIGNIFICANT |
|---|---|---|---|---|
| 0 | 0.0000 | 1.0000 | 0.0000 | 0 |
| 1 | -0.1933 | 0.0517 | 0.1933 | 0 |
| 2 | -0.1943 | -0.0959 | 0.1943 | 0 |
| 3 | -0.1952 | 0.0488 | 0.1952 | 0 |
| 4 | -0.1961 | 0.0301 | 0.1961 | 0 |
| 5 | -0.1971 | -0.1078 | 0.1971 | 0 |
| 6 | -0.1980 | -0.0041 | 0.1980 | 0 |
| 7 | -0.1990 | -0.0215 | 0.1990 | 0 |
| 8 | -0.2000 | -0.1642 | 0.2000 | 0 |
| 9 | -0.2010 | 0.0190 | 0.2010 | 0 |
| 10 | -0.2020 | 0.0455 | 0.2020 | 0 |
| 11 | -0.2031 | 0.0511 | 0.2031 | 0 |
| 12 | -0.2041 | -0.1696 | 0.2041 | 0 |
| 13 | -0.2052 | -0.0098 | 0.2052 | 0 |
| 14 | -0.2063 | -0.2487 | 0.2063 | 1 |
| 15 | -0.2074 | -0.0139 | 0.2074 | 0 |
| 16 | -0.2085 | 0.0676 | 0.2085 | 0 |
| 17 | -0.2097 | 0.0219 | 0.2097 | 0 |
| 18 | -0.2108 | -0.0982 | 0.2108 | 0 |
| 19 | -0.2120 | -0.1417 | 0.2120 | 0 |

*Partial Autocorrelation Coefficient

BYP1997 the increase in Priority Mail due to population growth was approximately 5.6 percent (0.0563), and from BYP1994 to BYP1997 it was about 2.9 percent (0.0292).

f. Government Volume

Previous models were based on volume data that did not include government volume. As explained in the Choice Trail, in future years only "with government" volume data will be available. So that future projections would include forecasts of the "with government" volume data, the two data sets were combined. Data including government volume begins in postal quarter one 1994. To account for the fact that the early data did not include government volumes, a binary variable was added with its value set equal to one from the beginning of the sample up to and including postal quarter four 1993. Beginning in quarter one of fiscal 1994, the value is set to zero, to the end of the estimation period. Its estimated value is -0.069 indicating that the previous data without government volume was lower. The variable continues to remain at zero through the Test Year and does not alter the forecast.

E. Volume Forecast

Projecting the combined influences of prices, incomes, and population gives a projection of 1,123 million(1,123.257) pieces of Priority Mail for the Test Year beginning October 1, 1997, if present postal rates are continued (before-rates forecast). If the rates proposed by the Postal Service are recommended, the forecast is 1,087 million (1087.342) pieces (after-rates forecast).

## EXPRESS MAIL

### A. Characteristics

#### 1. Introduction

Express Mail is an unzoned service offered for shipment of all mailable matter of 70 pounds or less. It is an expedited service guaranteeing same day, next day or second day delivery, depending on the service purchased and the location of the addressee. Beginning in 1970, as a pilot program with the Federal National Mortgage Association and six of its regional offices, it gradually grew through phases of test marketing in the early and mid 1970's, to an official class of mail in late 1977. In February of 1978 it served 1,016 offices. Today delivery is available virtually throughout the nation, on a next-day or second-day basis.

There are preparation requirements similar to other classes. In the case of Express Mail, the piece must be large enough to hold the required labels and indicia on a single side, and at the other extreme be not more than 108 inches in length plus girth. There are five basic domestic service offerings. They include Express Mail: Same Day Airport Service (formerly called Airport to Airport), Custom Designed Service, Next Day Service, Second Day Service, and Military Service. Second Day service, rather than being a reduced service standard, is service to addresses not served by the Next Day network. Express Mail Second Day was a new service addition approved in the 1987 general rate case. The current rate structure is divided into four categories: Same Day Airport, Custom Designed, Next Day and Second Day PO to Addressee, and Next Day and Second Day PO to PO. In 1996, ninety-nine percent (0.9851) of domestic Express

Mail Service was Next Day and Second Day PO to Addressee. The relative distribution of the other categories was approximately: virtually no (0.0000007) Same Day Airport, one percent (0.01040) Custom Designed, and four- tenths of one percent (0.0045) Next Day and Second Day PO to PO. For all of these groups the rate begins at pieces weighing less than or equal to one-half of one pound, then over one-half pound to two pounds, and then increases in one pound increments to 70 pounds. A flat-rate envelope was approved in the R90-1 general rate case. It is priced at the two-pound rate, regardless of actual weight, and comprises about two one-hundredths of one percent (0.00022) of Express Mail total volume. Under the proposal all of the services would remain, but the prices would change.

2. Dynamic Nature of the Service

Through the decade of the 1980's, the expedited delivery industry has seen explosive growth and rapid change in technology. It continues to be a fiercely competitive industry. The real or inflation-adjusted price has fallen, and the service has expanded as well as improved through the period we observed. The industry has grown from one providing an elite service to a few for critical or emergency situations, to one where some mailers almost routinely send "important" items "Express". Now it is not unusual to see mail-order catalogs and others offering the service as a routine extra-charge option.

Because of these rapid changes, both the industry as a whole, and Express Mail as one of the competitors, are not the same today as when the Express Mail service began in the late 1970's. One can reasonably expect the industry to change in the future as well. It will probably change in unexpected ways that will depend on the innovation

and the creativity of the competitors. The spectacular growth in facsimile (FAX), the Internet, and other electronic communications media could also be factors in the future of this industry.

We were not able to include all of these influences in our model. Our work is the third presentation of econometrically estimated elasticities. One consequence of this is the tentative nature of our results. Even though we have tried to be as comprehensive as possible in modeling this service, changes have occurred and are likely to continue to occur very rapidly. Those changes could significantly alter the results of future research.

Regression files for the Express Mail models are contained in Library Reference H-121 and H-122, a floppy disk. Volume forecast multipliers for Express Mail are also in H-122. (For a general discussion of volume multipliers see Docket No. R94-1, direct testimony of witness Tolley, USPS-T-2, Technical Appendix II.)

B. Volume Changes to Date

Table 6 shows the annual data for Express Mail volume[4]. Over the period, BYP1980 to BYP1997, volume increased by 305 percent (304.8), and the per adult increase was 220 percent (220.3). Over the last five years, BYP1992 to BYP1997, Express Mail volume increased by 7.4 percent (0.0736), and on a per adult basis volume increased by 1.6 percent (0.0164). Express Mail also experienced volume growth over the last three years of 9.5 five percent (0.0952) from BYP1994 to BYP1997. On a per

[4] As in the case of Priority Mail, BYP stands for the Base Year comparison Period. For example, BYP1997 would mean the four postal quarters 96:3, 96:4, 97:1 and 97:2 and BYP 1980 would be postal quarters 79:3, 79:4, 80:1 and 80:2.

TABLE 6
EXPRESS MAIL
Volume*

| Postal Qtrs | Volume (Millions) | Pieces per Adult |
|---|---|---|
| 79:3 - 80:2 | 14.506 | 0.100 |
| 84:3 - 85:2 | 45.197 | 0.286 |
| 89:3 - 90:2 | 55.502 | 0.329 |
| 90:3 - 91:2 | 59.735 | 0.350 |
| 91:3 - 92:2 | 54.692 | 0.316 |
| 92:3 - 93:2 | 52.262 | 0.298 |
| 93:3 - 94:2 | 53.614 | 0.302 |
| 94:3 - 95:2 | 57.250 | 0.319 |
| 95:3 - 96:2 | 56.124 | 0.310 |
| 96:3 - 97:2 | 58.718 | 0.321 |

Growth Rates

| BY Period | Volume | Pieces per Adult |
|---|---|---|
| 1980 - 1985 | 211.6% | 184.9% |
| 1985 - 1990 | 22.8% | 15.0% |
| 1990 - 1995 | 3.1% | -2.9% |
| 1995 - 1997 | 2.6% | 0.7% |
| 1980 - 1997 | 304.8% | 220.3% |
| 1990 - 1997 | 5.8% | -2.2% |
| 1991 - 1994 | -10.2% | -13.7% |
| 1992 - 1997 | 7.4% | 1.6% |
| 1994 - 1997 | 9.5% | 6.4% |

* Agency and Franked Mail Distributed except for the period 1986:1 - 1987:4.

adult basis, the total growth was 6.4 percent (0.32127/0.30190=0.0642) from BYP1994 to BYP1997. However, as Table 6 displays, some periods show volume declines. These results are indicative of the volatility of this market. Additional historical volume changes of Express Mail are also illustrated in Figure 2 along with the Test Year before and after rates volumes.

C. Changes to the Model

1. No Fundamental Changes

There were no fundamental changes to the model compared to the model presented in R-94. As part of our work, we experimented with dissaggregating the model into metro and non-metro areas. During part of the process, we changed the measure of long-run income from expenditures on services to expenditures on nondurables as discussed in the choice trail in Workpaper D. The current model uses that measure of permanent income. In the R-94 model there was a variable measuring a small cross-volume effect. When the revisions to long-run income were entered into the model, the cross-volume effect was no longer statistically significant (see choice trail Workpaper D). The new model does not have a cross-volume effect.

a. Logistic Growth Variable

The rapid growth in the industry in the early years, and the possibility of slower growth in the future suggested the logistic growth approach. The Z-variable method is used in the model now and was also used in the in the R-94 model (see Workpaper C and section D.7).

b. Priority Mail Price

The cross-price index of Priority Mail was added to the model in the R-94 rate

case. From our statistical results, the Priority Mail cross-elasticity is significant and continues to be an economic substitute for Express Mail.

c. Federal Express Average Revenue

The average revenue of Federal Express' domestic service (called package yield) was also added to the model in R-94. The Express Mail estimated cross-price elasticity is statistically significant. The result is that Federal Express appears to offer services that are competitive with Express Mail services (See section D.4).

d. Long-run Income

In 1995 the Department of Commerce made changes to the methods it uses to measure the level of national economic activity. Several of those changes resulted in revisions to the government's historical data. As discussed in the choice trail, those changes caused us to change the data series we use to compute the long-run level of economic activity which influences Express Mail. The new series we use is based on the revised Department of Commerce data on personal consumption expenditures on nondurables to compute the value for long-run or permanent income.

D. Factors Affecting Volume

1. Price

The real or inflation-adjusted weighted price index for Express Mail has declined from about fourteen dollars ($14.083) in Postal Fiscal Year 1980 to thirteen dollars ($13.013) in PFY1988 and then to eleven dollars and fifty-seven cents ($11.571) in BYP1997. The index is based on constant 1992 dollars. The decrease in the inflation adjusted price of Express Mail is about 18 percent (-0.1784) from 1980 to 1997. This decrease in the real price of the service represents an important reason why the volume

expanded in the 1980 to 1997 period.

The econometric models include the current period and three periods of lags for inflation adjusted price changes. The estimated elasticity of the own-price variable has the expected negative sign, and is statistically significant.

The results which are presented in Table 7, estimate that the long-run own-price elasticity for Express Mail is approximately equal to -1.53 (-1.534).[5] This means that one would expect at least a 2.8 percent (0.0279) increase in volume from BYP1992 to the 1997 base period, as the result of the two percent (-0.0182) decrease in real price, holding all the other factors constant. A small 0.1 percent (-0.0011) decrease in volume from BYP1994 to BYP1997 would be due to the seven one-hundredths of one percent (0.0007) increase in real price over the last three years, holding all of the other influences constant. Factors other than price are important.

[5] Our results, as in R-94-1, continue to be consistent with Professor Kahn's testimony in Docket No. RM88-2. Using his terminology, our long-run own-price elasticity would be called "Brand" elasticity. (See Direct Testimony of A.E. Kahn on behalf of USPS, USPS-T-2, Page 21.)

# TABLE 7
# EXPRESS MAIL
## Econometric Results

Dependent Variable DVOLEM_Z - Estimation by Restricted Regression
Quarterly Data From 1980:01 To 1997:02

| | | | |
|---|---|---|---|
| Usable Observations | 70 | Degrees of Freedom | 55 |
| Centered R**2 | 0.935211 | R Bar **2 | 0.918719 |
| Uncentered R**2 | 0.999658 | T x R**2 | 69.976 |
| Mean of Dependent Variable | | 0.717469557 | |
| Std Error of Dependent Variable | | 0.05261743 | |
| Standard Error of Estimate | | 0.015001134 | |
| Sum of Squared Residuals | | 0.012376872 | |
| Durbin-Watson Statistic | | 1.66306 | |
| Q(17-0) | | 11.326662 | |
| Significance Level of Q | | 0.83908733 | |

| | Variable | Coeff | Std Error | T-Stat | Signif |
|---|---|---|---|---|---|
| 1 | DUNT | -0.11376569 | 0.912563456 | -0.12467 | 0.90124246 |
| 2 | DEMFWUI | -0.52110939 | 0.08055388 | -6.46908 | 3.0000E-08 |
| 3 | DEMFWUI{1} | -0.53588724 | 0.061408334 | -8.72662 | 0 |
| 4 | DEMFWUI{2} | -0.26229713 | 0.060955302 | -4.30311 | 0.0000697 |
| 5 | DEMFWUI{3} | -0.21449433 | 0.059857623 | -3.58341 | 0.00071953 |
| 6 | DEMFWUI{4} | 0 | 0 | 0 | 0 |
| 7 | DSI | 1.087736128 | 0.074865876 | 14.52913 | 0 |
| 8 | DYPCN | 2.130741233 | 0.393251315 | 5.41827 | 1.3700E-06 |
| 9 | DPX8 | 0.152645304 | 0.076027558 | 2.00776 | 0.04959102 |
| 10 | DPX8{1} | 0.115047672 | 0.044937585 | 2.56017 | 0.01323904 |
| 11 | DPX8{2} | 0.114278183 | 0.047050377 | 2.42885 | 0.01844284 |
| 12 | DPX8{3} | 0.078573323 | 0.043245761 | 1.8169 | 0.07468215 |
| 13 | DP X8{4} | 0 | 0 | 0 | 0 |
| 14 | DFEDQAR | 0.040384613 | 0.070518158 | 0.57268 | 0.5691926 |
| 15 | DFEDQAR{1} | 0.12416755 | 0.057570663 | 2.15679 | 0.03540975 |
| 16 | DFEDQAR{2} | 0.14124133 | 0.055365856 | 2.55105 | 0.01355168 |
| 17 | DFEDQAR{3} | 0.003636353 | 0.062156045 | 0.0585 | 0.95355954 |
| 18 | DFEDQAR{4} | 0 | 0 | 0 | 0 |

TABLE 7 (Continued)
EXPRESS MAIL
Econometric Results

SHILLER SMOOTHNESS PRIORS

| | |
|---|---|
| Own Price | K = 0.003 |
| Priority Mail cross price | K = 0.034 |
| Federal Express cross price | K = 0.006 |

Data Legend

| | |
|---|---|
| DVOLEM_Z | Express Mail quarterly volume per accounting period per adult less the Z-variable. |
| DUNT | Constant term. |
| DEMFWUI | Express Mail price index deflated by personal consumption expenditures price deflator (chained). |
| DSI | Seasonal index. |
| DYPCN | Real permanent income per adult based on personal consumption expenditures on nondurable goods. |
| DPX8 | Priority Mail price index deflated by personal consumption expenditures price deflator (chained). |
| DFEDQAR | Federal Express Corporation's average revenue deflated by persona consumption expenditures price deflator (chained). |

The prefix "D" indicates variables have been transformed for autocorrelation correction.

2. Long-run Income based on nondurables

One would expect the estimated coefficient of this variable to have a positive sign. Our estimated permanent income elasticity for Express Mail service is positive with a value of 2.13, and is statistically significant. From BYP1992 to BYP1997 per adult (inflation adjusted) permanent income, based on personal consumption expenditures on nondurables, increased four percent (0.0399), and from BYP1994 to BYP1997 it increased by about 3.9 percent (0.0386). Over the three year period, the increase in Express Mail volume totaled approximately 8.2 percent (0.0823 compared to BYP1994) and over the longer five year period it was almost the same increase at 8.5 percent (0.0851 from 1992) due to the growth in long-run income, holding all the other influences constant. The impact of income was reduced because of the 1990-91 recession resulting in a slower than average subsequent recovery.

3. Priority Mail

For some customers, Priority Mail is an economic substitute for Express Mail. As such, we would expect the sign of the coefficient of Priority Mail price to be positive. We included the current period and three lag periods reflecting the inflation adjusted price index. Priority Mail price has an impact on Express Mail volume. Its estimated elasticity is 0.461 and is statistically significant.

Over the five year period, from BYP1992 to BYP1997 the weighted average real price of Priority Mail decreased by 4.1 percent (-0.0412). That decrease resulted in a decrease in Express Mail volume of about two percent (-0.0190). Over the three years, from BYP1994 to BYP1997, the fixed-weight index for Priority Mail prices decreased by 3.4 percent (-0.0339), resulting in a 1.6 percent (-0.0156) decrease in Express Mail

volume, holding all other influences constant.

4. Federal Express Average Revenue

A leading provider of substitute services for Express Mail is The Federal Express Corporation. We use data on the firm's total domestic express operating results. The data we use are called yield per package, and can be thought of as average revenue per piece. We include the current and three lags of this variable as a measure of the competitor's price.

The estimated cross-price elasticity is 0.309, and is statistically significant. Over the period from BYP1992 to BYP1997 the decrease in the weighted average inflation adjusted Federal Express price was approximately 28 percent (-0.2816). With a cross-price elasticity of 0.309, the resulting decrease in Express Mail is 8.7 percent (-0.0871). Over the three year BYP1994 to BYP1997 period, the weighted average Federal Express real price decreased thirteen percent (-0.1305), and accounted for a decrease in Express Mail volume of approximately four percent (-0.0404), holding all the other factors constant.

5. Seasonal Patterns

In the R90-1 and R94-1 cases we found that a moving seasonal pattern of fluctuations in Express Mail volumes existed. They continue to exist now. To account for this pattern of moving seasonal influences we used and continue to use a statistical technique called X-11/ARIMA. The technique is widely used by Federal Agencies in making seasonal adjustments to data series. The same computer program used in R90-1 and R94-1 continues to be used. The program is from the national statistics office of Canada called Statistics Canada. Our Workpaper B provides an outline of how we used

the technique, and how we used the computer program.

Table 8 of partial autocorrelations shows the residual pattern after the X-11/ARIMA process is completed. Based on that table, the Durbin-Watson statistic and the autoregression diagnostic regressions in Library Reference H-121 pages 32-35, an autocorrelation correction was necessary. AR(1) was used. Table 9 and the Durbin-Watson statistic in Table 7 indicate that no further autocorrelation adjustments are necessary. The impact of the X-11/ARIMA adjustments are converted into seasonal factors for our forecasts. The resulting seasonal factors used in forecasting Express Mail are: Fall=0.957435, Winter=1.028891, Spring=1.033492, Summer=0.985137.

TABLE 8
Express Mail
After X-11/ARIMA

PARTIAL AUTOCORRELATIONS AND 95 % CI AROUND ZERO

| LAG | LOWER BOUND | PAC* | UPPER BOUND | SIGNIFICANT |
|---|---|---|---|---|
| 0 | 0.0000 | 1.0000 | 0.0000 | 0 |
| 1 | -0.2390 | 0.5598 | 0.2390 | 1 |
| 2 | -0.2408 | -0.0368 | 0.2408 | 0 |
| 3 | -0.2425 | -0.1090 | 0.2425 | 0 |
| 4 | -0.2443 | -0.2338 | 0.2443 | 0 |
| 5 | -0.2462 | -0.0391 | 0.2462 | 0 |
| 6 | -0.2481 | 0.0637 | 0.2481 | 0 |
| 7 | -0.2500 | -0.0687 | 0.2500 | 0 |
| 8 | -0.2520 | -0.1000 | 0.2520 | 0 |
| 9 | -0.2540 | -0.0785 | 0.2540 | 0 |
| 10 | -0.2561 | 0.0413 | 0.2561 | 0 |
| 11 | -0.2582 | -0.0326 | 0.2582 | 0 |

*Partial Autocorrelation Coefficients

TABLE 9
Express Mail
Final Estimates

PARTIAL AUTOCORRELATIONS AND 95 % CI AROUND ZERO

| LAG | LOWER BOUND | PAC* | UPPER BOUND | SIGNIFICANT |
|---|---|---|---|---|
| 0 | 0.0000 | 1.0000 | 0.0000 | 0 |
| 1 | -0.2408 | 0.1467 | 0.2408 | 0 |
| 2 | -0.2425 | 0.0020 | 0.2425 | 0 |
| 3 | -0.2443 | 0.0637 | 0.2443 | 0 |
| 4 | -0.2462 | 0.0756 | 0.2462 | 0 |
| 5 | -0.2481 | -0.1712 | 0.2481 | 0 |
| 6 | -0.2500 | 0.0590 | 0.2500 | 0 |
| 7 | -0.2520 | 0.0407 | 0.2520 | 0 |
| 8 | -0.2540 | -0.0600 | 0.2540 | 0 |
| 9 | -0.2561 | 0.0266 | 0.2561 | 0 |
| 10 | -0.2582 | 0.0318 | 0.2582 | 0 |
| 11 | -0.2604 | 0.0056 | 0.2604 | 0 |

*Partial Autocorrelation Coefficients

6. Adult Population

In the five year period BYP1992 to BYP1997, the adult population (males and females 22 years of age and over) grew by 5.6 percent (0.0563). From BYP1994 to BYP1997 the increase was three percent (0.0292). Our dependent variable, quarterly per accounting period Express Mail volume, is divided by the adult population. To compute the total volume from per adult volume, one simply multiplies per adult volume by the adult population. Population growth translates to an approximately six percent (0.0563) increase in Express Mail volume through the BYP1992 to BYP1997, and an approximately three (0.0292) percent increase from BYP1994 to the base period 1997.

7. Logistic Growth Variable

Rapid growth in Express Mail volume during much of the sample period suggested that a logistic term should be used. The term would allow for market penetration as well as market maturation. The Z variable method we used is the same approach as first used in R87-1, R90-1 and R94-1. The approach is implemented in the same two-step process as in my previous testimony. (See Docket No. R94-1, USPS-T-3, page 35). The implementation of the variable is in my library reference H-121, pages 4- 5, and H-122.

As in R94-1, the Z variable has a relatively small impact on forecasted Express Mail volume. From BYP1992 to BYP1997 it increases volume by about one-half of one percent (0.0046). From BYP1994 to BYP1997 the variable has the impact of increasing volume by six-one-hundredths of one percent (0.0006).

E. Volume Forecast

Projecting the influences of own price, cross prices, long run income, and population, results in a projection of 64 million (64.170) pieces of Express Mail for the Test Year beginning October 1, 1997, if present postal rates are continued (before-rates forecast). If the rates recommended by the Postal Service are adopted, the forecast is 63 million (63.206) pieces of Express Mail (after-rates forecast).

# WORKPAPER A

## UPS Person Days Lost Due to Strikes

One of the important economic influences upon Priority Mail is the availability of competing services. When competing services are not available, or the availability is reduced, we would expect more Priority Mail volume. When a strike occurs at United Parcel Service (UPS) we would expect Priority Mail to increase, and our statistical results are consistent with that expectation.

There are many quarters with no strike activity at UPS. The data contains zeros for those periods. A double log model is usually not appropriate in such a situation. To see this, and to see the model that we actually used, we will write a simplified version of the double-log model and our model. We will reduce the number of variables, simplify the notation and omit the discussion of the stochastic specification of the model. None of these issues would compromise our explanation; we only simplify the issues for clarity.

Our symbols are:

V = Volume
X = non-zero explanatory variable
S = Strike data which contain some zeros
a, b, c = parameters to be estimated.

The double log model is derived from equation (1):

$$V = aX^b, \tag{1}$$

which becomes:

$$\ln(V) = \ln(a) + b \ln(X) \quad . \tag{2}$$

If we simply added S, we would have

$$V = aX^b S^c \quad \text{, or:} \tag{3}$$

$$\ln(V) = \ln(a) + b \ln(X) + c \ln(S) . \tag{4}$$

Equation (3) would imply that Priority Mail would be zero when UPS had no strikes. That is, zero to any non-zero power is zero. If we attempted to use equation (4) we would find it impossible, since the logarithm of zero is undefined.

The model we constructed is analogous to equations 5 and 6 below:

$$V = aX^b e^{cS} \tag{5}$$

$$\ln(V) = \ln(a) + b \ln(X) + c S \quad . \tag{6}$$

As can be seen, the model continues to be linear in the parameters which are to be estimated. The only complication is that the coefficient c is no longer an elasticity.

In equation (2) or (6) it can be shown that the elasticity of V with respect to X is

$$\eta_x = \partial V/\partial X * X/V = \partial \ln(V)/\partial \ln(X) = b \tag{7}$$

However, the elasticity of V with respect to S is not equal to c. Simple calculus shows that the elasticity is

$$\eta_s = \partial V/\partial S * S/V = c S \quad . \tag{8}$$

This is obtained by first taking the total differential of equation (6) which is:

$$d \ln (V) = d \ln(a) + \partial \ln(V)/\partial \ln(X) \; d \ln(X) + \partial \ln(V)/\partial S \; dS \tag{9}$$

from equation (6) $\partial \ln(V)/\partial S = c$, and from equation (7) $\partial \ln(V)/\partial \ln(X) = b$ .

Since $d \ln (V) = (1/V)\, dV$ equation (9) becomes

$$(1/V)\, d(V) = 0 + b(1/X)\, d(X) + c\, d(S) \quad . \tag{10}$$

Holding X constant and rearranging terms results in

$$1/V * \partial V/\partial S = c \tag{11}$$

and multiplying both sides by S results in our elasticity

$$\eta_s = S/V * \partial V/\partial S = c\, S \quad . \tag{12}$$

which is the answer. The elasticity is no longer a constant. The elasticity of S varies as S varies.

To see how these elasticities vary over time we computed the elasticity for each of the years with UPS strike activity. They are presented in the table below.

TABLE WPA-1

| PFY | UPSMDLS (00,000) | COEFFICIENT | ELASTICITY |
|---|---|---|---|
| 1970 | 1.18234 | 0.020327 | 0.0240 |
| 1971 | 0.84276 | 0.020327 | 0.0171 |
| 1972 | 0.42 | 0.020327 | 0.0085 |
| 1973 | 0.11606 | 0.020327 | 0.0024 |
| 1974 | 1.98626 | 0.020327 | 0.0404 |
| 1975 | 1.66077 | 0.020327 | 0.0338 |
| 1976 | 4.6129 | 0.020327 | 0.0938 |
| 1977 | 6.29719 | 0.020327 | 0.1280 |
| 1980 | 0.07217 | 0.020327 | 0.0015 |
| 1981 | 0.147 | 0.020327 | 0.0030 |

| | | | |
|---|---|---|---|
| 1982 | 0.25 | 0.020327 | 0.0051 |
| 1994 | 0.40 | 0.020327 | 0.0081 |

## WORKPAPER B

### X- 11/ARIMA

We used the X-ll/ARIMA program published by Time Series Research and Analysis Division, Statistics Canada, Ottawa, Canada. Our objective was to account for the possibility of shifting seasonal patterns. The general approach we used is the same as in R94-1. USPS T-3, Workpaper B "X-11/ARIMA".

Our use of the X-II/ARIMA process was the same as in R94-1 using the default settings for the program. Following this process, we used X-11 (without ARIMA) for both Priority Mail and Express Mail.

The process involves five stages:

1. Compute the OLS residuals from the econometric model with three binary seasonal variables.
2. Invoke the default setting for the X-11/ARIMA program using the residuals computed in stage one. The changing seasonal component of the original residual series is saved.
3. The seasonal index, that combines the fixed seasonal (binary) and changing seasonal (X-11) variables, is constructed next. We calculate the fixed binary coefficients relative to the summer quarter at this time. For each time period the index is constructed by adding the relevant adjusted binary coefficient to the variable seasonable component from X-11.

4. The seasonal index computed in stage three combines the fixed and shifting seasonal patterns. This index replaces the binary variables in the regression at stage one. The OLS regression of stage one is rerun, and the relevant AR corrections are made based on these new results.

5. After the AR corrections are made, the final regression with Shillerization is run. This is the final result from which our elasticity estimates are obtained.

# WORKPAPER C

## Description of Logistic Growth Variable

Logistic growth is modelled as follows:

$$\frac{\alpha}{[1 + \beta*EXP(-\delta*T)]} + 10000*(\alpha - ABS(\alpha)) + 10000*(\beta - ABS(\beta)) + 10000*(\delta - ABS(\delta))$$

where $\alpha$, $\beta$, and $\delta$ are the parameters to be estimated, EXP is the symbol for exponential, ABS is the symbol for absolute value, and T indicates time. The parameter $\alpha$ represents the maximum adoption level, the parameter $\beta$ represents the time it takes to reach the maximum adoption level, and the parameter $\delta$ reflects the rate of adoption. The rate of change of the dependent variable with respect to time is proportional to the current level of the dependent variable and also to the distance still to travel to reach the maximum adoption level $\alpha$. The parameters $\alpha$, $\beta$, and $\delta$ must all be positive. The terms $1000*(\alpha-ABS(\alpha))$, $1000*(\beta-ABS(\beta))$, and $1000*(\delta-ABS(\delta))$ are called the penalty functions. These functions vanish when convergence is attained and are used to ensure that the convergence occurs such that the positivity conditions hold.

This is a nonlinear expression and needs to be estimated using a nonlinear estimation technique. In practice this is handled in two stages. In the first stage, using a nonlinear least squares technique, an equation is estimated with a logistic trend term. From this equation the parameters of the logistic component of the model are used to construct the market penetration variable called the Z-variable. The variable is simply

the prediction from the equation using only the logistic component.

In the second stage the coefficient of the computed Z-variable is constrained to equal 1. This is achieved by subtracting the Z-variable from the dependent variable to obtain a new transformed dependent variable. The estimation then proceeds as usual but with the new transformed dependent variable. The final forecasts are retransformed by adding the Z-variable back to the forecasts from the model.

The statistical calculations are performed as a standard feature in the computer software system, "Regression Analysis of Time Series". They are invoked by using the "NONLIN" and "NLLS" commands producing the non-linear estimations via non-linear least squares as discussed above.

# WORKPAPER D

## Description of Choice Trail

The following choice trail leads from the R94-1 models to the R97-1 models.

A. Priority Mail

1) The R94-1 model included a binary variable taking on a value equal to unity from 1991 quarter 3 onwards (DUPS), and the interaction of DUPS with the current deflated UPS price. These two variables were used to account for the varying UPS pricing behavior over time. As the model's estimation period was extended it became apparent that the lagged values of UPS prices were increasingly important. The R94-1 Priority Mail model, when extended to 1994Q3, produced forecast errors of 2.6 percent for the first three quarters of 1994. When the estimation period was extended to the fourth quarter of 1994, the forecast error increased to three percent. Also, the most recent postal quarter (94:4) had a relatively high residual of approximately 6.6 percent (0.0661). So, instead of interacting DUPS with the current deflated UPS price, DUPS was interacted with four through eight lags of UPS prices.

2) At the same time, a separate Shiller smoothness parameter was estimated for lags four through seven (with eight being set to zero) of UPS prices interacted with DUPS. The estimated long-run own-price elasticities, plus the Parcel Post and UPS cross-price elasticities essentially remained unchanged.

The sum of the estimated coefficients of UPS price lags four through seven interacted with DUPS was 1.24 as compared to the R94-1 value of 1.11 when only the current UPS price was interacted with DUPS. The forecast error for 1994 decreased from three percent to less than one percent.

3) In February of 1996, the Department of Commerce moved from fixed-weight indices to chain-weighted indices when computing inflation adjusted economic variables. The new revised Commerce data uses 1992 as the base period. We used the new Commerce Department revised data and reestimated the Priority Mail equation. With our newly extended estimation period, the estimated long-run own-price elasticity remained stable at -0.78. The Parcel Post estimated cross-price elasticity decreased slightly from 0.19 to 0.17. The sum of the coefficients of the fourth through seventh lags of UPS prices increased from 1.24 to 1.31.

4) Monthly economic data are available before quarterly data. It was decided to use monthly economic data wherever possible. RCF, Inc. developed a method to compute postal quarter values from monthly data. We use that method, as well. The approach was used in the previous Parcel Classification Reform case, MC97-2. The estimated coefficients from the Priority Mail volume equation using monthly data were about the same as using quarterly data to estimate the equation. The estimated long-run own-price elasticity was -0.77 compared to -0.78 from quarterly data and the Parcel Post cross-price elasticity was 0.18 compared to 0.17 from quarterly data. The sum of

the estimated coefficients for UPS prices interacted with DUPS from monthly data was 1.33 compared to 1.31 from the model with quarterly Commerce Department data.

5) Billing determinants for GFY 1995 were obtained and the fixed-weight price indices were recomputed. The estimated coefficients remained stable. The estimated own-price elasticity increased slightly in absolute magnitude from -0.77 to -0.79. Parcel Post cross-price elasticity became 0.14 compared to 0.18 using 1993 billing determinants-based fixed-weight price indices. The sum of the coefficients of UPS prices interacted with DUPS remained unchanged at 1.33.

6) In the R94-1 Priority Mail equation, the coefficient of the permanent income variable was constrained to 1.03. This estimate of the permanent income elasticity was obtained from the Household Diary Study. Instead of imposing a fixed constraint we decide to impose a stochastic constraint on the permanent income coefficient. The technique is called Mixed Estimation. This is the method RCF, Inc. began using in R94-1. The estimated coefficient of permanent income from the Household Study was 1.03 and its standard error was 0.2244. Using the Mixed Estimation technique, we implemented the stochastic constraint on the permanent income coefficient and the Shiller smoothness coefficients.[1] The estimated long-run price

[1]This is a standard way to implement these econometric procedures. See Jan Kmenta, Elements of Econometrics, Second Edition, Macmillian 1986, Pp. 497-500, for Mixed

elasticities remained fairly stable. The revised own-price elasticity changed from -0.79 to -0.80, as compared to 0.78 in R94-1. The Parcel Post estimated cross-price elasticity decreased slightly from 0.14 to 0.12, compared to 0.19 in R94-1. The UPS cross-elasticity became 0.20, as compared to 0.26 in R94-1. The sum of the coefficients of UPS prices increased slightly from 1.33 to 1.39, as compared to 1.11 in R94-1. Finally, the econometrically estimated permanent income elasticity was 0.85, compared to the fixed value of 1.03 in the R94-1 general rate case. The forecast from this model was submitted in the recent Parcel Classification Reform case MC97-2.

7) It was decided that the models should forecast volumes with Agency and Franked Mail distributed to classes. Volume data with Agency and Franked Mail distributed to classes are available from 1988:1 onwards. We estimated the model using volume data with Agency and Franked Mail distributed to classes from 1988:1 onwards. A binary variable with a value of 1 for the period 1970:1 to 1987:4 and 0 for the period 1988:1 to 1996:4 was included to account for Agency and Franked Mail. The estimated long-run own-price elasticity was -0.67. However, the estimated coefficient of the binary variable seemed very large in absolute magnitude at -0.129. Since the objective of the model is to obtain the most reliable

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Estimation and Pp. 543-544, for Shiller Lags.

estimates, we wanted to use the most reliable data. We tried volume data without Agency and Franked Mail volume since these were the most reliable Priority Mail data in the past. Also, there was a rate change in 1995 and had we started the data in 1995 we might have confounded the own-price elasticity estimates. In addition, we believe it would be beneficial if the data began at least one full year prior to the rate change, so that future rate changes would be based on volume data that included a rate change. For these reasons we selected 1994:1 as the starting quarter for the volume data with Agency and Franked Mail distributed.

The model, estimated with Agency and Franked Mail volume distributed beginning in 1994:1, produced an own-price elasticity estimate of -0.80. This estimate is essentially the same as in the Parcel Classification Reform case. The estimated coefficient of the binary variable to account for Agency and Franked Mail volume seemed reasonable at -0.069 since the average amount of government Priority Mail in the period 1988:1 to 1993:4 was 6.4 percent (0.0636).

8) Billing determinants for GFY 1996 became available. The fixed-weight price index was calculated using the new GFY 1996 billing determinants. The Priority model was estimated with the new fixed-weight price index. The estimated long-run own-price elasticity was -0.78. The estimated coefficient of the binary variable for Agency and Franked Mail volume remained stable at 0.065.

9) Data for Priority Mail volumes were revised. These data also include Agency and Franked Mail volume. We used these data beginning in 1994:1. The model when estimated with the revised data produced a long-run own-price elasticity of -0.770. The estimated coefficient of the binary variable for Agency and Franked Mail volume was 0.069.

B. Express Mail

1) The R94-1 Express Mail model produced unexpected results when extended to cover the sample period ending in 1995Q1. The estimated coefficient of the permanent income variable, based on the service sector (GDPSPERM), was negative. This lead us to search for an alternative measure of permanent income. The unrestricted coefficient of permanent income based on real per adult personal disposable income (YPERM) was positive, statistically significant and appeared to have a reasonable value of 1.69. Hence, we replaced GDPSPERM by YPERM.

2) The estimated coefficient of per adult Priority Mail volume, lagged one period normalized by the accounting periods beginning in postal quarter 1991:Q3 (DP_VOL8(1)), was insignificant. We decided to exclude DP_VOL8(1) from the Express Mail volume equation.

3) In February of 1996, the Department of Commerce moved from fixed-weight indices to chain-weighted indices. The revised data also uses 1992 as the base period. We used the Commerce Department revised data and reestimated the Express Mail equation. The estimated coefficient of revised

permanent income, based on the real per adult chain-weighted personal disposable income (YPERM92), was negative. We constructed a permanent income variable based on real per adult chain-weighted personal consumption expenditures on nondurable goods (YPCN92). The permanent income variable (YPCN92) was constructed using a five quarter weighted moving average of per adult, inflation-adjusted chain-weighted, personal consumption expenditures on nondurable goods . The weights are 0.2975, 0.2380, 0.1904, 0.1523, and 0.1218 for the current period and four lags respectively. The estimated coefficient of YPCN92 was statistically significant and seemed to be reasonable at 1.1.

4) Monthly economic data are available before quarterly data. It was decided to use monthly economic data, converted to postal quarters wherever possible. This method was developed by RCF, Inc. and used in MC97-2 and we also use the same method. The estimated coefficients from the Express Mail volume equation using monthly data were about the same as using quarterly data to estimate the equation. The estimated long-run own price and cross-price elasticities for Federal Express from monthly data and those estimated from quarterly data are the same, when rounded to two decimal places. The cross-price elasticity for Priority Mail was 0.37 when estimated from quarterly economic data and is 0.42 when estimated from monthly data. This equation formed the basis for developing equations to explain Express Mail metro market and non-metro market Express Mail volumes.

5) Express Mail volume data for metro markets and non-metro markets are available from 1988Q1 through 1996Q3. Volume data for the four quarters of 1991 are not available. As most of the rapid growth in the expedited mail market had occurred prior to 1988, it was decided not to use the logistic trend to capture the market penetration phenomena. We estimated separate equations for Express Mail metro and non-metro markets. The explanatory variables included current and four lags of own prices, current and four lags of Priority Mail cross prices, current and four lags of Federal Express Corporation's average revenue, permanent income based on real per adult chain-weighted personal consumption expenditures on nondurable goods (YPCN92). The computed long-run cross-price elasticity for Priority Mail was negative, but not statistically significant, in the metro market equation. Because of this, Priority Mail cross-prices were excluded from the metro market equation. The estimated metro market own-price elasticity was -1.65 and the estimated non-metro market own-price elasticity was -1.42.

6) Billing determinants for GFY 1995 were obtained and fixed-weight price indices were recomputed. Express Mail metro and non-metro market equations were estimated using fixed-weight price indices based on GFY 1995 billing determinants. The estimated metro market own-price elasticity remained unchanged (-1.65) and the estimated non-metro market own-price elasticity was also unchanged (-1.42).

7) Because we now have two equations, the possibility of interaction between the two markets can be considered. A well-known econometric method called, Seemingly Unrelated Regression Estimation (SURE), is available for use in this situation. We used that method. The estimated metro market own-price elasticity is -1.63 and the estimated nonmetro market own-price elasticity is -1.15. This is the final MC97-2 Express Mail model with metro and non-metro equations jointly estimated using SURE.

8) It was decided not to offer Express metro and non-metro services. So we reformulated the Express Mail model using the total Express Mail volume. The estimation begins in 1979:4, the first period the lagged values of Federal Express average revenues are available. Because of the rapid growth after the inception of Express Mail in 1977, and possible maturation of the markets, we decided to capture the market penetration phenomena by a logistic trend defined over the entire sample period. This is accomplished by using the so called Z-variable approach. The approach was used in both the R87-1, R90-1, and R94-1 general rate cases. An outline of the approach is presented in Workpaper C of this testimony. The Express Mail model was estimated using the Z-variable approach. Agency and Franked mail distributed volume was used. A binary variable to account for the absence of Agency and Franked mail volume for the period 1986:1 to 1987:4 was included in the model. The estimated long-run own-price elasticity was -1.540. The estimated coefficient of the binary variable for the absence of

Agency and Franked mail volume was not statistically significant with a t value of -0.11. Hence, it was decided to exclude the binary variable. Without the binary variable in the model, the estimated long-run own-price elasticity remained fairly stable at -1.545.

9) Billing determinants for GFY 1996 became available. The fixed weight price index was calculated using the new GFY 1996 billing determinants. The Express Mail model was estimated with the new fixed-weight price index. The estimated long-run own-price elasticity was -1.534. This is the final model used in the R97-1 rate case.

# APPENDIX A: DATA

TABLE A.1
POSTAL VOLUMES USED IN REGRESSIONS:
PRIORITY MAIL AND EXPRESS MAIL
(Millions of Pieces)

| PQtrs | VOL8 | VOL9 |
|---|---|---|
| 1970:1 | 44.318 | NA |
| 1970:2 | 44.397 | NA |
| 1970:3 | 41.312 | NA |
| 1970:4 | 53.320 | NA |
| 1971:1 | 46.359 | NA |
| 1971:2 | 47.440 | NA |
| 1971:3 | 48.156 | NA |
| 1971:4 | 60.990 | NA |
| 1972:1 | 47.823 | NA |
| 1972:2 | 49.138 | NA |
| 1972:3 | 48.622 | NA |
| 1972:4 | 59.632 | NA |
| 1973:1 | 48.746 | NA |
| 1973:2 | 50.003 | NA |
| 1973:3 | 51.124 | NA |
| 1973:4 | 65.259 | NA |
| 1974:1 | 50.423 | NA |
| 1974:2 | 55.358 | NA |
| 1974:3 | 49.801 | NA |
| 1974:4 | 63.499 | NA |
| 1975:1 | 48.764 | NA |
| 1975:2 | 49.886 | NA |
| 1975:3 | 45.501 | NA |
| 1975:4 | 59.604 | NA |
| 1976:1 | 42.959 | NA |
| 1976:2 | 44.232 | NA |
| 1976:3 | 42.718 | NA |
| 1976:4 | 52.889 | NA |
| 1977:1 | 53.023 | NA |
| 1977:2 | 43.933 | 1.149 |
| 1977:3 | 46.007 | 1.323 |
| 1977:4 | 58.396 | 1.949 |
| 1978:1 | 51.151 | 1.523 |
| 1978:2 | 44.154 | 1.661 |
| 1978:3 | 49.773 | 1.935 |
| 1978:4 | 68.584 | 2.702 |
| 1979:1 | 55.040 | 2.358 |
| 1979:2 | 48.361 | 2.724 |

(Table continued on next page)

TABLE A.1 (Continued)
POSTAL VOLUMES USED IN REGRESSIONS:
PRIORITY MAIL AND EXPRESS MAIL
(Millions of Pieces)

| PQtrs | VOL8 | VOL9 |
|---|---|---|
| 1979:3 | 54.820 | 2.891 |
| 1979:4 | 71.604 | 4.366 |
| 1980:1 | 57.050 | 3.470 |
| 1980:2 | 57.434 | 3.779 |
| 1980:3 | 60.805 | 4.176 |
| 1980:4 | 70.692 | 6.014 |
| 1981:1 | 63.933 | 4.949 |
| 1981:2 | 63.658 | 5.545 |
| 1981:3 | 63.181 | 5.888 |
| 1981:4 | 77.695 | 7.431 |
| 1982:1 | 62.139 | 5.940 |
| 1982:2 | 58.160 | 6.245 |
| 1982:3 | 63.341 | 6.844 |
| 1982:4 | 73.591 | 9.358 |
| 1983:1 | 67.662 | 7.755 |
| 1983:2 | 59.159 | 8.066 |
| 1983:3 | 63.369 | 8.800 |
| 1983:4 | 80.422 | 12.078 |
| 1984:1 | 68.600 | 9.765 |
| 1984:2 | 63.704 | 9.700 |
| 1984:3 | 71.211 | 10.494 |
| 1984:4 | 89.683 | 13.800 |
| 1985:1 | 70.806 | 10.673 |
| 1985:2 | 63.838 | 10.230 |
| 1985:3 | 78.002 | 10.292 |
| 1985:4 | 93.850 | 12.618 |
| 1986:1 | 80.483 | 9.337 |
| 1986:2 | 74.480 | 9.041 |
| 1986:3 | 75.371 | 9.407 |
| 1986:4 | 98.770 | 12.189 |
| 1987:1 | 86.079 | 9.375 |
| 1987:2 | 77.316 | 9.381 |
| 1987:3 | 78.644 | 9.947 |
| 1987:4 | 109.386 | 12.678 |
| 1988:1 | 96.384 | 9.536 |
| 1988:2 | 84.206 | 10.045 |
| 1988:3 | 96.861 | 10.863 |
| 1988:4 | 124.201 | 14.799 |

(Table continued on next page)

TABLE A.1 (Continued)
POSTAL VOLUMES USED IN REGRESSIONS:
PRIORITY MAIL AND EXPRESS MAIL
(Millions of Pieces)

| PQtrs | VOL8 | VOL9 |
|---|---|---|
| 1989:1 | 99.674 | 11.514 |
| 1989:2 | 99.672 | 12.074 |
| 1989:3 | 107.802 | 12.911 |
| 1989:4 | 131.182 | 16.524 |
| 1990:1 | 114.726 | 12.687 |
| 1990:2 | 110.227 | 13.380 |
| 1990:3 | 118.189 | 14.140 |
| 1990:4 | 142.605 | 18.242 |
| 1991:1 | 122.987 | 13.729 |
| 1991:2 | 118.819 | 13.624 |
| 1991:3 | 112.288 | 13.527 |
| 1991:4 | 143.161 | 16.852 |
| 1992:1 | 125.232 | 12.085 |
| 1992:2 | 129.121 | 12.228 |
| 1992:3 | 134.570 | 12.561 |
| 1992:4 | 161.471 | 16.015 |
| 1993:1 | 141.156 | 11.455 |
| 1993:2 | 142.042 | 12.231 |
| 1993:3 | 158.215 | 12.436 |
| 1993:4 | 181.789 | 16.077 |
| 1994:1 | 174.600 | 11.927 |
| 1994:2 | 168.601 | 13.174 |
| 1994:3 | 199.236 | 13.448 |
| 1994:4 | 226.158 | 17.312 |
| 1995:1 | 196.060 | 12.880 |
| 1995:2 | 205.768 | 13.610 |
| 1995:3 | 206.576 | 13.284 |
| 1995:4 | 240.804 | 16.962 |
| 1996:1 | 209.083 | 12.362 |
| 1996:2 | 212.417 | 13.516 |
| 1996:3 | 221.151 | 13.729 |
| 1996:4 | 286.496 | 17.516 |
| 1997:1 | 237.380 | 13.096 |
| 1997:2 | 246.239 | 14.377 |

DATA LEGEND

VOL8 Priority Mail Volume. Agency and Franked Mail distributed from 1994:1 onwards. Data for the period 1994:1 to 1996:4 are the revised values.

VOL9 Domestic and International Express Mail Volume from 1977:2 through 1984:4. Domestic Express Mail Volume from 1985:1 through 1997:2. Agency and Franked Mail distributed except for 1986:1 - 1987:4.

TABLE A.2
POSTAL PRICES USED IN REGRESSIONS:
PRIORITY MAIL, EXPRESS MAIL, AND PARCEL POST
(Dollars)

| PQtrs | PX8FWI96 | PX9FWI96 | PX25FWI96 |
|---|---|---|---|
| 1969:1 | 1.368478 | NA | 0.873411 |
| 1969:2 | 1.368478 | NA | 0.873411 |
| 1969:3 | 1.368478 | NA | 0.873411 |
| 1969:4 | 1.368478 | NA | 0.873411 |
| 1970:1 | 1.368478 | NA | 0.873411 |
| 1970:2 | 1.368478 | NA | 0.873411 |
| 1970:3 | 1.368478 | NA | 0.873411 |
| 1970:4 | 1.368478 | NA | 0.873411 |
| 1971:1 | 1.368478 | NA | 0.927432 |
| 1971:2 | 1.368478 | NA | 0.999277 |
| 1971:3 | 1.379277 | NA | 0.999277 |
| 1971:4 | 1.511016 | NA | 0.999277 |
| 1972:1 | 1.511016 | NA | 0.999277 |
| 1972:2 | 1.511016 | NA | 0.999277 |
| 1972:3 | 1.511016 | NA | 0.999277 |
| 1972:4 | 1.511016 | NA | 0.999277 |
| 1973:1 | 1.511016 | NA | 0.999277 |
| 1973:2 | 1.511016 | NA | 0.999277 |
| 1973:3 | 1.511016 | NA | 0.999277 |
| 1973:4 | 1.511016 | NA | 0.999277 |
| 1974:1 | 1.511016 | NA | 0.999277 |
| 1974:2 | 1.618349 | NA | 1.017727 |
| 1974:3 | 1.833013 | NA | 1.054626 |
| 1974:4 | 1.833013 | NA | 1.054626 |
| 1975:1 | 1.833013 | NA | 1.054626 |
| 1975:2 | 1.833013 | NA | 1.054626 |
| 1975:3 | 1.833013 | NA | 1.054626 |
| 1975:4 | 1.833013 | NA | 1.078845 |
| 1976:1 | 1.842125 | NA | 1.159836 |
| 1976:2 | 2.033466 | NA | 1.287583 |
| 1976:3 | 2.033466 | NA | 1.287583 |
| 1976:4 | 2.033466 | NA | 1.287583 |
| 1977:1 | 2.033466 | NA | 1.287583 |
| 1977:2 | 2.033466 | NA | 1.287583 |
| 1977:3 | 2.033466 | NA | 1.287583 |
| 1977:4 | 2.033466 | NA | 1.287583 |
| 1978:1 | 2.033466 | 8.035238 | 1.287583 |
| 1978:2 | 2.033466 | 8.035238 | 1.287583 |
| 1978:3 | 2.084225 | 8.035238 | 1.408013 |

(Table continued on next page)

TABLE A.2 (Continued)
POSTAL PRICES USED IN REGRESSIONS:
PRIORITY MAIL, EXPRESS MAIL, AND PARCEL POST
(Dollars)

| PQtrs | PX8FWI96 | PX9FWI96 | PX25FWI96 |
|---|---|---|---|
| 1978:4 | 2.242848 | 8.035238 | 1.784358 |
| 1979:1 | 2.242848 | 8.035238 | 1.784358 |
| 1979:2 | 2.242848 | 8.035238 | 1.784358 |
| 1979:3 | 2.242848 | 8.035238 | 1.784358 |
| 1979:4 | 2.242848 | 8.035238 | 1.784358 |
| 1980:1 | 2.242848 | 8.035238 | 1.784358 |
| 1980:2 | 2.242848 | 8.035238 | 1.784358 |
| 1980:3 | 2.242848 | 8.035238 | 1.784358 |
| 1980:4 | 2.242848 | 8.035238 | 1.784358 |
| 1981:1 | 2.242848 | 8.035238 | 1.784358 |
| 1981:2 | 2.242848 | 8.035238 | 1.784358 |
| 1981:3 | 2.806778 | 9.717062 | 1.946035 |
| 1981:4 | 2.811083 | 9.729852 | 1.947270 |
| 1982:1 | 2.870792 | 9.828422 | 1.947270 |
| 1982:2 | 2.901677 | 9.879406 | 1.947270 |
| 1982:3 | 2.901677 | 9.879406 | 1.947270 |
| 1982:4 | 2.901677 | 9.879406 | 1.947270 |
| 1983:1 | 2.901677 | 9.879406 | 1.947270 |
| 1983:2 | 2.901677 | 9.879406 | 1.947270 |
| 1983:3 | 2.901677 | 9.879406 | 1.947270 |
| 1983:4 | 2.901677 | 9.879406 | 1.947270 |
| 1984:1 | 2.901677 | 9.879406 | 1.947270 |
| 1984:2 | 2.901677 | 9.879406 | 1.947270 |
| 1984:3 | 2.901677 | 9.879406 | 1.947270 |
| 1984:4 | 2.901677 | 9.879406 | 1.947270 |
| 1985:1 | 2.901677 | 9.879406 | 1.947270 |
| 1985:2 | 2.882609 | 10.361673 | 1.955532 |
| 1985:3 | 2.843142 | 11.359855 | 1.972633 |
| 1985:4 | 2.843142 | 11.359855 | 1.972633 |
| 1986:1 | 2.843142 | 11.359855 | 1.972633 |
| 1986:2 | 2.843142 | 11.359855 | 1.972633 |
| 1986:3 | 2.843142 | 11.359855 | 1.972633 |
| 1986:4 | 2.843142 | 11.359855 | 1.972633 |
| 1987:1 | 2.843142 | 11.359855 | 1.972633 |
| 1987:2 | 2.843142 | 11.359855 | 1.972633 |
| 1987:3 | 2.843142 | 11.359855 | 1.972633 |
| 1987:4 | 2.843142 | 11.359855 | 1.972633 |
| 1988:1 | 2.843142 | 11.359855 | 1.972633 |
| 1988:2 | 2.843142 | 11.359855 | 1.972633 |

(Table continued on next page)

TABLE A.2 (Continued)
POSTAL PRICES USED IN REGRESSIONS:
PRIORITY MAIL, EXPRESS MAIL, AND PARCEL POST
(Dollars)

| PQtrs | PX8FWI96 | PX9FWI96 | PX25FWI96 |
|---|---|---|---|
| 1988:3 | 2.843142 | 10.551732 | 2.204716 |
| 1988:4 | 2.843142 | 10.271363 | 2.285235 |
| 1989:1 | 2.843142 | 10.271363 | 2.285235 |
| 1989:2 | 2.843142 | 10.271363 | 2.285235 |
| 1989:3 | 2.843142 | 10.271363 | 2.285235 |
| 1989:4 | 2.843142 | 10.271363 | 2.285235 |
| 1990:1 | 2.843142 | 10.271363 | 2.285235 |
| 1990:2 | 2.843142 | 10.271363 | 2.285235 |
| 1990:3 | 2.843142 | 10.271363 | 2.285235 |
| 1990:4 | 2.843142 | 10.271363 | 2.285235 |
| 1991:1 | 2.843142 | 10.271363 | 2.285235 |
| 1991:2 | 3.057050 | 10.901962 | 2.456975 |
| 1991:3 | 3.398029 | 11.812827 | 2.705044 |
| 1991:4 | 3.398029 | 11.812827 | 2.705044 |
| 1992:1 | 3.398029 | 11.812827 | 2.705044 |
| 1992:2 | 3.398029 | 11.812827 | 2.705044 |
| 1992:3 | 3.398029 | 11.812827 | 2.705044 |
| 1992:4 | 3.398029 | 11.812827 | 2.705044 |
| 1993:1 | 3.398029 | 11.812827 | 2.705044 |
| 1993:2 | 3.398029 | 11.812827 | 2.705044 |
| 1993:3 | 3.398029 | 11.812827 | 2.705044 |
| 1993:4 | 3.398029 | 11.812827 | 2.705044 |
| 1994:1 | 3.398029 | 11.812827 | 2.705044 |
| 1994:2 | 3.398029 | 11.812827 | 2.705044 |
| 1994:3 | 3.398029 | 11.812827 | 2.705044 |
| 1994:4 | 3.398029 | 11.812827 | 2.705044 |
| 1995:1 | 3.398029 | 11.812827 | 2.705044 |
| 1995:2 | 3.506602 | 12.511127 | 3.087099 |
| 1995:3 | 3.544270 | 12.753395 | 3.219649 |
| 1995:4 | 3.543786 | 12.753395 | 3.219649 |
| 1996:1 | 3.541608 | 12.753395 | 3.219649 |
| 1996:2 | 3.541608 | 12.753395 | 3.219649 |
| 1996:3 | 3.541608 | 12.753395 | 3.219649 |
| 1996:4 | 3.541608 | 12.753395 | 3.219649 |
| 1997:1 | 3.541608 | 12.753395 | 3.219649 |
| 1997:2 | 3.541608 | 12.753395 | 3.219649 |
| 1997:3 | 3.541608 | 12.753395 | 3.219649 |
| 1997:4 | 3.541608 | 12.753395 | 3.219649 |

(Table continued on next page)

TABLE A.2 (Continued)
POSTAL PRICES USED IN REGRESSIONS:
PRIORITY MAIL, EXPRESS MAIL, AND PARCEL POST
(Dollars)

| PQtrs | PX8FWI96 | PX9FWI96 | PX25FWI96 |
|---|---|---|---|
| 1998:1 | 3.541608 | 12.753395 | 3.219649 |
| 1998:2 | 3.541608 | 12.753395 | 3.219649 |
| 1998:3 | 3.541608 | 12.753395 | 3.219649 |
| 1998:4 | 3.541608 | 12.753395 | 3.219649 |
| 1999:1 | 3.541608 | 12.753395 | 3.219649 |
| 1999:2 | 3.541608 | 12.753395 | 3.219649 |
| 1999:3 | 3.541608 | 12.753395 | 3.219649 |
| 1999:4 | 3.541608 | 12.753395 | 3.219649 |
| 2000:1 | 3.541608 | 12.753395 | 3.219649 |

DATA LEGEND

PX8FWI96 Priority Mail Fixed Weight Price Index based on 1996 billing determinants.
PX9FWI96 Express Mail Fixed Weight Price Index based on 1996 billing determinants.
PX25FWI96 Parcel Post Fixed Weight Price Index based on 1996 billing determinants.

TABLE A.3
GENERAL ECONOMIC VARIABLES USED IN REGRESSIONS

| PQtrs | PIDC | N22 | YPERM92 | YPCN92 | JS_PNS |
|---|---|---|---|---|---|
| 1969:1 | 0.274964 | 117.314983 | 18.956198 | NA | 105.144762 |
| 1969:2 | 0.277214 | 117.898930 | 19.092286 | NA | 100.798333 |
| 1969:3 | 0.280012 | 118.478000 | 19.226177 | NA | 101.818571 |
| 1969:4 | 0.283241 | 119.023093 | 19.378015 | NA | 94.751339 |
| 1970:1 | 0.286893 | 119.542243 | 19.522179 | 7.064580 | 93.580714 |
| 1970:2 | 0.290179 | 120.052772 | 19.651030 | 7.078107 | 88.491667 |
| 1970:3 | 0.292988 | 120.572000 | 19.787770 | 7.082356 | 79.093452 |
| 1970:4 | 0.296348 | 121.112679 | 19.923603 | 7.091243 | 79.397500 |
| 1971:1 | 0.300750 | 121.669294 | 20.040701 | 7.109308 | 87.302619 |
| 1971:2 | 0.303167 | 122.231762 | 20.170042 | 7.116075 | 97.178929 |
| 1971:3 | 0.306964 | 122.790000 | 20.301141 | 7.115871 | 101.535238 |
| 1971:4 | 0.310036 | 123.336739 | 20.421143 | 7.108710 | 98.423125 |
| 1972:1 | 0.312345 | 123.875957 | 20.534588 | 7.111110 | 96.873929 |
| 1972:2 | 0.315429 | 124.414447 | 20.635777 | 7.113965 | 105.589881 |
| 1972:3 | 0.317274 | 124.959000 | 20.741851 | 7.158319 | 108.162857 |
| 1972:4 | 0.320098 | 125.514866 | 20.882201 | 7.218859 | 109.168482 |
| 1973:1 | 0.323274 | 126.081128 | 21.079342 | 7.295558 | 114.978333 |
| 1973:2 | 0.327095 | 126.655326 | 21.267225 | 7.365532 | 114.857143 |
| 1973:3 | 0.333119 | 127.235000 | 21.445382 | 7.391263 | 107.724286 |
| 1973:4 | 0.339125 | 127.818452 | 21.614257 | 7.403129 | 105.561696 |
| 1974:1 | 0.346714 | 128.407030 | 21.796680 | 7.386380 | 100.839048 |
| 1974:2 | 0.356095 | 129.002843 | 21.912632 | 7.327640 | 95.682500 |
| 1974:3 | 0.365179 | 129.608000 | 21.979954 | 7.259742 | 90.881429 |
| 1974:4 | 0.375170 | 130.224106 | 22.040299 | 7.206034 | 76.249107 |
| 1975:1 | 0.385167 | 130.850752 | 22.071133 | 7.121641 | 69.498214 |
| 1975:2 | 0.390667 | 131.487021 | 22.073246 | 7.062429 | 78.813333 |
| 1975:3 | 0.395619 | 132.132000 | 22.158704 | 7.056888 | 88.500476 |
| 1975:4 | 0.403804 | 132.784904 | 22.203977 | 7.067991 | 88.160714 |
| 1976:1 | 0.411060 | 133.445464 | 22.256791 | 7.080324 | 89.351071 |
| 1976:2 | 0.414964 | 134.113542 | 22.322816 | 7.131387 | 99.471190 |
| 1976:3 | 0.418536 | 134.789000 | 22.385729 | 7.186269 | 101.560952 |
| 1976:4 | 0.425527 | 135.471545 | 22.447491 | 7.232749 | 103.857589 |
| 1977:1 | 0.433190 | 136.160268 | 22.509638 | 7.275005 | 102.662262 |
| 1977:2 | 0.440488 | 136.854107 | 22.554195 | 7.311408 | 101.895714 |
| 1977:3 | 0.447536 | 137.552000 | 22.607832 | 7.319978 | 99.100119 |
| 1977:4 | 0.454768 | 138.253573 | 22.683767 | 7.313111 | 97.943571 |
| 1978:1 | 0.461857 | 138.961213 | 22.769638 | 7.331786 | 93.961429 |
| 1978:2 | 0.469060 | 139.677997 | 22.856054 | 7.341004 | 89.460595 |
| 1978:3 | 0.478476 | 140.407000 | 22.960311 | 7.360087 | 95.063214 |

(Table continued on next page)

TABLE A.3 (Continued)
GENERAL ECONOMIC VARIABLES USED IN REGRESSIONS

| PQtrs | PIDC | N22 | YPERM92 | YPCN92 | JS_PNS |
|---|---|---|---|---|---|
| 1978:4 | 0.488277 | 141.150350 | 23.059655 | 7.387488 | 101.079732 |
| 1979:1 | 0.498143 | 141.906379 | 23.167260 | 7.427850 | 96.940357 |
| 1979:2 | 0.507821 | 142.672468 | 23.270494 | 7.446756 | 99.240476 |
| 1979:3 | 0.519071 | 143.446000 | 23.348741 | 7.439310 | 100.959048 |
| 1979:4 | 0.533429 | 144.223354 | 23.414878 | 7.438388 | 105.522054 |
| 1980:1 | 0.547429 | 144.996896 | 23.475628 | 7.441405 | 105.284048 |
| 1980:2 | 0.562857 | 145.757990 | 23.533658 | 7.421280 | 110.757857 |
| 1980:3 | 0.576607 | 146.498000 | 23.534465 | 7.367916 | 106.708810 |
| 1980:4 | 0.590679 | 147.211110 | 23.537809 | 7.312800 | 122.111964 |
| 1981:1 | 0.605262 | 147.902788 | 23.573941 | 7.265596 | 133.168333 |
| 1981:2 | 0.619262 | 148.581322 | 23.609681 | 7.235966 | 131.529405 |
| 1981:3 | 0.630429 | 149.255000 | 23.620571 | 7.208138 | 132.964048 |
| 1981:4 | 0.641911 | 149.930564 | 23.651409 | 7.191572 | 126.699107 |
| 1982:1 | 0.653214 | 150.608576 | 23.671912 | 7.174398 | 122.101786 |
| 1982:2 | 0.661060 | 151.288049 | 23.667496 | 7.153531 | 115.361667 |
| 1982:3 | 0.666512 | 151.968000 | 23.682615 | 7.126931 | 114.677738 |
| 1982:4 | 0.678018 | 152.647273 | 23.677527 | 7.103334 | 113.212411 |
| 1983:1 | 0.686571 | 153.324034 | 23.669632 | 7.098598 | 136.520000 |
| 1983:2 | 0.691512 | 153.996278 | 23.660352 | 7.097058 | 146.335714 |
| 1983:3 | 0.698929 | 154.662000 | 23.662940 | 7.105204 | 160.199286 |
| 1983:4 | 0.707902 | 155.319515 | 23.686274 | 7.136151 | 165.655179 |
| 1984:1 | 0.715536 | 155.968413 | 23.746498 | 7.173975 | 165.884881 |
| 1984:2 | 0.721702 | 156.608605 | 23.841114 | 7.203691 | 161.336429 |
| 1984:3 | 0.727667 | 157.240000 | 23.957077 | 7.239720 | 156.757262 |
| 1984:4 | 0.733688 | 157.863042 | 24.093294 | 7.279345 | 158.930536 |
| 1985:1 | 0.739810 | 158.480312 | 24.217766 | 7.300343 | 165.283571 |
| 1985:2 | 0.745893 | 159.094926 | 24.329690 | 7.316727 | 175.245833 |
| 1985:3 | 0.753774 | 159.710000 | 24.456705 | 7.334670 | 182.660119 |
| 1985:4 | 0.760554 | 160.327317 | 24.556957 | 7.344316 | 188.575357 |
| 1986:1 | 0.769024 | 160.943338 | 24.660347 | 7.358277 | 195.148333 |
| 1986:2 | 0.774571 | 161.553189 | 24.774025 | 7.381946 | 215.818214 |
| 1986:3 | 0.774298 | 162.152000 | 24.896386 | 7.419367 | 237.536548 |
| 1986:4 | 0.780732 | 162.735517 | 25.007121 | 7.443450 | 242.167857 |
| 1987:1 | 0.787345 | 163.301962 | 25.097227 | 7.471095 | 242.708690 |
| 1987:2 | 0.795548 | 163.850176 | 25.189553 | 7.494408 | 272.039048 |
| 1987:3 | 0.803036 | 164.379000 | 25.244260 | 7.514024 | 290.639048 |
| 1987:4 | 0.812223 | 164.888334 | 25.322182 | 7.518257 | 315.392411 |
| 1988:1 | 0.821750 | 165.382315 | 25.419347 | 7.519493 | 261.498095 |
| 1988:2 | 0.826560 | 165.866138 | 25.538394 | 7.527341 | 253.646071 |

(Table continued on next page)

TABLE A.3 (Continued)
GENERAL ECONOMIC VARIABLES USED IN REGRESSIONS

| PQtrs | PIDC | N22 | YPERM92 | YPCN92 | JS_PNS |
|---|---|---|---|---|---|
| 1988:3 | 0.834405 | 166.345000 | 25.646982 | 7.553262 | 261.248333 |
| 1988:4 | 0.846509 | 166.822569 | 25.758075 | 7.586676 | 267.748661 |
| 1989:1 | 0.857417 | 167.296403 | 25.864431 | 7.637473 | 274.166071 |
| 1989:2 | 0.866940 | 167.762536 | 25.978748 | 7.677436 | 287.556429 |
| 1989:3 | 0.879095 | 168.217000 | 26.073062 | 7.692572 | 304.686905 |
| 1989:4 | 0.887313 | 168.658657 | 26.161234 | 7.714300 | 336.968214 |
| 1990:1 | 0.896583 | 169.097697 | 26.242860 | 7.735315 | 345.037976 |
| 1990:2 | 0.907155 | 169.547138 | 26.337150 | 7.748459 | 338.274048 |
| 1990:3 | 0.918417 | 170.020000 | 26.429589 | 7.748026 | 342.974762 |
| 1990:4 | 0.932134 | 170.525614 | 26.510890 | 7.754041 | 343.652679 |
| 1991:1 | 0.947738 | 171.058559 | 26.560348 | 7.727684 | 314.531071 |
| 1991:2 | 0.955940 | 171.609725 | 26.589654 | 7.675769 | 342.862619 |
| 1991:3 | 0.961560 | 172.170000 | 26.619987 | 7.643473 | 377.030119 |
| 1991:4 | 0.969545 | 172.741061 | 26.651112 | 7.612268 | 383.493125 |
| 1992:1 | 0.978762 | 173.321945 | 26.672326 | 7.559823 | 386.827500 |
| 1992:2 | 0.986821 | 173.910174 | 26.712143 | 7.544692 | 408.334048 |
| 1992:3 | 0.994798 | 174.503274 | 26.759956 | 7.535458 | 409.949881 |
| 1992:4 | 1.001473 | 175.097613 | 26.801023 | 7.525709 | 414.578036 |
| 1993:1 | 1.010048 | 175.685583 | 26.858219 | 7.546130 | 420.077381 |
| 1993:2 | 1.016345 | 176.260814 | 26.899747 | 7.570113 | 438.372976 |
| 1993:3 | 1.023405 | 176.816939 | 26.922829 | 7.574144 | 445.994762 |
| 1993:4 | 1.026714 | 177.348912 | 26.954128 | 7.592665 | 451.148661 |
| 1994:1 | 1.033821 | 177.856987 | 26.991334 | 7.614229 | 463.062143 |
| 1994:2 | 1.038786 | 178.342742 | 27.015726 | 7.627144 | 470.322857 |
| 1994:3 | 1.045000 | 178.807755 | 27.054812 | 7.661774 | 453.738929 |
| 1994:4 | 1.052679 | 179.253946 | 27.119769 | 7.703480 | 458.077679 |
| 1995:1 | 1.060131 | 179.684596 | 27.194923 | 7.748835 | 462.411429 |
| 1995:2 | 1.064798 | 180.103329 | 27.281914 | 7.790850 | 469.168333 |
| 1995:3 | 1.072619 | 180.513767 | 27.356000 | 7.825052 | 507.911429 |
| 1995:4 | 1.077464 | 180.919484 | 27.443966 | 7.848767 | 554.391987 |
| 1996:1 | 1.081655 | 181.323853 | 27.545458 | 7.855528 | 589.696115 |
| 1996:2 | 1.086202 | 181.730195 | 27.649712 | 7.866837 | 626.975214 |
| 1996:3 | 1.094143 | 182.141835 | 27.738186 | 7.882311 | 651.151429 |
| 1996:4 | 1.099241 | 182.560576 | 27.849255 | 7.886141 | 660.414228 |
| 1997:1 | 1.105762 | 182.982146 | 27.960947 | 7.895855 | 711.293135 |
| 1997:2 | 1.110702 | 183.400755 | 28.091057 | 7.918302 | 770.105998 |
| 1997:3 | 1.128066 | 183.810613 | 28.165135 | 7.942280 | 798.169629 |
| 1997:4 | 1.135125 | 184.208212 | 28.239236 | 7.962772 | 801.836124 |

(Table continued on next page)

TABLE A.3 (Continued)
GENERAL ECONOMIC VARIABLES USED IN REGRESSIONS

| PQtrs | PIDC | N22 | YPERM92 | YPCN92 | JS_PNS |
|---|---|---|---|---|---|
| 1998:1 | 1.142449 | 184.599173 | 28.315846 | 7.987338 | 806.182500 |
| 1998:2 | 1.150017 | 184.991397 | 28.403594 | 8.013209 | 804.763257 |
| 1998:3 | 1.157925 | 185.392788 | 28.487632 | 8.034177 | 799.635415 |
| 1998:4 | 1.165693 | 185.809008 | 28.572373 | 8.052189 | 795.515922 |
| 1999:1 | 1.173747 | 186.236758 | 28.657758 | 8.070107 | 791.450931 |
| 1999:2 | 1.182060 | 186.670501 | 28.753890 | 8.091475 | 788.063033 |
| 1999:3 | 1.190472 | 187.104697 | 28.848261 | 8.109768 | 786.189939 |
| 1999:4 | 1.198832 | 187.535177 | 28.939984 | 8.125861 | 788.528953 |
| 2000:1 | 1.207409 | 187.963247 | 29.033466 | 8.141512 | 789.815428 |

DATA LEGEND

| | |
|---|---|
| PIDC | Price Deflator: Personal Consumption Expenditures (1992=1.0) (chained). |
| N22 | Civilian Population 22 Years and Older (Millions) |
| YPERM92 | Permanent Income per Adult in 1992 Dollars based on Disposable Income. |
| YPCN92 | Permanent Income per Adult in 1992 Dollars based on Personal Consumption Expenditures on Nondurable Goods. |
| JS_PNS | Standard and Poor's Composite Index of Common Stock Prices. |

TABLE A.4
ADDITIONAL VARIABLES USED IN REGRESSIONS (PART 1)

| PQtrs | AP | VOLWT | UPSMDLS | UPSPOTM | FEDQARR | UPSGFWI96 |
|---|---|---|---|---|---|---|
| 1969:1 | 3.000000 | NA | NA | 0.506000 | NA | NA |
| 1969:2 | 3.000000 | 1.080000 | NA | 0.506000 | NA | NA |
| 1969:3 | 3.000000 | 1.080000 | NA | 0.506000 | NA | 0.546053 |
| 1969:4 | 4.000000 | 1.080000 | NA | 0.506000 | NA | 0.546053 |
| 1970:1 | 3.000000 | 1.080000 | 56000 | 0.506000 | NA | 0.546053 |
| 1970:2 | 3.000000 | 1.080000 | 538 | 0.506000 | NA | 0.546053 |
| 1970:3 | 3.000000 | 1.080000 | 3946 | 0.506000 | NA | 0.546053 |
| 1970:4 | 4.000000 | 1.080000 | 57750 | 0.506000 | NA | 0.630521 |
| 1971:1 | 3.000000 | 1.080000 | 31476 | 0.506000 | NA | 0.668915 |
| 1971:2 | 3.000000 | 1.080000 | 198 | 0.506000 | NA | 0.688344 |
| 1971:3 | 3.000000 | 1.041000 | 52602 | 0.506000 | NA | 0.716408 |
| 1971:4 | 4.000000 | 1.000000 | 0 | 0.538000 | NA | 0.716408 |
| 1972:1 | 3.000000 | 1.000000 | 0 | 0.538000 | NA | 0.716408 |
| 1972:2 | 3.000000 | 1.000000 | 0 | 0.538000 | NA | 0.716408 |
| 1972:3 | 3.000000 | 1.000000 | 42000 | 0.538000 | NA | 0.716408 |
| 1972:4 | 4.000000 | 1.000000 | 0 | 0.538000 | NA | 0.716408 |
| 1973:1 | 3.000000 | 1.000000 | 0 | 0.538000 | NA | 0.716408 |
| 1973:2 | 3.000000 | 1.000000 | 0 | 0.538000 | NA | 0.716408 |
| 1973:3 | 3.000000 | 1.000000 | 0 | 0.538000 | NA | 0.716408 |
| 1973:4 | 4.000000 | 1.000000 | 11606 | 0.538000 | NA | 0.716408 |
| 1974:1 | 3.000000 | 1.000000 | 24447 | 0.541000 | NA | 0.716408 |
| 1974:2 | 3.000000 | 1.000000 | 0 | 0.541000 | NA | 0.716408 |
| 1974:3 | 3.000000 | 1.000000 | 0 | 0.541000 | NA | 0.765124 |
| 1974:4 | 4.000000 | 1.000000 | 174179 | 0.541000 | NA | 0.765124 |
| 1975:1 | 3.000000 | 1.000000 | 166077 | 0.541000 | NA | 0.765124 |
| 1975:2 | 3.000000 | 1.000000 | 0 | 0.541000 | NA | 0.855469 |
| 1975:3 | 3.000000 | 1.000000 | 0 | 0.541000 | NA | 0.856158 |
| 1975:4 | 4.000000 | 1.020000 | 0 | 0.741000 | NA | 0.856158 |
| 1976:1 | 3.000000 | 1.080000 | 0 | 0.969000 | NA | 0.856158 |
| 1976:2 | 3.000000 | 1.080000 | 0 | 0.969000 | NA | 0.856158 |
| 1976:3 | 3.000000 | 1.080000 | 149810 | 0.969000 | NA | 0.856158 |
| 1976:4 | 4.000000 | 1.080000 | 311480 | 0.969000 | NA | 0.873789 |
| 1977:1 | 3.000000 | 1.080000 | 629719 | 0.974000 | NA | 0.887821 |
| 1977:2 | 3.000000 | 1.080000 | 0 | 0.974000 | NA | 0.926563 |
| 1977:3 | 3.000000 | 1.080000 | 0 | 0.974000 | NA | 0.930437 |
| 1977:4 | 4.000000 | 1.080000 | 0 | 0.974000 | NA | 0.989258 |
| 1978:1 | 3.000000 | 1.080000 | 0 | 0.974000 | NA | 0.998100 |
| 1978:2 | 3.000000 | 1.080000 | 0 | 0.974000 | NA | 0.998100 |
| 1978:3 | 3.000000 | 1.061000 | 0 | 0.974000 | NA | 1.031886 |

(Table continued on next page)

TABLE A.4 (Continued)
ADDITIONAL VARIABLES USED IN REGRESSIONS (PART 1)

| PQtrs | AP | VOLWT | UPSMDLS | UPSPOTM | FEDQARR | UPSGFWI96 |
|---|---|---|---|---|---|---|
| 1978:4 | 4.000000 | 1.000000 | 0 | 0.974000 | 21.381250 | 1.056780 |
| 1979:1 | 3.000000 | 1.000000 | 0 | 0.974000 | 21.238690 | 1.056780 |
| 1979:2 | 3.000000 | 1.000000 | 0 | 0.974000 | 22.063690 | 1.056780 |
| 1979:3 | 3.000000 | 1.000000 | 0 | 0.974000 | 22.016190 | 1.109810 |
| 1979:4 | 4.000000 | 1.000000 | 0 | 0.974000 | 23.059464 | 1.171658 |
| 1980:1 | 3.000000 | 1.000000 | 0 | 0.990000 | 23.608333 | 1.225665 |
| 1980:2 | 3.000000 | 1.000000 | 7217 | 0.990000 | 23.550476 | 1.247425 |
| 1980:3 | 3.000000 | 1.000000 | 0 | 0.990000 | 25.137738 | 1.311463 |
| 1980:4 | 4.000000 | 1.000000 | 0 | 0.990000 | 24.988304 | 1.356974 |
| 1981:1 | 3.000000 | 1.000000 | 0 | 0.995000 | 26.876667 | 1.398752 |
| 1981:2 | 3.000000 | 1.000000 | 0 | 1.000000 | 26.565833 | 1.419641 |
| 1981:3 | 3.000000 | 1.000000 | 14700 | 1.000000 | 27.112738 | 1.455801 |
| 1981:4 | 4.000000 | 1.000000 | 0 | 1.000000 | 25.801429 | 1.489834 |
| 1982:1 | 3.000000 | 1.000000 | 0 | 1.000000 | 24.669643 | 1.477604 |
| 1982:2 | 3.000000 | 1.000000 | 0 | 1.000000 | 23.990833 | 1.471278 |
| 1982:3 | 3.000000 | 1.000000 | 0 | 1.000000 | 24.332500 | 1.515452 |
| 1982:4 | 4.000000 | 1.000000 | 25000 | 1.000000 | 23.914107 | 1.559626 |
| 1983:1 | 3.000000 | 1.000000 | 0 | 1.000000 | 23.351429 | 1.559626 |
| 1983:2 | 3.000000 | 1.000000 | 0 | 1.000000 | 22.998571 | 1.559626 |
| 1983:3 | 3.000000 | 1.000000 | 0 | 1.000000 | 23.307143 | 1.559626 |
| 1983:4 | 4.000000 | 1.000000 | 0 | 1.000000 | 22.306429 | 1.585249 |
| 1984:1 | 3.000000 | 1.000000 | 0 | 1.000000 | 21.465833 | 1.597206 |
| 1984:2 | 3.000000 | 1.000000 | 0 | 1.000000 | 20.536548 | 1.597206 |
| 1984:3 | 3.000000 | 1.000000 | 0 | 1.000000 | 19.489643 | 1.597206 |
| 1984:4 | 4.000000 | 1.000000 | 0 | 1.000000 | 19.464911 | 1.597206 |
| 1985:1 | 3.000000 | 1.000000 | 0 | 1.000000 | 19.360119 | 1.597206 |
| 1985:2 | 3.000000 | 1.000000 | 0 | 1.000000 | 18.919643 | 1.632329 |
| 1985:3 | 3.000000 | 1.000000 | 0 | 1.000000 | 18.935000 | 1.636496 |
| 1985:4 | 4.000000 | 1.000000 | 0 | 1.000000 | 18.610179 | 1.636496 |
| 1986:1 | 3.000000 | 1.000000 | 0 | 1.000000 | 17.631786 | 1.636496 |
| 1986:2 | 3.000000 | 1.000000 | 0 | 1.000000 | 17.385952 | 1.636496 |
| 1986:3 | 3.000000 | 1.000000 | 0 | 1.000000 | 17.034881 | 1.636496 |
| 1986:4 | 4.000000 | 1.000000 | 0 | 1.000000 | 17.031607 | 1.636496 |
| 1987:1 | 3.000000 | 1.000000 | 0 | 1.000000 | 16.823452 | 1.636496 |
| 1987:2 | 3.000000 | 1.000000 | 0 | 1.000000 | 16.480952 | 1.636496 |
| 1987:3 | 3.000000 | 1.000000 | 0 | 1.000000 | 16.227857 | 1.636496 |
| 1987:4 | 4.000000 | 1.000000 | 0 | 1.000000 | 16.063036 | 1.636496 |
| 1988:1 | 3.000000 | 1.000000 | 0 | 1.000000 | 15.756190 | 1.636496 |
| 1988:2 | 3.000000 | 1.000000 | 0 | 1.000000 | 15.324643 | 1.705487 |

(Table continued on next page)

TABLE A.4 (Continued)
ADDITIONAL VARIABLES USED IN REGRESSIONS (PART 1)

| PQtrs | AP | VOLWT | UPSMDLS | UPSPOTM | FEDQARR | UPSGFWI96 |
|---|---|---|---|---|---|---|
| 1988:3 | 3.000000 | 0.938000 | 0 | 1.000000 | 15.344048 | 1.776601 |
| 1988:4 | 4.000000 | 0.917000 | 0 | 1.000000 | 15.492500 | 1.776601 |
| 1989:1 | 3.000000 | 0.917000 | 0 | 1.000000 | 15.450476 | 1.776601 |
| 1989:2 | 3.000000 | 0.917000 | 0 | 1.000000 | 15.077738 | 1.840326 |
| 1989:3 | 3.000000 | 0.917000 | 0 | 1.000000 | 15.157024 | 1.932373 |
| 1989:4 | 4.000000 | 0.917000 | 0 | 1.000000 | 15.356339 | 1.932373 |
| 1990:1 | 3.000000 | 0.917000 | 0 | 1.000000 | 15.604405 | 1.932373 |
| 1990:2 | 3.000000 | 0.917000 | 0 | 1.000000 | 15.521071 | 1.990910 |
| 1990:3 | 3.000000 | 0.917000 | 0 | 1.000000 | 15.957262 | 2.112070 |
| 1990:4 | 4.000000 | 0.917000 | 0 | 1.000000 | 16.263750 | 2.112070 |
| 1991:1 | 3.000000 | 0.917000 | 0 | 1.000000 | 16.144286 | 2.112070 |
| 1991:2 | 3.000000 | 0.917000 | 0 | 1.000000 | 15.556548 | 2.184577 |
| 1991:3 | 3.000000 | 0.917000 | 0 | 1.000000 | 15.373333 | 2.411162 |
| 1991:4 | 4.000000 | 0.917000 | 0 | 1.000000 | 15.363750 | 2.411162 |
| 1992:1 | 3.000000 | 0.917000 | 0 | 1.000000 | 15.045357 | 2.411162 |
| 1992:2 | 3.000000 | 0.917000 | 0 | 1.000000 | 14.367024 | 2.452951 |
| 1992:3 | 3.000000 | 0.917000 | 0 | 1.000000 | 13.995000 | 2.673834 |
| 1992:4 | 4.000000 | 0.917000 | 0 | 1.000000 | 13.864196 | 2.673834 |
| 1993:1 | 3.000000 | 0.917000 | 0 | 1.000000 | 13.581667 | 2.673834 |
| 1993:2 | 3.000000 | 0.917000 | 0 | 1.000000 | 13.537500 | 2.737397 |
| 1993:3 | 3.000000 | 0.917000 | 0 | 1.000000 | 13.619762 | 2.936031 |
| 1993:4 | 4.000000 | 0.917000 | 0 | 1.000000 | 13.769375 | 2.936031 |
| 1994:1 | 3.000000 | 0.917000 | 0 | 1.000000 | 13.365833 | 2.936031 |
| 1994:2 | 3.000000 | 0.917000 | 40000 | 1.000000 | 13.017857 | 2.969516 |
| 1994:3 | 3.000000 | 0.917000 | 0 | 1.000000 | 13.166429 | 3.038823 |
| 1994:4 | 4.000000 | 0.917000 | 0 | 1.000000 | 13.123036 | 3.038823 |
| 1995:1 | 3.000000 | 0.917000 | 0 | 1.000000 | 12.604167 | 3.038823 |
| 1995:2 | 3.000000 | 0.917000 | 0 | 1.000000 | 12.269524 | 3.108895 |
| 1995:3 | 3.000000 | 0.917000 | 0 | 1.000000 | 12.431905 | 3.249038 |
| 1995:4 | 4.000000 | 0.917000 | 0 | 1.000000 | 12.686429 | 3.249038 |
| 1996:1 | 3.000000 | 0.917000 | 0 | 1.000000 | 12.599167 | 3.249038 |
| 1996:2 | 3.000000 | 0.917000 | 0 | 1.000000 | 12.485000 | 3.282164 |
| 1996:3 | 3.000000 | 0.917000 | 0 | 1.000000 | 12.878571 | 3.348415 |
| 1996:4 | 4.000000 | 0.917000 | 0 | 1.000000 | 12.964911 | 3.348415 |
| 1997:1 | 3.000000 | 0.917000 | 0 | 1.000000 | 12.493452 | 3.348415 |
| 1997:2 | 3.000000 | 0.917000 | 0 | 1.000000 | 12.531548 | 3.396628 |
| 1997:3 | 3.000000 | 0.917000 | 0 | 1.000000 | 12.743321 | 3.493054 |
| 1997:4 | 4.000000 | 0.917000 | 0 | 1.000000 | 12.743321 | 3.493054 |

(Table continued on next page)

TABLE A.4 (Continued)
ADDITIONAL VARIABLES USED IN REGRESSIONS (PART 1)

| PQtrs | AP | VOLWT | UPSMDLS | UPSPOTM | FEDQARR | UPSGFWI96 |
|---|---|---|---|---|---|---|
| 1998:1 | 3.000000 | 0.917000 | 0 | 1.000000 | 12.743321 | 3.493054 |
| 1998:2 | 3.000000 | 0.917000 | 0 | 1.000000 | 12.743321 | 3.523874 |
| 1998:3 | 3.000000 | 0.917000 | 0 | 1.000000 | 12.743321 | 3.585513 |
| 1998:4 | 4.000000 | 0.917000 | 0 | 1.000000 | 12.743321 | 3.585513 |
| 1999:1 | 3.000000 | 0.917000 | 0 | 1.000000 | 12.743321 | 3.585513 |
| 1999:2 | 3.000000 | 0.917000 | 0 | 1.000000 | 12.743321 | 3.619106 |
| 1999:3 | 3.000000 | 0.917000 | 0 | 1.000000 | 12.743321 | 3.686293 |
| 1999:4 | 4.000000 | 0.917000 | 0 | 1.000000 | 12.743321 | 3.686293 |
| 2000:1 | 3.000000 | 0.917000 | 0 | 1.000000 | 12.743321 | 3.686293 |

DATA LEGEND

| | |
|---|---|
| AP | Number of Accounting Periods in the Postal Quarter. |
| VOLWT | Adjusts for Different Minimum Weight Allowances in Priority Mail. |
| UPSMDLS | United Parcel Service's Mandays Lost due to Strikes. |
| UPSPOTM | United Parcel Service's Potential Market. |
| FEDQARR | Federal Express Average Revenue. |
| UPSGFWI96 | United Parcel Service's Ground Service Price Index using Priority Mail 96 Billing Determinants. |

TABLE A.4
ADDITIONAL VARIABLES USED IN REGRESSIONS (PART 2)

| PQtrs | DUPS | DNOGOV | ZVARIABLE | SIPM | SIEM |
|---|---|---|---|---|---|
| 1969:1 | 0.000000 | 1.000000 | NA | NA | NA |
| 1969:2 | 0.000000 | 1.000000 | NA | NA | NA |
| 1969:3 | 0.000000 | 1.000000 | NA | NA | NA |
| 1969:4 | 0.000000 | 1.000000 | NA | NA | NA |
| 1970:1 | 0.000000 | 1.000000 | NA | NA | NA |
| 1970:2 | 0.000000 | 1.000000 | NA | NA | NA |
| 1970:3 | 0.000000 | 1.000000 | NA | 0.006029 | NA |
| 1970:4 | 0.000000 | 1.000000 | NA | -0.041233 | NA |
| 1971:1 | 0.000000 | 1.000000 | NA | -0.002918 | NA |
| 1971:2 | 0.000000 | 1.000000 | NA | 0.037093 | NA |
| 1971:3 | 0.000000 | 1.000000 | NA | 0.006029 | NA |
| 1971:4 | 0.000000 | 1.000000 | NA | -0.041233 | NA |
| 1972:1 | 0.000000 | 1.000000 | NA | -0.002918 | NA |
| 1972:2 | 0.000000 | 1.000000 | NA | 0.037093 | NA |
| 1972:3 | 0.000000 | 1.000000 | NA | 0.006029 | NA |
| 1972:4 | 0.000000 | 1.000000 | NA | -0.041233 | NA |
| 1973:1 | 0.000000 | 1.000000 | NA | -0.001159 | NA |
| 1973:2 | 0.000000 | 1.000000 | NA | 0.037291 | NA |
| 1973:3 | 0.000000 | 1.000000 | NA | 0.004830 | NA |
| 1973:4 | 0.000000 | 1.000000 | NA | -0.043797 | NA |
| 1974:1 | 0.000000 | 1.000000 | NA | 0.004513 | NA |
| 1974:2 | 0.000000 | 1.000000 | NA | 0.035566 | NA |
| 1974:3 | 0.000000 | 1.000000 | NA | 0.002613 | NA |
| 1974:4 | 0.000000 | 1.000000 | NA | -0.047003 | NA |
| 1975:1 | 0.000000 | 1.000000 | NA | 0.014436 | NA |
| 1975:2 | 0.000000 | 1.000000 | NA | 0.029509 | NA |
| 1975:3 | 0.000000 | 1.000000 | NA | 0.002337 | NA |
| 1975:4 | 0.000000 | 1.000000 | NA | -0.052192 | NA |
| 1976:1 | 0.000000 | 1.000000 | NA | 0.029423 | NA |
| 1976:2 | 0.000000 | 1.000000 | NA | 0.017621 | NA |
| 1976:3 | 0.000000 | 1.000000 | NA | 0.003138 | NA |
| 1976:4 | 0.000000 | 1.000000 | NA | -0.053107 | NA |
| 1977:1 | 0.000000 | 1.000000 | NA | 0.040135 | NA |
| 1977:2 | 0.000000 | 1.000000 | NA | 0.004185 | NA |
| 1977:3 | 0.000000 | 1.000000 | NA | 0.011110 | NA |
| 1977:4 | 0.000000 | 1.000000 | NA | -0.058368 | NA |
| 1978:1 | 0.000000 | 1.000000 | NA | 0.048451 | NA |
| 1978:2 | 0.000000 | 1.000000 | NA | -0.006544 | NA |
| 1978:3 | 0.000000 | 1.000000 | NA | 0.018087 | NA |

(Table continued on next page)

TABLE A.4 (Continued)
ADDITIONAL VARIABLES USED IN REGRESSIONS (PART 2)

| PQtrs | DUPS | DNOGOV | ZVARIABLE | SIPM | SIEM |
|---|---|---|---|---|---|
| 1978:4 | 0.000000 | 1.000000 | NA | -0.058780 | NA |
| 1979:1 | 0.000000 | 1.000000 | NA | 0.048155 | NA |
| 1979:2 | 0.000000 | 1.000000 | NA | -0.011674 | NA |
| 1979:3 | 0.000000 | 1.000000 | NA | 0.025196 | NA |
| 1979:4 | 0.000000 | 1.000000 | 0.208579 | -0.061549 | -0.007841 |
| 1980:1 | 0.000000 | 1.000000 | 0.254869 | 0.048664 | -0.005969 |
| 1980:2 | 0.000000 | 1.000000 | 0.308668 | -0.014019 | -0.002822 |
| 1980:3 | 0.000000 | 1.000000 | 0.370008 | 0.025939 | 0.017032 |
| 1980:4 | 0.000000 | 1.000000 | 0.438437 | -0.058064 | -0.008346 |
| 1981:1 | 0.000000 | 1.000000 | 0.512938 | 0.046713 | -0.005628 |
| 1981:2 | 0.000000 | 1.000000 | 0.591933 | -0.017467 | -0.003918 |
| 1981:3 | 0.000000 | 1.000000 | 0.673379 | 0.029254 | 0.018540 |
| 1981:4 | 0.000000 | 1.000000 | 0.754962 | -0.058025 | -0.009042 |
| 1982:1 | 0.000000 | 1.000000 | 0.834351 | 0.049913 | -0.004664 |
| 1982:2 | 0.000000 | 1.000000 | 0.909460 | -0.024563 | -0.006815 |
| 1982:3 | 0.000000 | 1.000000 | 0.978650 | 0.029922 | 0.021554 |
| 1982:4 | 0.000000 | 1.000000 | 1.040840 | -0.053686 | -0.010361 |
| 1983:1 | 0.000000 | 1.000000 | 1.095515 | 0.053773 | -0.002747 |
| 1983:2 | 0.000000 | 1.000000 | 1.142655 | -0.033168 | -0.011107 |
| 1983:3 | 0.000000 | 1.000000 | 1.182621 | 0.029557 | 0.025207 |
| 1983:4 | 0.000000 | 1.000000 | 1.216024 | -0.051259 | -0.010579 |
| 1984:1 | 0.000000 | 1.000000 | 1.243611 | 0.062287 | -0.003131 |
| 1984:2 | 0.000000 | 1.000000 | 1.266171 | -0.040547 | -0.013839 |
| 1984:3 | 0.000000 | 1.000000 | 1.284470 | 0.023108 | 0.029145 |
| 1984:4 | 0.000000 | 1.000000 | 1.299217 | -0.046209 | -0.011500 |
| 1985:1 | 0.000000 | 1.000000 | 1.311039 | 0.069075 | -0.004645 |
| 1985:2 | 0.000000 | 1.000000 | 1.320475 | -0.043678 | -0.014180 |
| 1985:3 | 0.000000 | 1.000000 | 1.327981 | 0.016618 | 0.031876 |
| 1985:4 | 0.000000 | 1.000000 | 1.333937 | -0.044474 | -0.012191 |
| 1986:1 | 0.000000 | 1.000000 | 1.338652 | 0.073464 | -0.007483 |
| 1986:2 | 0.000000 | 1.000000 | 1.342378 | -0.041756 | -0.012164 |
| 1986:3 | 0.000000 | 1.000000 | 1.345319 | 0.011561 | 0.033173 |
| 1986:4 | 0.000000 | 1.000000 | 1.347638 | -0.046062 | -0.013802 |
| 1987:1 | 0.000000 | 1.000000 | 1.349465 | 0.073768 | -0.007979 |
| 1987:2 | 0.000000 | 1.000000 | 1.350903 | -0.034661 | -0.011246 |
| 1987:3 | 0.000000 | 1.000000 | 1.352035 | 0.009588 | 0.033565 |
| 1987:4 | 0.000000 | 1.000000 | 1.352925 | -0.052231 | -0.013963 |
| 1988:1 | 0.000000 | 1.000000 | 1.353625 | 0.072957 | -0.009704 |
| 1988:2 | 0.000000 | 1.000000 | 1.354175 | -0.025981 | -0.009232 |

(Table continued on next page)

TABLE A.4 (Continued)
ADDITIONAL VARIABLES USED IN REGRESSIONS (PART 2)

| PQtrs | DUPS | DNOGOV | ZVARIABLE | SIPM | SIEM |
|---|---|---|---|---|---|
| 1988:3 | 0.000000 | 1.000000 | 1.354608 | 0.008995 | 0.032849 |
| 1988:4 | 0.000000 | 1.000000 | 1.354948 | -0.058536 | -0.013153 |
| 1989:1 | 0.000000 | 1.000000 | 1.355215 | 0.070018 | -0.011534 |
| 1989:2 | 0.000000 | 1.000000 | 1.355424 | -0.017264 | -0.007887 |
| 1989:3 | 0.000000 | 1.000000 | 1.355589 | 0.008874 | 0.032196 |
| 1989:4 | 0.000000 | 1.000000 | 1.355718 | -0.060258 | -0.010658 |
| 1990:1 | 0.000000 | 1.000000 | 1.355820 | 0.062106 | -0.016274 |
| 1990:2 | 0.000000 | 1.000000 | 1.355900 | -0.009631 | -0.004493 |
| 1990:3 | 0.000000 | 1.000000 | 1.355963 | 0.011320 | 0.031123 |
| 1990:4 | 0.000000 | 1.000000 | 1.356012 | -0.062159 | -0.008044 |
| 1991:1 | 0.000000 | 1.000000 | 1.356051 | 0.054744 | -0.021365 |
| 1991:2 | 0.000000 | 1.000000 | 1.356081 | -0.002405 | -0.001350 |
| 1991:3 | 1.000000 | 1.000000 | 1.356105 | 0.011322 | 0.031440 |
| 1991:4 | 1.000000 | 1.000000 | 1.356124 | -0.062001 | -0.006285 |
| 1992:1 | 1.000000 | 1.000000 | 1.356138 | 0.049465 | -0.028501 |
| 1992:2 | 1.000000 | 1.000000 | 1.356150 | 0.002939 | 0.004508 |
| 1992:3 | 1.000000 | 1.000000 | 1.356159 | 0.009176 | 0.032404 |
| 1992:4 | 1.000000 | 1.000000 | 1.356166 | -0.060532 | -0.006950 |
| 1993:1 | 1.000000 | 1.000000 | 1.356172 | 0.047140 | -0.035341 |
| 1993:2 | 1.000000 | 1.000000 | 1.356176 | 0.005028 | 0.011721 |
| 1993:3 | 1.000000 | 1.000000 | 1.356180 | 0.006585 | 0.033394 |
| 1993:4 | 1.000000 | 1.000000 | 1.356182 | -0.055783 | -0.009487 |
| 1994:1 | 1.000000 | 0.000000 | 1.356185 | 0.042407 | -0.040774 |
| 1994:2 | 1.000000 | 0.000000 | 1.356186 | 0.006249 | 0.019259 |
| 1994:3 | 1.000000 | 0.000000 | 1.356188 | 0.007117 | 0.033414 |
| 1994:4 | 1.000000 | 0.000000 | 1.356189 | -0.053619 | -0.012520 |
| 1995:1 | 1.000000 | 0.000000 | 1.356189 | 0.038708 | -0.043389 |
| 1995:2 | 1.000000 | 0.000000 | 1.356190 | 0.007017 | 0.024390 |
| 1995:3 | 1.000000 | 0.000000 | 1.356191 | 0.008059 | 0.032856 |
| 1995:4 | 1.000000 | 0.000000 | 1.356191 | -0.052061 | -0.014616 |
| 1996:1 | 1.000000 | 0.000000 | 1.356191 | 0.035671 | -0.044148 |
| 1996:2 | 1.000000 | 0.000000 | 1.356191 | 0.008168 | 0.026980 |
| 1996:3 | 1.000000 | 0.000000 | 1.356192 | 0.008612 | 0.032336 |
| 1996:4 | 1.000000 | 0.000000 | 1.356192 | -0.052109 | -0.015582 |
| 1997:1 | 1.000000 | 0.000000 | 1.356192 | 0.034766 | -0.044106 |
| 1997:2 | 1.000000 | 0.000000 | 1.356192 | 0.009416 | 0.027873 |
| 1997:3 | 1.000000 | 0.000000 | 1.356192 | | |
| 1997:4 | 1.000000 | 0.000000 | 1.356192 | | |

(Table continued on next page)

TABLE A.4 (Continued)
ADDITIONAL VARIABLES USED IN REGRESSIONS (PART 2)

| PQtrs | DUPS | DNOGOV | ZVARIABLE | SIPM | SIEM |
|---|---|---|---|---|---|
| 1998:1 | 1.000000 | 0.000000 | 1.356192 | | |
| 1998:2 | 1.000000 | 0.000000 | 1.356192 | | |
| 1998:3 | 1.000000 | 0.000000 | 1.356192 | | |
| 1998:4 | 1.000000 | 0.000000 | 1.356192 | | |
| 1999:1 | 1.000000 | 0.000000 | 1.356192 | | |
| 1999:2 | 1.000000 | 0.000000 | 1.356192 | | |
| 1999:3 | 1.000000 | 0.000000 | 1.356192 | | |
| 1999:4 | 1.000000 | 0.000000 | 1.356192 | | |
| 2000:1 | 1.000000 | 0.000000 | 1.356192 | | |

DATA LEGEND

| | |
|---|---|
| DUPS | Binary shift variable 0 up to and including 91:2 when R90 rate increase took effect, 1 there after. |
| DNOGOV | Binary shift variable 1 up to and including 93:4 where Agency and Franked Mail is excluded. |
| ZVARIABLE | Logistic growth variable used in Express Mail Model. |
| SIPM | Seasonal Index used in Priority Mail Model. |
| SIEM | Seasonal Index used in Express Mail Model. |

TABLE A.5
VARIABLES USED TO CONSTUCT PERMANENT INCOME VARIABLES

| PQtrs | YD92C | CN92C |
|---|---|---|
| 1969:1 | 2326.00238 | 826.74458 |
| 1969:2 | 2327.26429 | 834.03892 |
| 1969:3 | 2351.53929 | 837.85545 |
| 1969:4 | 2400.16429 | 840.08575 |
| 1970:1 | 2418.54286 | 844.83595 |
| 1970:2 | 2426.30119 | 852.89874 |
| 1970:3 | 2461.78214 | 854.98836 |
| 1970:4 | 2487.66696 | 860.96268 |
| 1971:1 | 2491.14762 | 868.85658 |
| 1971:2 | 2532.19286 | 870.07973 |
| 1971:3 | 2561.36310 | 873.22742 |
| 1971:4 | 2574.02768 | 873.67913 |
| 1972:1 | 2591.11786 | 881.60087 |
| 1972:2 | 2600.01786 | 887.14205 |
| 1972:3 | 2630.01667 | 907.76050 |
| 1972:4 | 2699.71607 | 922.09275 |
| 1973:1 | 2804.11786 | 937.08295 |
| 1973:2 | 2828.70476 | 946.39317 |
| 1973:3 | 2851.76071 | 938.36333 |
| 1973:4 | 2874.38571 | 944.52903 |
| 1974:1 | 2926.82262 | 941.00332 |
| 1974:2 | 2873.16548 | 929.33795 |
| 1974:3 | 2835.02857 | 926.27843 |
| 1974:4 | 2847.44196 | 926.80464 |
| 1975:1 | 2828.25476 | 913.66596 |
| 1975:2 | 2806.30000 | 919.13400 |
| 1975:3 | 2935.88333 | 936.84110 |
| 1975:4 | 2905.36429 | 945.91327 |
| 1976:1 | 2936.21190 | 950.86319 |
| 1976:2 | 2976.34524 | 968.28835 |
| 1976:3 | 2995.53095 | 979.86869 |
| 1976:4 | 3017.29643 | 990.43574 |
| 1977:1 | 3041.30833 | 999.28527 |
| 1977:2 | 3039.76548 | 1005.65696 |
| 1977:3 | 3074.29286 | 1005.53823 |
| 1977:4 | 3129.48036 | 1006.54312 |
| 1978:1 | 3170.17857 | 1024.86764 |
| 1978:2 | 3198.91667 | 1028.74900 |
| 1978:3 | 3253.61667 | 1040.07274 |

(Table continued on next page)

TABLE A.5 (Continued)
VARIABLES USED TO CONSTUCT PERMANENT INCOME VARIABLES

| PQtrs | YD92C | CN92C |
|---|---|---|
| 1978:4 | 3277.78125 | 1049.57370 |
| 1979:1 | 3321.25476 | 1062.60725 |
| 1979:2 | 3347.47381 | 1066.35512 |
| 1979:3 | 3342.31905 | 1060.78190 |
| 1979:4 | 3353.00804 | 1070.97550 |
| 1980:1 | 3372.05952 | 1079.89490 |
| 1980:2 | 3394.15357 | 1077.01296 |
| 1980:3 | 3331.64048 | 1063.46058 |
| 1980:4 | 3351.89107 | 1058.67398 |
| 1981:1 | 3419.00000 | 1063.59400 |
| 1981:2 | 3439.25952 | 1073.59839 |
| 1981:3 | 3421.09048 | 1073.52630 |
| 1981:4 | 3469.53393 | 1074.87925 |
| 1982:1 | 3473.37857 | 1074.41675 |
| 1982:2 | 3452.48810 | 1075.62154 |
| 1982:3 | 3498.50714 | 1077.11099 |
| 1982:4 | 3484.00982 | 1079.08149 |
| 1983:1 | 3494.18571 | 1089.97843 |
| 1983:2 | 3506.09405 | 1094.13790 |
| 1983:3 | 3539.12500 | 1102.52279 |
| 1983:4 | 3588.36607 | 1118.84511 |
| 1984:1 | 3667.24286 | 1129.41855 |
| 1984:2 | 3747.92024 | 1135.81407 |
| 1984:3 | 3812.61905 | 1146.66461 |
| 1984:4 | 3878.95804 | 1158.16430 |
| 1985:1 | 3895.44881 | 1160.88088 |
| 1985:2 | 3908.74048 | 1167.13294 |
| 1985:3 | 3966.40714 | 1174.83049 |
| 1985:4 | 3956.39018 | 1178.92916 |
| 1986:1 | 3992.47500 | 1189.15962 |
| 1986:2 | 4041.17857 | 1199.84886 |
| 1986:3 | 4088.73690 | 1214.95706 |
| 1986:4 | 4102.83304 | 1217.19003 |
| 1987:1 | 4099.23810 | 1225.87987 |
| 1987:2 | 4131.07738 | 1232.55650 |
| 1987:3 | 4094.18929 | 1239.13002 |
| 1987:4 | 4155.75179 | 1240.16879 |
| 1988:1 | 4214.04167 | 1241.97752 |
| 1988:2 | 4280.02024 | 1250.91700 |

(Table continued on next page)

TABLE A.5 (Continued)
VARIABLES USED TO CONSTUCT PERMANENT INCOME VARIABLES

| PQtrs | YD92C | CN92C |
|---|---|---|
| 1988:3 | 4293.25119 | 1266.36355 |
| 1988:4 | 4327.46071 | 1277.96976 |
| 1989:1 | 4349.39048 | 1294.20235 |
| 1989:2 | 4392.75952 | 1296.79638 |
| 1989:3 | 4387.92857 | 1292.55505 |
| 1989:4 | 4403.94732 | 1305.33397 |
| 1990:1 | 4418.20000 | 1313.44448 |
| 1990:2 | 4465.83929 | 1319.02810 |
| 1990:3 | 4490.47857 | 1316.11310 |
| 1990:4 | 4499.13304 | 1321.10089 |
| 1991:1 | 4469.47619 | 1310.42619 |
| 1991:2 | 4455.78929 | 1298.43095 |
| 1991:3 | 4477.06786 | 1308.71071 |
| 1991:4 | 4498.41250 | 1307.73929 |
| 1992:1 | 4500.72857 | 1296.48095 |
| 1992:2 | 4553.51310 | 1311.63095 |
| 1992:3 | 4590.39286 | 1312.38690 |
| 1992:4 | 4601.72143 | 1317.47768 |
| 1993:1 | 4653.87619 | 1336.79524 |
| 1993:2 | 4649.87381 | 1340.48907 |
| 1993:3 | 4637.41905 | 1339.29062 |
| 1993:4 | 4670.61429 | 1351.20208 |
| 1994:1 | 4700.39643 | 1359.31529 |
| 1994:2 | 4695.66429 | 1365.37956 |
| 1994:3 | 4739.68929 | 1383.31632 |
| 1994:4 | 4806.94286 | 1393.40428 |
| 1995:1 | 4848.99167 | 1406.60988 |
| 1995:2 | 4895.73333 | 1414.76596 |
| 1995:3 | 4897.61905 | 1419.13014 |
| 1995:4 | 4947.92143 | 1424.86774 |
| 1996:1 | 5000.12143 | 1422.81038 |
| 1996:2 | 5034.40954 | 1432.86892 |
| 1996:3 | 5034.00114 | 1441.66593 |
| 1996:4 | 5104.45507 | 1440.11138 |
| 1997:1 | 5137.07218 | 1448.37149 |
| 1997:2 | 5204.05358 | 1458.99651 |
| 1997:3 | 5130.72389 | 1468.25310 |
| 1997:4 | 5155.04662 | 1474.07835 |

(Table continued on next page)

TABLE A.5 (Continued)
VARIABLES USED TO CONSTUCT PERMANENT INCOME VARIABLES

| PQtrs | YD92C | CN92C |
|---|---|---|
| 1998:1 | 5184.06215 | 1480.66663 |
| 1998:2 | 5230.38395 | 1489.31473 |
| 1998:3 | 5250.23361 | 1495.13687 |
| 1998:4 | 5278.47433 | 1501.25231 |
| 1999:1 | 5307.12761 | 1507.78283 |
| 1999:2 | 5355.93659 | 1516.85466 |
| 1999:3 | 5382.31089 | 1522.95969 |
| 1999:4 | 5406.58096 | 1528.24195 |
| 2000:1 | 5439.04388 | 1534.39976 |

DATA LEGEND

YD92C Disposable Personal Income in 1992 Dollars
CN92C Personal Consumption Expenditures on Nondurable Goods 1992 Dollars.

TABLE A.6
VARIABLES USED TO CONSTRUCT THE SEASONAL INDICES

| PQtrs | SCPM | SCEM |
|---|---|---|
| 1969:1 | NA | NA |
| 1969:2 | NA | NA |
| 1969:3 | NA | NA |
| 1969:4 | NA | NA |
| 1970:1 | NA | NA |
| 1970:2 | NA | NA |
| 1970:3 | -626.410 | NA |
| 1970:4 | 1176.850 | NA |
| 1971:1 | -5078.800 | NA |
| 1971:2 | 4425.400 | NA |
| 1971:3 | -626.410 | NA |
| 1971:4 | 1176.850 | NA |
| 1972:1 | -5078.800 | NA |
| 1972:2 | 4425.400 | NA |
| 1972:3 | -626.410 | NA |
| 1972:4 | 1176.850 | NA |
| 1973:1 | -4902.890 | NA |
| 1973:2 | 4445.270 | NA |
| 1973:3 | -746.330 | NA |
| 1973:4 | 920.520 | NA |
| 1974:1 | -4335.660 | NA |
| 1974:2 | 4272.690 | NA |
| 1974:3 | -968.010 | NA |
| 1974:4 | 599.870 | NA |
| 1975:1 | -3343.350 | NA |
| 1975:2 | 3667.070 | NA |
| 1975:3 | -995.650 | NA |
| 1975:4 | 81.000 | NA |
| 1976:1 | -1844.630 | NA |
| 1976:2 | 2478.210 | NA |
| 1976:3 | -915.510 | NA |
| 1976:4 | -10.530 | NA |
| 1977:1 | -773.480 | NA |
| 1977:2 | 1134.620 | NA |
| 1977:3 | -118.340 | NA |
| 1977:4 | -536.660 | NA |
| 1978:1 | 58.150 | NA |
| 1978:2 | 61.730 | NA |
| 1978:3 | 579.350 | NA |

(Table continued on next page)

TABLE A.6 (Continued)
VARIABLES USED TO CONSTRUCT THE SEASONAL INDICES

| PQtrs | SCPM | SCEM |
|---|---|---|
| 1978:4 | -577.830 | NA |
| 1979:1 | 28.530 | NA |
| 1979:2 | -451.250 | NA |
| 1979:3 | 1290.240 | NA |
| 1979:4 | -854.750 | 238.550 |
| 1980:1 | 79.490 | 1419.110 |
| 1980:2 | -685.770 | -538.140 |
| 1980:3 | 1364.540 | -1079.570 |
| 1980:4 | -506.210 | 188.010 |
| 1981:1 | -115.700 | 1453.230 |
| 1981:2 | -1030.620 | -647.760 |
| 1981:3 | 1696.050 | -928.700 |
| 1981:4 | -502.270 | 118.490 |
| 1982:1 | 204.370 | 1549.620 |
| 1982:2 | -1740.130 | -937.470 |
| 1982:3 | 1762.820 | -627.370 |
| 1982:4 | -68.390 | -13.400 |
| 1983:1 | 590.360 | 1741.300 |
| 1983:2 | -2600.640 | -1366.620 |
| 1983:3 | 1726.320 | -262.030 |
| 1983:4 | 174.240 | -35.280 |
| 1984:1 | 1441.720 | 1702.920 |
| 1984:2 | -3338.570 | -1639.800 |
| 1984:3 | 1081.480 | 131.720 |
| 1984:4 | 679.300 | -127.300 |
| 1985:1 | 2120.510 | 1551.550 |
| 1985:2 | -3651.670 | -1673.950 |
| 1985:3 | 432.400 | 404.870 |
| 1985:4 | 852.810 | -196.440 |
| 1986:1 | 2559.430 | 1267.740 |
| 1986:2 | -3459.430 | -1472.340 |
| 1986:3 | -73.220 | 534.610 |
| 1986:4 | 693.960 | -357.500 |
| 1987:1 | 2589.840 | 1218.120 |
| 1987:2 | -2749.950 | -1380.510 |
| 1987:3 | -270.510 | 573.770 |
| 1987:4 | 77.120 | -373.670 |
| 1988:1 | 2508.780 | 1045.640 |
| 1988:2 | -1881.940 | -1179.160 |

(Table continued on next page)

TABLE A.6 (Continued)
VARIABLES USED TO CONSTRUCT THE SEASONAL INDICES

| PQtrs | SCPM | SCEM |
|---|---|---|
| 1988:3 | -329.820 | 502.190 |
| 1988:4 | -553.390 | -292.640 |
| 1989:1 | 2214.890 | 862.640 |
| 1989:2 | -1010.270 | -1044.590 |
| 1989:3 | -341.950 | 436.860 |
| 1989:4 | -725.640 | -43.180 |
| 1990:1 | 1423.660 | 388.610 |
| 1990:2 | -246.950 | -705.220 |
| 1990:3 | -97.350 | 329.570 |
| 1990:4 | -915.760 | 218.300 |
| 1991:1 | 687.460 | -120.520 |
| 1991:2 | 475.650 | -390.940 |
| 1991:3 | -97.140 | 361.230 |
| 1991:4 | -899.910 | 394.180 |
| 1992:1 | 159.530 | -834.070 |
| 1992:2 | 1010.020 | 194.880 |
| 1992:3 | -311.730 | 457.660 |
| 1992:4 | -753.030 | 327.640 |
| 1993:1 | -73.000 | -1518.070 |
| 1993:2 | 1218.930 | 916.220 |
| 1993:3 | -570.820 | 556.620 |
| 1993:4 | -278.160 | 73.980 |
| 1994:1 | -546.220 | -2061.350 |
| 1994:2 | 1341.020 | 1669.950 |
| 1994:3 | -517.610 | 558.710 |
| 1994:4 | -61.700 | -229.360 |
| 1995:1 | -916.120 | -2322.860 |
| 1995:2 | 1417.830 | 2183.050 |
| 1995:3 | -423.490 | 502.880 |
| 1995:4 | 94.070 | -438.980 |
| 1996:1 | -1219.820 | -2398.790 |
| 1996:2 | 1532.920 | 2442.040 |
| 1996:3 | -368.160 | 450.820 |
| 1996:4 | 89.290 | -535.570 |
| 1997:1 | -1310.370 | -2394.550 |
| 1997:2 | 1657.680 | 2531.420 |

DATA LEGEND

| | |
|---|---|
| SCPM | Moving Seasonal Component of OLS Residuals of Priority Mail Model. |
| SCEM | Moving Seasonal Component of OLS Residuals of Express Mail Model. |

TABLE A.7
GENERAL ECONOMIC VARIABLES (MONTHLY DATA)

| Calendar | PIDC | YD92C | CN92C | JS_PNS |
|---|---|---|---|---|
| 1959:1 | 0.226000 | 1500.600000 | 595.590000 | 55.620000 |
| 1959:2 | 0.227000 | 1507.200000 | 597.744000 | 54.770000 |
| 1959:3 | 0.227000 | 1518.100000 | 606.640000 | 56.150000 |
| 1959:4 | 0.227000 | 1527.100000 | 596.938000 | 57.100000 |
| 1959:5 | 0.227000 | 1536.500000 | 608.451000 | 57.960000 |
| 1959:6 | 0.228000 | 1542.700000 | 609.072000 | 57.460000 |
| 1959:7 | 0.228000 | 1538.100000 | 604.776000 | 59.740000 |
| 1959:8 | 0.229000 | 1528.900000 | 606.534000 | 59.400000 |
| 1959:9 | 0.229000 | 1529.100000 | 612.879000 | 57.050000 |
| 1959:10 | 0.230000 | 1531.500000 | 612.337000 | 57.000000 |
| 1959:11 | 0.230000 | 1542.900000 | 609.641000 | 57.230000 |
| 1959:12 | 0.230000 | 1558.200000 | 614.532000 | 59.060000 |
| 1960:1 | 0.230000 | 1562.400000 | 613.434000 | 58.030000 |
| 1960:2 | 0.230000 | 1559.800000 | 607.129000 | 55.780000 |
| 1960:3 | 0.230000 | 1559.700000 | 615.708000 | 55.020000 |
| 1960:4 | 0.231000 | 1564.900000 | 628.120000 | 55.730000 |
| 1960:5 | 0.231000 | 1567.900000 | 612.483000 | 55.220000 |
| 1960:6 | 0.232000 | 1568.300000 | 617.228000 | 57.260000 |
| 1960:7 | 0.232000 | 1568.900000 | 618.814000 | 55.840000 |
| 1960:8 | 0.232000 | 1566.900000 | 613.884000 | 56.510000 |
| 1960:9 | 0.233000 | 1568.800000 | 612.165000 | 54.810000 |
| 1960:10 | 0.233000 | 1573.300000 | 617.757000 | 53.730000 |
| 1960:11 | 0.234000 | 1566.400000 | 618.497000 | 55.470000 |
| 1960:12 | 0.234000 | 1557.000000 | 610.064000 | 56.800000 |
| 1961:1 | 0.234000 | 1570.900000 | 615.113000 | 59.720000 |
| 1961:2 | 0.234000 | 1578.200000 | 617.810000 | 62.170000 |
| 1961:3 | 0.234000 | 1584.400000 | 625.450000 | 64.120000 |
| 1961:4 | 0.234000 | 1587.900000 | 624.062000 | 65.830000 |
| 1961:5 | 0.234000 | 1600.200000 | 625.767000 | 66.500000 |
| 1961:6 | 0.234000 | 1618.700000 | 627.922000 | 65.620000 |
| 1961:7 | 0.235000 | 1624.400000 | 623.044000 | 65.440000 |
| 1961:8 | 0.235000 | 1624.200000 | 626.388000 | 67.790000 |
| 1961:9 | 0.235000 | 1626.500000 | 629.561000 | 67.260000 |
| 1961:10 | 0.235000 | 1643.600000 | 631.385000 | 68.000000 |
| 1961:11 | 0.235000 | 1660.300000 | 635.522000 | 71.080000 |
| 1961:12 | 0.235000 | 1670.100000 | 638.893000 | 71.740000 |
| 1962:1 | 0.235000 | 1664.200000 | 639.686000 | 69.070000 |
| 1962:2 | 0.236000 | 1671.200000 | 638.324000 | 70.220000 |
| 1962:3 | 0.236000 | 1682.000000 | 644.101000 | 70.290000 |

(Table continued on next page)

TABLE A.7 (Continued)
GENERAL ECONOMIC VARIABLES (MONTHLY DATA)

| Calendar | PIDC | YD92C | CN92C | JS_PNS |
|---|---|---|---|---|
| 1962:4 | 0.236000 | 1687.100000 | 644.207000 | 68.050000 |
| 1962:5 | 0.237000 | 1688.700000 | 647.167000 | 62.990000 |
| 1962:6 | 0.237000 | 1691.900000 | 640.241000 | 55.630000 |
| 1962:7 | 0.237000 | 1699.600000 | 643.929000 | 56.970000 |
| 1962:8 | 0.237000 | 1701.000000 | 647.128000 | 58.520000 |
| 1962:9 | 0.238000 | 1701.000000 | 654.993000 | 58.000000 |
| 1962:10 | 0.238000 | 1706.200000 | 649.269000 | 56.170000 |
| 1962:11 | 0.238000 | 1712.400000 | 654.041000 | 60.040000 |
| 1962:12 | 0.238000 | 1719.800000 | 654.728000 | 62.640000 |
| 1963:1 | 0.239000 | 1732.600000 | 656.024000 | 65.060000 |
| 1963:2 | 0.239000 | 1720.000000 | 651.781000 | 65.920000 |
| 1963:3 | 0.239000 | 1726.200000 | 658.006000 | 65.670000 |
| 1963:4 | 0.239000 | 1734.100000 | 657.663000 | 68.760000 |
| 1963:5 | 0.239000 | 1740.400000 | 655.878000 | 70.140000 |
| 1963:6 | 0.240000 | 1752.500000 | 660.452000 | 70.110000 |
| 1963:7 | 0.240000 | 1752.300000 | 661.523000 | 69.070000 |
| 1963:8 | 0.241000 | 1759.900000 | 667.590000 | 70.980000 |
| 1963:9 | 0.241000 | 1772.500000 | 660.492000 | 72.850000 |
| 1963:10 | 0.241000 | 1785.200000 | 659.328000 | 73.030000 |
| 1963:11 | 0.241000 | 1787.600000 | 661.456000 | 72.620000 |
| 1963:12 | 0.241000 | 1803.600000 | 670.167000 | 74.170000 |
| 1964:1 | 0.242000 | 1809.500000 | 669.493000 | 76.450000 |
| 1964:2 | 0.242000 | 1814.200000 | 677.094000 | 77.390000 |
| 1964:3 | 0.242000 | 1857.100000 | 682.262000 | 78.800000 |
| 1964:4 | 0.242000 | 1866.400000 | 679.671000 | 79.940000 |
| 1964:5 | 0.243000 | 1875.200000 | 692.295000 | 80.720000 |
| 1964:6 | 0.243000 | 1882.900000 | 694.502000 | 80.240000 |
| 1964:7 | 0.243000 | 1890.000000 | 699.023000 | 83.220000 |
| 1964:8 | 0.243000 | 1902.800000 | 704.204000 | 82.000000 |
| 1964:9 | 0.244000 | 1910.700000 | 700.715000 | 83.410000 |
| 1964:10 | 0.244000 | 1911.500000 | 703.795000 | 84.850000 |
| 1964:11 | 0.244000 | 1921.600000 | 695.018000 | 85.440000 |
| 1964:12 | 0.245000 | 1941.100000 | 712.307000 | 83.960000 |
| 1965:1 | 0.245000 | 1942.500000 | 710.364000 | 86.120000 |
| 1965:2 | 0.245000 | 1941.600000 | 717.832000 | 86.750000 |
| 1965:3 | 0.246000 | 1947.300000 | 707.496000 | 86.830000 |
| 1965:4 | 0.246000 | 1952.400000 | 719.524000 | 87.970000 |
| 1965:5 | 0.246000 | 1975.000000 | 723.860000 | 89.280000 |
| 1965:6 | 0.247000 | 1978.600000 | 716.299000 | 85.040000 |

(Table continued on next page)

TABLE A.7 (Continued)
GENERAL ECONOMIC VARIABLES (MONTHLY DATA)

| Calendar | PIDC | YD92C | CN92C | JS_PNS |
|---|---|---|---|---|
| 1965:7 | 0.247000 | 1997.500000 | 728.394000 | 84.910000 |
| 1965:8 | 0.248000 | 2007.100000 | 727.812000 | 86.490000 |
| 1965:9 | 0.248000 | 2064.100000 | 734.210000 | 89.380000 |
| 1965:10 | 0.248000 | 2053.200000 | 756.337000 | 91.390000 |
| 1965:11 | 0.248000 | 2067.400000 | 753.086000 | 92.150000 |
| 1965:12 | 0.249000 | 2075.100000 | 756.879000 | 91.730000 |
| 1966:1 | 0.249000 | 2075.300000 | 759.668000 | 93.320000 |
| 1966:2 | 0.250000 | 2082.800000 | 763.118000 | 92.690000 |
| 1966:3 | 0.251000 | 2088.400000 | 764.374000 | 88.880000 |
| 1966:4 | 0.252000 | 2082.000000 | 771.261000 | 91.600000 |
| 1966:5 | 0.252000 | 2085.300000 | 764.890000 | 86.780000 |
| 1966:6 | 0.253000 | 2095.900000 | 770.944000 | 86.060000 |
| 1966:7 | 0.253000 | 2103.500000 | 779.086000 | 85.840000 |
| 1966:8 | 0.254000 | 2115.000000 | 770.150000 | 80.650000 |
| 1966:9 | 0.255000 | 2126.900000 | 773.362000 | 77.810000 |
| 1966:10 | 0.256000 | 2136.100000 | 769.053000 | 77.130000 |
| 1966:11 | 0.256000 | 2145.200000 | 772.199000 | 80.990000 |
| 1966:12 | 0.257000 | 2142.900000 | 772.305000 | 81.330000 |
| 1967:1 | 0.257000 | 2163.600000 | 776.535000 | 84.450000 |
| 1967:2 | 0.257000 | 2165.600000 | 776.760000 | 87.360000 |
| 1967:3 | 0.257000 | 2181.700000 | 778.531000 | 89.420000 |
| 1967:4 | 0.258000 | 2182.900000 | 780.963000 | 90.960000 |
| 1967:5 | 0.259000 | 2187.400000 | 779.192000 | 92.590000 |
| 1967:6 | 0.259000 | 2196.200000 | 782.814000 | 91.430000 |
| 1967:7 | 0.260000 | 2203.700000 | 775.596000 | 93.010000 |
| 1967:8 | 0.261000 | 2211.200000 | 781.346000 | 94.490000 |
| 1967:9 | 0.262000 | 2210.300000 | 787.546000 | 95.810000 |
| 1967:10 | 0.263000 | 2211.700000 | 776.984000 | 95.660000 |
| 1967:11 | 0.264000 | 2224.000000 | 784.545000 | 92.660000 |
| 1967:12 | 0.264000 | 2242.600000 | 795.913000 | 95.300000 |
| 1968:1 | 0.265000 | 2245.600000 | 795.516000 | 95.040000 |
| 1968:2 | 0.266000 | 2260.100000 | 800.116000 | 90.750000 |
| 1968:3 | 0.267000 | 2281.000000 | 813.163000 | 89.090000 |
| 1968:4 | 0.268000 | 2289.700000 | 809.131000 | 95.670000 |
| 1968:5 | 0.269000 | 2300.700000 | 810.506000 | 97.870000 |
| 1968:6 | 0.270000 | 2310.600000 | 819.587000 | 100.530000 |
| 1968:7 | 0.271000 | 2304.900000 | 827.174000 | 100.300000 |
| 1968:8 | 0.272000 | 2306.700000 | 828.906000 | 98.110000 |

(Table continued on next page)

TABLE A.7 (Continued)
GENERAL ECONOMIC VARIABLES (MONTHLY DATA)

| Calendar | PIDC | YD92C | CN92C | JS_PNS |
|---|---|---|---|---|
| 1968:9 | 0.273000 | 2305.100000 | 821.385000 | 101.340000 |
| 1968:10 | 0.274000 | 2317.900000 | 822.587000 | 103.760000 |
| 1968:11 | 0.275000 | 2324.300000 | 832.699000 | 105.400000 |
| 1968:12 | 0.275000 | 2331.500000 | 821.794000 | 106.480000 |
| 1969:1 | 0.276000 | 2324.600000 | 829.633000 | 102.040000 |
| 1969:2 | 0.277000 | 2325.600000 | 836.533000 | 101.460000 |
| 1969:3 | 0.278000 | 2330.400000 | 834.444000 | 99.300000 |
| 1969:4 | 0.279000 | 2328.600000 | 836.572000 | 101.260000 |
| 1969:5 | 0.280000 | 2354.700000 | 842.640000 | 104.620000 |
| 1969:6 | 0.281000 | 2370.000000 | 833.598000 | 99.140000 |
| 1969:7 | 0.282000 | 2387.500000 | 836.956000 | 94.710000 |
| 1969:8 | 0.283000 | 2401.900000 | 844.517000 | 94.180000 |
| 1969:9 | 0.284000 | 2405.500000 | 835.845000 | 94.510000 |
| 1969:10 | 0.285000 | 2416.000000 | 846.341000 | 95.520000 |
| 1969:11 | 0.286000 | 2417.200000 | 844.067000 | 96.210000 |
| 1969:12 | 0.288000 | 2420.800000 | 842.230000 | 91.110000 |
| 1970:1 | 0.289000 | 2419.200000 | 854.034000 | 90.310000 |
| 1970:2 | 0.290000 | 2423.400000 | 851.033000 | 87.160000 |
| 1970:3 | 0.291000 | 2429.200000 | 854.166000 | 88.650000 |
| 1970:4 | 0.292000 | 2475.500000 | 848.892000 | 85.950000 |
| 1970:5 | 0.293000 | 2459.800000 | 857.352000 | 76.060000 |
| 1970:6 | 0.294000 | 2449.900000 | 858.501000 | 75.590000 |
| 1970:7 | 0.295000 | 2481.900000 | 857.153000 | 75.720000 |
| 1970:8 | 0.296000 | 2490.600000 | 859.493000 | 77.920000 |
| 1970:9 | 0.297000 | 2496.200000 | 865.401000 | 82.580000 |
| 1970:10 | 0.299000 | 2486.600000 | 863.485000 | 84.370000 |
| 1970:11 | 0.300000 | 2481.800000 | 865.058000 | 84.280000 |
| 1970:12 | 0.302000 | 2492.600000 | 874.086000 | 90.050000 |
| 1971:1 | 0.302000 | 2529.100000 | 872.909000 | 93.490000 |
| 1971:2 | 0.303000 | 2528.500000 | 872.962000 | 97.110000 |
| 1971:3 | 0.304000 | 2537.300000 | 865.216000 | 99.600000 |
| 1971:4 | 0.306000 | 2540.300000 | 872.579000 | 103.040000 |
| 1971:5 | 0.307000 | 2548.100000 | 870.861000 | 101.640000 |
| 1971:6 | 0.308000 | 2601.400000 | 876.888000 | 99.720000 |
| 1971:7 | 0.309000 | 2562.000000 | 871.270000 | 99.000000 |
| 1971:8 | 0.310000 | 2573.600000 | 874.443000 | 97.240000 |
| 1971:9 | 0.311000 | 2579.100000 | 874.866000 | 99.400000 |
| 1971:10 | 0.311000 | 2580.500000 | 873.636000 | 97.290000 |

(Table continued on next page)

TABLE A.7 (Continued)
GENERAL ECONOMIC VARIABLES (MONTHLY DATA)

| Calendar | PIDC | YD92C | CN92C | JS_PNS |
|---|---|---|---|---|
| 1971:11 | 0.312000 | 2586.500000 | 882.466000 | 92.780000 |
| 1971:12 | 0.313000 | 2602.200000 | 886.088000 | 99.170000 |
| 1972:1 | 0.314000 | 2586.100000 | 876.227000 | 103.300000 |
| 1972:2 | 0.316000 | 2601.400000 | 882.268000 | 105.240000 |
| 1972:3 | 0.316000 | 2609.500000 | 900.152000 | 107.690000 |
| 1972:4 | 0.317000 | 2623.200000 | 901.712000 | 108.810000 |
| 1972:5 | 0.317000 | 2643.600000 | 910.648000 | 107.650000 |
| 1972:6 | 0.318000 | 2620.600000 | 911.758000 | 108.010000 |
| 1972:7 | 0.319000 | 2670.500000 | 917.693000 | 107.210000 |
| 1972:8 | 0.320000 | 2701.800000 | 920.442000 | 111.010000 |
| 1972:9 | 0.321000 | 2714.500000 | 923.985000 | 109.390000 |
| 1972:10 | 0.322000 | 2772.900000 | 937.719000 | 109.560000 |
| 1972:11 | 0.323000 | 2805.700000 | 935.828000 | 115.050000 |
| 1972:12 | 0.324000 | 2819.700000 | 936.476000 | 117.500000 |
| 1973:1 | 0.325000 | 2810.400000 | 946.086000 | 118.420000 |
| 1973:2 | 0.327000 | 2832.100000 | 950.435000 | 114.160000 |
| 1973:3 | 0.329000 | 2841.400000 | 942.887000 | 112.420000 |
| 1973:4 | 0.332000 | 2841.600000 | 938.578000 | 110.270000 |
| 1973:5 | 0.333000 | 2855.300000 | 936.807000 | 107.220000 |
| 1973:6 | 0.335000 | 2861.100000 | 940.058000 | 104.750000 |
| 1973:7 | 0.336000 | 2863.200000 | 956.092000 | 105.830000 |
| 1973:8 | 0.340000 | 2862.000000 | 933.661000 | 103.800000 |
| 1973:9 | 0.341000 | 2882.800000 | 946.284000 | 105.610000 |
| 1973:10 | 0.343000 | 2923.100000 | 941.327000 | 109.840000 |
| 1973:11 | 0.346000 | 2934.300000 | 945.134000 | 102.030000 |
| 1973:12 | 0.349000 | 2925.200000 | 937.494000 | 94.780000 |
| 1974:1 | 0.352000 | 2901.000000 | 935.683000 | 96.110000 |
| 1974:2 | 0.356000 | 2872.700000 | 929.325000 | 93.450000 |
| 1974:3 | 0.360000 | 2847.700000 | 923.443000 | 97.440000 |
| 1974:4 | 0.362000 | 2835.000000 | 927.329000 | 92.460000 |
| 1974:5 | 0.366000 | 2834.800000 | 925.888000 | 89.670000 |
| 1974:6 | 0.369000 | 2834.200000 | 925.624000 | 89.790000 |
| 1974:7 | 0.371000 | 2858.400000 | 929.722000 | 82.820000 |
| 1974:8 | 0.375000 | 2846.300000 | 929.960000 | 76.030000 |
| 1974:9 | 0.379000 | 2840.700000 | 922.795000 | 68.120000 |
| 1974:10 | 0.382000 | 2849.000000 | 921.592000 | 69.440000 |
| 1974:11 | 0.385000 | 2825.700000 | 916.318000 | 71.740000 |
| 1974:12 | 0.387000 | 2819.400000 | 905.797000 | 67.070000 |

(Table continued on next page)

TABLE A.7 (Continued)
GENERAL ECONOMIC VARIABLES (MONTHLY DATA)

| Calendar | PIDC | YD92C | CN92C | JS_PNS |
|---|---|---|---|---|
| 1975:1 | 0.389000 | 2807.000000 | 915.618000 | 72.560000 |
| 1975:2 | 0.391000 | 2806.200000 | 919.028000 | 80.100000 |
| 1975:3 | 0.392000 | 2805.700000 | 922.756000 | 83.780000 |
| 1975:4 | 0.394000 | 2858.900000 | 919.306000 | 84.720000 |
| 1975:5 | 0.396000 | 3031.100000 | 948.544000 | 90.100000 |
| 1975:6 | 0.398000 | 2923.300000 | 947.117000 | 92.400000 |
| 1975:7 | 0.402000 | 2881.200000 | 943.892000 | 92.490000 |
| 1975:8 | 0.404000 | 2903.600000 | 948.624000 | 85.710000 |
| 1975:9 | 0.406000 | 2916.600000 | 946.218000 | 84.670000 |
| 1975:10 | 0.408000 | 2934.100000 | 941.658000 | 88.570000 |
| 1975:11 | 0.411000 | 2934.500000 | 951.915000 | 90.070000 |
| 1975:12 | 0.413000 | 2937.700000 | 954.850000 | 88.700000 |
| 1976:1 | 0.414000 | 2961.000000 | 969.94500 | 96.860000 |
| 1976:2 | 0.415000 | 2979.000000 | 964.57800 | 100.640000 |
| 1976:3 | 0.416000 | 2990.500000 | 970.57900 | 101.080000 |
| 1976:4 | 0.417000 | 2994.900000 | 980.86300 | 101.930000 |
| 1976:5 | 0.419000 | 2996.100000 | 975.24500 | 101.160000 |
| 1976:6 | 0.421000 | 2997.000000 | 988.75500 | 101.770000 |
| 1976:7 | 0.423000 | 3016.600000 | 987.48600 | 104.200000 |
| 1976:8 | 0.426000 | 3020.800000 | 991.04100 | 103.290000 |
| 1976:9 | 0.428000 | 3022.300000 | 991.64900 | 105.450000 |
| 1976:10 | 0.431000 | 3018.100000 | 997.49200 | 101.890000 |
| 1976:11 | 0.433000 | 3046.400000 | 995.19200 | 101.190000 |
| 1976:12 | 0.435000 | 3053.600000 | 1004.57700 | 104.660000 |
| 1977:1 | 0.438000 | 3045.000000 | 1005.50200 | 103.810000 |
| 1977:2 | 0.441000 | 3015.100000 | 1008.51600 | 100.960000 |
| 1977:3 | 0.443000 | 3060.900000 | 1002.64700 | 100.570000 |
| 1977:4 | 0.446000 | 3068.600000 | 1006.37500 | 99.050000 |
| 1977:5 | 0.448000 | 3074.000000 | 1007.96100 | 98.760000 |
| 1977:6 | 0.451000 | 3089.600000 | 1000.66400 | 99.290000 |
| 1977:7 | 0.453000 | 3120.200000 | 1009.75800 | 100.180000 |
| 1977:8 | 0.455000 | 3133.300000 | 1003.90300 | 97.750000 |
| 1977:9 | 0.457000 | 3147.500000 | 1005.85900 | 96.230000 |
| 1977:10 | 0.459000 | 3150.500000 | 1017.84800 | 93.740000 |
| 1977:11 | 0.462000 | 3173.100000 | 1030.93400 | 94.280000 |
| 1977:12 | 0.464000 | 3183.000000 | 1024.41700 | 93.820000 |
| 1978:1 | 0.467000 | 3174.800000 | 1016.98900 | 90.250000 |
| 1978:2 | 0.469000 | 3196.800000 | 1030.43200 | 88.980000 |

(Table continued on next page)

TABLE A.7 (Continued)
GENERAL ECONOMIC VARIABLES (MONTHLY DATA)

| Calendar | PIDC | YD92C | CN92C | JS_PNS |
|---|---|---|---|---|
| 1978:3 | 0.472000 | 3233.200000 | 1042.15600 | 88.820000 |
| 1978:4 | 0.476000 | 3253.700000 | 1036.48600 | 92.710000 |
| 1978:5 | 0.480000 | 3256.400000 | 1040.95400 | 97.410000 |
| 1978:6 | 0.483000 | 3257.000000 | 1044.17900 | 97.660000 |
| 1978:7 | 0.486000 | 3268.200000 | 1043.72900 | 97.190000 |
| 1978:8 | 0.489000 | 3281.300000 | 1048.02500 | 103.920000 |
| 1978:9 | 0.491000 | 3287.300000 | 1059.20800 | 103.860000 |
| 1978:10 | 0.495000 | 3310.000000 | 1052.18900 | 100.580000 |
| 1978:11 | 0.498000 | 3318.700000 | 1062.51300 | 94.710000 |
| 1978:12 | 0.501000 | 3333.600000 | 1071.68600 | 96.110000 |
| 1979:1 | 0.505000 | 3339.600000 | 1062.73700 | 99.710000 |
| 1979:2 | 0.508000 | 3346.400000 | 1065.57900 | 98.230000 |
| 1979:3 | 0.512000 | 3360.600000 | 1071.71300 | 100.110000 |
| 1979:4 | 0.516000 | 3343.200000 | 1054.14500 | 102.070000 |
| 1979:5 | 0.521000 | 3340.000000 | 1059.26100 | 99.730000 |
| 1979:6 | 0.525000 | 3335.600000 | 1071.36900 | 101.730000 |
| 1979:7 | 0.530000 | 3355.400000 | 1058.82500 | 102.710000 |
| 1979:8 | 0.534000 | 3360.000000 | 1074.95100 | 107.360000 |
| 1979:9 | 0.539000 | 3350.600000 | 1078.54600 | 108.600000 |
| 1979:10 | 0.543000 | 3361.500000 | 1075.05700 | 104.470000 |
| 1979:11 | 0.547000 | 3372.400000 | 1085.06300 | 103.660000 |
| 1979:12 | 0.552000 | 3381.500000 | 1078.85000 | 107.780000 |
| 1980:1 | 0.558000 | 3412.500000 | 1082.67000 | 110.870000 |
| 1980:2 | 0.564000 | 3394.500000 | 1076.08800 | 115.340000 |
| 1980:3 | 0.570000 | 3368.400000 | 1069.67700 | 104.690000 |
| 1980:4 | 0.574000 | 3337.800000 | 1065.05000 | 102.970000 |
| 1980:5 | 0.579000 | 3318.200000 | 1062.28800 | 107.690000 |
| 1980:6 | 0.582000 | 3321.200000 | 1057.80700 | 114.550000 |
| 1980:7 | 0.587000 | 3351.100000 | 1056.78900 | 119.830000 |
| 1980:8 | 0.592000 | 3350.700000 | 1062.68400 | 123.500000 |
| 1980:9 | 0.597000 | 3366.400000 | 1056.41900 | 126.510000 |
| 1980:10 | 0.601000 | 3401.200000 | 1064.17800 | 130.220000 |
| 1980:11 | 0.606000 | 3416.200000 | 1059.12900 | 135.650000 |
| 1980:12 | 0.609000 | 3441.400000 | 1068.11700 | 133.480000 |
| 1981:1 | 0.615000 | 3444.400000 | 1079.56400 | 132.970000 |
| 1981:2 | 0.621000 | 3433.300000 | 1070.97200 | 128.400000 |
| 1981:3 | 0.626000 | 3439.100000 | 1069.39900 | 133.190000 |
| 1981:4 | 0.629000 | 3416.400000 | 1073.97300 | 134.430000 |

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TABLE A.7 (Continued)
GENERAL ECONOMIC VARIABLES (MONTHLY DATA)

| Calendar | PIDC | YD92C | CN92C | JS_PNS |
|---|---|---|---|---|
| 1981:5 | 0.632000 | 3416.100000 | 1072.33400 | 131.730000 |
| 1981:6 | 0.634000 | 3429.200000 | 1079.27300 | 132.280000 |
| 1981:7 | 0.639000 | 3476.700000 | 1073.76100 | 129.130000 |
| 1981:8 | 0.643000 | 3482.100000 | 1074.92500 | 129.630000 |
| 1981:9 | 0.648000 | 3472.500000 | 1073.36500 | 118.270000 |
| 1981:10 | 0.650000 | 3482.200000 | 1074.67300 | 119.800000 |
| 1981:11 | 0.654000 | 3476.500000 | 1070.89300 | 122.920000 |
| 1981:12 | 0.656000 | 3459.400000 | 1078.34800 | 123.790000 |
| 1982:1 | 0.660000 | 3446.500000 | 1069.91500 | 117.280000 |
| 1982:2 | 0.662000 | 3452.200000 | 1081.89100 | 114.500000 |
| 1982:3 | 0.663000 | 3460.500000 | 1074.83200 | 110.840000 |
| 1982:4 | 0.664000 | 3515.700000 | 1080.39700 | 116.310000 |
| 1982:5 | 0.668000 | 3504.000000 | 1077.42300 | 116.350000 |
| 1982:6 | 0.673000 | 3477.600000 | 1069.75600 | 109.700000 |
| 1982:7 | 0.677000 | 3491.000000 | 1084.50800 | 109.380000 |
| 1982:8 | 0.679000 | 3485.300000 | 1077.81900 | 109.650000 |
| 1982:9 | 0.681000 | 3479.500000 | 1080.31800 | 122.430000 |
| 1982:10 | 0.685000 | 3484.400000 | 1090.08600 | 132.660000 |
| 1982:11 | 0.687000 | 3495.800000 | 1086.67600 | 138.100000 |
| 1982:12 | 0.688000 | 3504.400000 | 1093.97200 | 139.370000 |
| 1983:1 | 0.691000 | 3501.700000 | 1091.58000 | 144.270000 |
| 1983:2 | 0.692000 | 3501.800000 | 1090.57500 | 146.800000 |
| 1983:3 | 0.693000 | 3521.000000 | 1104.15000 | 151.880000 |
| 1983:4 | 0.698000 | 3535.100000 | 1097.71300 | 157.710000 |
| 1983:5 | 0.701000 | 3547.500000 | 1102.93400 | 164.100000 |
| 1983:6 | 0.703000 | 3548.800000 | 1113.56200 | 166.390000 |
| 1983:7 | 0.706000 | 3596.700000 | 1119.41700 | 166.960000 |
| 1983:8 | 0.709000 | 3582.300000 | 1118.13500 | 162.420000 |
| 1983:9 | 0.712000 | 3612.400000 | 1122.51000 | 167.160000 |
| 1983:10 | 0.714000 | 3640.300000 | 1126.27800 | 167.650000 |
| 1983:11 | 0.716000 | 3667.900000 | 1132.60900 | 165.230000 |
| 1983:12 | 0.717000 | 3702.700000 | 1129.49000 | 164.360000 |
| 1984:1 | 0.720000 | 3728.800000 | 1145.98600 | 166.390000 |
| 1984:2 | 0.723000 | 3760.100000 | 1128.51200 | 157.250000 |
| 1984:3 | 0.725000 | 3785.500000 | 1132.50300 | 157.440000 |
| 1984:4 | 0.727000 | 3813.700000 | 1145.08700 | 157.600000 |
| 1984:5 | 0.729000 | 3816.700000 | 1149.95200 | 156.550000 |
| 1984:6 | 0.730000 | 3843.600000 | 1166.39500 | 153.120000 |

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TABLE A.7 (Continued)
GENERAL ECONOMIC VARIABLES (MONTHLY DATA)

| Calendar | PIDC | YD92C | CN92C | JS_PNS |
|---|---|---|---|---|
| 1984:7 | 0.732000 | 3862.500000 | 1151.76200 | 151.080000 |
| 1984:8 | 0.735000 | 3889.400000 | 1153.05800 | 164.420000 |
| 1984:9 | 0.737000 | 3913.400000 | 1164.43900 | 166.110000 |
| 1984:10 | 0.739000 | 3881.200000 | 1152.31800 | 164.820000 |
| 1984:11 | 0.740000 | 3900.400000 | 1167.49200 | 166.270000 |
| 1984:12 | 0.741000 | 3907.700000 | 1163.73800 | 164.480000 |
| 1985:1 | 0.744000 | 3935.000000 | 1163.28900 | 171.610000 |
| 1985:2 | 0.747000 | 3897.900000 | 1172.62100 | 180.880000 |
| 1985:3 | 0.751000 | 3875.400000 | 1167.09600 | 179.420000 |
| 1985:4 | 0.753000 | 3945.400000 | 1176.97000 | 180.620000 |
| 1985:5 | 0.755000 | 4038.000000 | 1177.80300 | 184.900000 |
| 1985:6 | 0.758000 | 3947.400000 | 1170.17600 | 188.890000 |
| 1985:7 | 0.759000 | 3956.100000 | 1174.56400 | 192.540000 |
| 1985:8 | 0.761000 | 3958.900000 | 1182.38900 | 188.310000 |
| 1985:9 | 0.764000 | 3961.500000 | 1187.42500 | 184.060000 |
| 1985:10 | 0.766000 | 3989.400000 | 1185.73300 | 186.180000 |
| 1985:11 | 0.770000 | 3984.200000 | 1192.80500 | 197.450000 |
| 1985:12 | 0.773000 | 4014.300000 | 1189.26300 | 207.260000 |
| 1986:1 | 0.775000 | 4027.700000 | 1198.33100 | 208.190000 |
| 1986:2 | 0.775000 | 4045.200000 | 1197.48500 | 219.370000 |
| 1986:3 | 0.774000 | 4084.100000 | 1216.25500 | 232.330000 |
| 1986:4 | 0.773000 | 4089.400000 | 1210.28000 | 237.980000 |
| 1986:5 | 0.775000 | 4090.800000 | 1218.19800 | 238.460000 |
| 1986:6 | 0.778000 | 4087.900000 | 1217.92000 | 245.300000 |
| 1986:7 | 0.779000 | 4105.600000 | 1219.04400 | 240.180000 |
| 1986:8 | 0.781000 | 4108.300000 | 1215.22300 | 245.000000 |
| 1986:9 | 0.785000 | 4106.800000 | 1216.65100 | 238.270000 |
| 1986:10 | 0.786000 | 4097.000000 | 1227.83400 | 237.360000 |
| 1986:11 | 0.788000 | 4097.400000 | 1221.31700 | 245.090000 |
| 1986:12 | 0.789000 | 4104.200000 | 1231.83900 | 248.610000 |
| 1987:1 | 0.794000 | 4120.900000 | 1221.25100 | 264.510000 |
| 1987:2 | 0.798000 | 4144.800000 | 1244.63400 | 280.930000 |
| 1987:3 | 0.800000 | 4150.600000 | 1234.16500 | 292.470000 |
| 1987:4 | 0.802000 | 3989.700000 | 1239.20100 | 289.320000 |
| 1987:5 | 0.805000 | 4153.600000 | 1241.64700 | 289.120000 |
| 1987:6 | 0.808000 | 4149.700000 | 1240.97300 | 301.380000 |
| 1987:7 | 0.810000 | 4148.200000 | 1239.58500 | 310.090000 |
| 1987:8 | 0.814000 | 4162.500000 | 1241.44900 | 329.360000 |

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TABLE A.7 (Continued)
GENERAL ECONOMIC VARIABLES (MONTHLY DATA)

| Calendar | PIDC | YD92C | CN92C | JS_PNS |
|---|---|---|---|---|
| 1987:9 | 0.817000 | 4162.800000 | 1238.50100 | 318.660000 |
| 1987:10 | 0.820000 | 4201.100000 | 1238.91100 | 280.160000 |
| 1987:11 | 0.823000 | 4213.600000 | 1241.11800 | 245.010000 |
| 1987:12 | 0.824000 | 4251.300000 | 1249.65700 | 240.960000 |
| 1988:1 | 0.826000 | 4264.500000 | 1247.48900 | 250.480000 |
| 1988:2 | 0.827000 | 4300.200000 | 1248.34900 | 258.130000 |
| 1988:3 | 0.830000 | 4304.500000 | 1268.83700 | 265.740000 |
| 1988:4 | 0.834000 | 4275.700000 | 1261.79200 | 262.610000 |
| 1988:5 | 0.837000 | 4300.400000 | 1268.87700 | 256.120000 |
| 1988:6 | 0.841000 | 4319.900000 | 1269.61700 | 270.680000 |
| 1988:7 | 0.845000 | 4328.900000 | 1274.29600 | 269.050000 |
| 1988:8 | 0.848000 | 4330.500000 | 1283.68100 | 263.730000 |
| 1988:9 | 0.853000 | 4330.300000 | 1285.02900 | 267.970000 |
| 1988:10 | 0.856000 | 4345.500000 | 1292.48400 | 277.400000 |
| 1988:11 | 0.858000 | 4346.500000 | 1298.48500 | 271.020000 |
| 1988:12 | 0.861000 | 4370.700000 | 1293.51500 | 276.510000 |
| 1989:1 | 0.866000 | 4381.300000 | 1304.85700 | 285.410000 |
| 1989:2 | 0.869000 | 4407.000000 | 1292.64300 | 294.010000 |
| 1989:3 | 0.873000 | 4421.500000 | 1288.36000 | 292.710000 |
| 1989:4 | 0.879000 | 4372.600000 | 1291.50600 | 302.250000 |
| 1989:5 | 0.883000 | 4379.100000 | 1295.97400 | 313.930000 |
| 1989:6 | 0.884000 | 4402.200000 | 1299.34500 | 323.730000 |
| 1989:7 | 0.887000 | 4404.700000 | 1299.05400 | 331.930000 |
| 1989:8 | 0.888000 | 4408.000000 | 1309.28500 | 346.610000 |
| 1989:9 | 0.891000 | 4399.400000 | 1316.23800 | 347.330000 |
| 1989:10 | 0.895000 | 4405.100000 | 1309.41700 | 347.400000 |
| 1989:11 | 0.898000 | 4429.000000 | 1311.69100 | 340.220000 |
| 1989:12 | 0.900000 | 4433.700000 | 1323.78500 | 348.570000 |
| 1990:1 | 0.906000 | 4465.300000 | 1312.70000 | 339.970000 |
| 1990:2 | 0.910000 | 4479.800000 | 1322.20000 | 330.450000 |
| 1990:3 | 0.915000 | 4481.400000 | 1322.50000 | 338.470000 |
| 1990:4 | 0.918000 | 4501.500000 | 1317.20000 | 338.180000 |
| 1990:5 | 0.921000 | 4486.100000 | 1310.30000 | 350.250000 |
| 1990:6 | 0.926000 | 4495.300000 | 1323.20000 | 360.390000 |
| 1990:7 | 0.929000 | 4514.400000 | 1322.70000 | 360.030000 |
| 1990:8 | 0.935000 | 4491.200000 | 1321.40000 | 330.750000 |
| 1990:9 | 0.941000 | 4493.600000 | 1315.40000 | 315.410000 |
| 1990:10 | 0.947000 | 4463.800000 | 1310.00000 | 307.120000 |

(Table continued on next page)

TABLE A.7 (Continued)
GENERAL ECONOMIC VARIABLES (MONTHLY DATA)

| Calendar | PIDC | YD92C | CN92C | JS_PNS |
|---|---|---|---|---|
| 1990:11 | 0.949000 | 4463.800000 | 1313.40000 | 315.290000 |
| 1990:12 | 0.951000 | 4478.700000 | 1301.80000 | 328.750000 |
| 1991:1 | 0.956000 | 4449.600000 | 1293.20000 | 325.490000 |
| 1991:2 | 0.958000 | 4447.100000 | 1298.90000 | 362.260000 |
| 1991:3 | 0.959000 | 4461.500000 | 1309.90000 | 372.280000 |
| 1991:4 | 0.961000 | 4477.500000 | 1304.40000 | 379.680000 |
| 1991:5 | 0.964000 | 4488.200000 | 1312.00000 | 377.990000 |
| 1991:6 | 0.966000 | 4511.900000 | 1307.80000 | 378.290000 |
| 1991:7 | 0.968000 | 4490.600000 | 1313.00000 | 380.230000 |
| 1991:8 | 0.971000 | 4492.600000 | 1305.80000 | 389.400000 |
| 1991:9 | 0.975000 | 4499.300000 | 1302.50000 | 387.200000 |
| 1991:10 | 0.977000 | 4492.500000 | 1295.00000 | 386.880000 |
| 1991:11 | 0.980000 | 4497.500000 | 1296.30000 | 385.920000 |
| 1991:12 | 0.983000 | 4528.900000 | 1295.80000 | 388.510000 |
| 1992:1 | 0.986000 | 4545.800000 | 1317.50000 | 416.080000 |
| 1992:2 | 0.989000 | 4571.700000 | 1315.50000 | 412.560000 |
| 1992:3 | 0.992000 | 4579.300000 | 1310.10000 | 407.360000 |
| 1992:4 | 0.995000 | 4588.900000 | 1310.80000 | 407.410000 |
| 1992:5 | 0.997000 | 4601.500000 | 1316.00000 | 414.810000 |
| 1992:6 | 0.999000 | 4609.000000 | 1309.20000 | 408.270000 |
| 1992:7 | 1.003000 | 4599.100000 | 1314.70000 | 415.050000 |
| 1992:8 | 1.000000 | 4592.100000 | 1324.40000 | 417.930000 |
| 1992:9 | 1.006000 | 4610.700000 | 1324.30000 | 418.480000 |
| 1992:10 | 1.010000 | 4631.800000 | 1336.10000 | 412.500000 |
| 1992:11 | 1.011000 | 4643.900000 | 1340.20000 | 422.840000 |
| 1992:12 | 1.012000 | 4790.400000 | 1343.10000 | 435.640000 |
| 1993:1 | 1.016000 | 4609.400000 | 1340.77100 | 435.230000 |
| 1993:2 | 1.019000 | 4604.000000 | 1340.24200 | 441.700000 |
| 1993:3 | 1.021000 | 4595.600000 | 1329.68100 | 450.160000 |
| 1993:4 | 1.024000 | 4646.800000 | 1341.53700 | 443.080000 |
| 1993:5 | 1.025000 | 4666.200000 | 1345.80700 | 445.250000 |
| 1993:6 | 1.025000 | 4661.200000 | 1346.28300 | 448.060000 |
| 1993:7 | 1.026000 | 4664.000000 | 1351.43800 | 447.290000 |
| 1993:8 | 1.028000 | 4683.100000 | 1352.49500 | 454.130000 |
| 1993:9 | 1.029000 | 4677.300000 | 1358.04700 | 459.240000 |
| 1993:10 | 1.034000 | 4680.400000 | 1357.78300 | 463.900000 |
| 1993:11 | 1.035000 | 4689.500000 | 1360.91500 | 462.890000 |
| 1993:12 | 1.036000 | 4825.100000 | 1360.91500 | 465.950000 |

(Table continued on next page)

TABLE A.7 (Continued)
GENERAL ECONOMIC VARIABLES (MONTHLY DATA)

| Calendar | PIDC | YD92C | CN92C | JS_PNS |
|---|---|---|---|---|
| 1994:1 | 1.038000 | 4620.500000 | 1354.24000 | 472.990000 |
| 1994:2 | 1.041000 | 4681.600000 | 1378.06000 | 471.580000 |
| 1994:3 | 1.044000 | 4697.100000 | 1386.38700 | 463.810000 |
| 1994:4 | 1.045000 | 4721.400000 | 1381.41700 | 447.230000 |
| 1994:5 | 1.046000 | 4802.600000 | 1382.35600 | 450.900000 |
| 1994:6 | 1.048000 | 4804.000000 | 1387.85400 | 454.830000 |
| 1994:7 | 1.052000 | 4803.800000 | 1391.54200 | 451.400000 |
| 1994:8 | 1.056000 | 4806.600000 | 1397.88700 | 464.240000 |
| 1994:9 | 1.058000 | 4820.300000 | 1401.49600 | 466.960000 |
| 1994:10 | 1.060000 | 4849.900000 | 1406.75700 | 463.810000 |
| 1994:11 | 1.061000 | 4853.100000 | 1407.92000 | 461.010000 |
| 1994:12 | 1.061000 | 4876.800000 | 1409.69100 | 455.190000 |
| 1995:1 | 1.065000 | 4902.700000 | 1420.58300 | 465.250000 |
| 1995:2 | 1.067000 | 4901.700000 | 1412.04400 | 481.920000 |
| 1995:3 | 1.070000 | 4906.900000 | 1417.27800 | 493.150000 |
| 1995:4 | 1.073000 | 4877.100000 | 1415.61300 | 507.910000 |
| 1995:5 | 1.075000 | 4911.300000 | 1425.18300 | 523.810000 |
| 1995:6 | 1.076000 | 4933.000000 | 1428.02500 | 539.350000 |
| 1995:7 | 1.077000 | 4952.400000 | 1422.61800 | 557.366500 |
| 1995:8 | 1.079000 | 4950.300000 | 1421.61400 | 559.111000 |
| 1995:9 | 1.079000 | 4975.800000 | 1429.82200 | 578.770000 |
| 1995:10 | 1.082000 | 4992.400000 | 1416.44600 | 582.918182 |
| 1995:11 | 1.082000 | 5010.800000 | 1424.25800 | 595.530000 |
| 1995:12 | 1.084000 | 5035.600000 | 1428.89700 | 614.570000 |
| 1996:1 | 1.086000 | 5023.100000 | 1426.28000 | 614.420000 |
| 1996:2 | 1.088000 | 5045.200000 | 1442.84200 | 649.542000 |
| 1996:3 | 1.091000 | 5044.701000 | 1439.26000 | 647.070000 |
| 1996:4 | 1.095000 | 5000.047000 | 1442.80300 | 647.170000 |
| 1996:5 | 1.097000 | 5063.069000 | 1443.25200 | 661.230000 |
| 1996:6 | 1.097000 | 5100.458000 | 1436.56400 | 668.499000 |
| 1996:7 | 1.100000 | 5092.238000 | 1438.48000 | 644.070455 |
| 1996:8 | 1.100000 | 5117.502000 | 1441.89100 | 662.682273 |
| 1996:9 | 1.102000 | 5133.985000 | 1446.25300 | 674.883000 |
| 1996:10 | 1.106000 | 5123.236000 | 1449.88800 | 701.455652 |
| 1996:11 | 1.107000 | 5145.882000 | 1448.13000 | 735.699000 |
| 1996:12 | 1.109000 | 5173.257000 | 1447.74600 | 743.252857 |

(Table continued on next page)

TABLE A.7 (Continued)
GENERAL ECONOMIC VARIABLES (MONTHLY DATA)

| Calendar | PIDC | YD92C | CN92C | JS_PNS |
|---|---|---|---|---|
| 1997:1 | 1.110000 | 5203.448000 | 1462.59100 | 766.216818 |
| 1997:2 | 1.113000 | 5232.221000 | 1465.06200 | 798.387895 |

DATA LEGEND

| | |
|---|---|
| PIDC | Implicit Price Deflator: Personal Consumption Expenditures (1992=1.0) |
| YD92C | Disposable Personal Income in 1992 Dollars |
| CN92C | Personal Consumption Expenditures on Nondurable Goods 1992 Dollars. |
| JS_PNS | Standard and Poor's Composite Index of Common Stock Prices. |

# APPENDIX B: FORECAST ERROR ANALYSIS

# PRIORITY MAIL FORECAST ERROR ANALYSIS

Forecast Errors From Forecasts Using Base Period 91Q3- 92Q2

| Year | Fall | Winter | Spring | Summer |
|---|---|---|---|---|
| 92 | | | 0.036813 | -0.029915 |
| 93 | -0.017517 | -0.001062 | 0.040011 | -0.063138 |
| 94 | -0.019836 | -0.047012 | 0.081619 | -0.030910 |
| 95 | -0.019122 | 0.049499 | 0.015802 | -0.060525 |
| 96 | -0.039163 | -0.003485 | -0.007241 | 0.017278 |
| 97 | -0.021800 | 0.031312 | | |

SPLY Differences of Forecast Errors:

| Year | Fall | Winter | Spring | Summer |
|---|---|---|---|---|
| 92 | | | 0.036813 | -0.029915 |
| 93 | -0.017517 | -0.001062 | 0.003198 | -0.033223 |
| 94 | -0.002319 | -0.045950 | 0.041608 | 0.032228 |
| 95 | 0.000714 | 0.096511 | -0.065817 | -0.029616 |
| 96 | -0.020041 | -0.052984 | -0.023043 | 0.077803 |
| 97 | 0.017363 | 0.034797 | | |

4-Quarter Averages of SPLY Differences:

| Begin | End | |
|---|---|---|
| 1992:3 | 1993:2 | -0.002920 |
| 1992:4 | 1993:3 | -0.011324 |
| 1993:1 | 1993:4 | -0.012151 |
| 1993:2 | 1994:1 | -0.008351 |
| 1993:3 | 1994:2 | -0.019574 |
| 1993:4 | 1994:3 | -0.009971 |
| 1994:1 | 1994:4 | 0.006392 |
| 1994:2 | 1995:1 | 0.007150 |
| 1994:3 | 1995:2 | 0.042765 |
| 1994:4 | 1995:3 | 0.015909 |
| 1995:1 | 1995:4 | 0.000448 |
| 1995:2 | 1996:1 | -0.004741 |
| 1995:3 | 1996:2 | -0.042114 |
| 1995:4 | 1996:3 | -0.031421 |
| 1996:1 | 1996:4 | -0.004566 |
| 1996:2 | 1997:1 | 0.004785 |
| 1996:3 | 1997:2 | 0.026730 |
| SUM/17.0 = | | -0.002527 |

Annual Net Trend Projection Factors:

| | |
|---|---|
| 1992:3 to 1997:2 | 0.998966 |
| R97-1 Forecast | 1.000000 |

# EXPRESS MAIL FORECAST ERROR ANALYSIS

Forecast Errors From Forecasts Using Base Period 91Q3- 92Q2

| Year | Fall | Winter | Spring | Summer |
|---|---|---|---|---|
| 92 | | | -0.005601 | -0.008933 |
| 93 | -0.043310 | -0.022370 | -0.038920 | -0.045233 |
| 94 | -0.047913 | 0.010818 | -0.004658 | -0.018663 |
| 95 | -0.024025 | 0.011521 | -0.011943 | -0.008755 |
| 96 | -0.012744 | 0.036339 | 0.015196 | -0.001481 |
| 97 | 0.005071 | 0.056259 | | |

SPLY Differences of Forecast Errors:

| Year | Fall | Winter | Spring | Summer |
|---|---|---|---|---|
| 92 | | | -0.005601 | -0.008933 |
| 93 | -0.043310 | -0.022370 | -0.033319 | -0.036300 |
| 94 | -0.004603 | 0.033189 | 0.034263 | 0.026570 |
| 95 | 0.023888 | 0.000703 | -0.007285 | 0.009908 |
| 96 | 0.011282 | 0.024818 | 0.027139 | 0.007274 |
| 97 | 0.017815 | 0.019920 | | |

4-Quarter Averages of SPLY Differences:

| Begin | End | |
|---|---|---|
| 1992:3 | 1993:2 | -0.020054 |
| 1992:4 | 1993:3 | -0.026983 |
| 1993:1 | 1993:4 | -0.033825 |
| 1993:2 | 1994:1 | -0.024148 |
| 1993:3 | 1994:2 | -0.010258 |
| 1993:4 | 1994:3 | 0.006637 |
| 1994:1 | 1994:4 | 0.022355 |
| 1994:2 | 1995:1 | 0.029477 |
| 1994:3 | 1995:2 | 0.021356 |
| 1994:4 | 1995:3 | 0.010969 |
| 1995:1 | 1995:4 | 0.006803 |
| 1995:2 | 1996:1 | 0.003652 |
| 1995:3 | 1996:2 | 0.009681 |
| 1995:4 | 1996:3 | 0.018287 |
| 1996:1 | 1996:4 | 0.017628 |
| 1996:2 | 1997:1 | 0.019261 |
| 1996:3 | 1997:2 | 0.018037 |
| SUM/17.0 = | | 0.003177 |

Annual Net Trend Projection Factors:

| | |
|---|---|
| 1992:3 to 1997:2 | 0.998441 |
| R97-1 Forecast | 1.000000 |