TECHNICAL APPENDIX D

Description of Choice Trail

The following choice trail leads from the R2000-1 models to the R2001-1 models.

A. Priority Mail

1) The R2000-1 model was constructed using 1992 based economic data. The Bureau of Commerce rebased the economic data using 1996 as the base period. The Priority Mail model was reestimated using the 1996 rebased economic data. The estimated own-price elasticity was -0.789 compared to -0.82 in R2000-1. The impact of the change in the base period for the economic data from 1992 to 1996 was minor on the estimated coefficients of the Priority Mail model.

2) The model was estimated using data through the fourth postal quarter of 2000. The estimated coefficients remained fairly stable with the estimated own-price elasticity decreased slightly in absolute magnitude from -0.789 to -0.780.

3) Billing determinants for 1999:3 - 2000:2 were obtained and the Priority Mail fixed-weight price index was recomputed. The estimated own-price elasticity decreased in absolute magnitude from -0.780 to -0.737. Parcel Post cross-price elasticity increased to 0.104 compared to 0.076. The sum of the coefficients of UPS prices became 1.699 compared to 1.554

using 1998 billing determinants-based fixed-weight price indices. The new billing determinant covers the first full four quarters of the post weight-change period. This is the period where the minimum weight for Priority Mail increased to 13 ounces from 11 ounces. Thus, the lighter weight pieces are now able to travel as First-Class Mail. Because these lighter-weight Priority Mail pieces were close in weight to First-Class Mail they were sensitive to Priority Mail price increases. Removing them resulted in the remaining Priority Mail pieces being less sensitive to price changes. Being less sensitive to price changes, resulted in the price elasticity being reduced in absolute value.

4) Billing determinants for GFY 2000 were obtained and the Priority Mail fixed-weight price index was recomputed. Using Priority Mail GFY 2000 billing determinants, the UPS ground fixed-weight price index was also recomputed. The Priority mail model was estimated through 2001:1 using the GFY 2000 billing determinants based fixed-weight price indices. The estimated coefficients remained fairly stable with the estimated own-price elasticity of -0.735. However, the regression diagnostics revealed that, although there was no autocorrelation before imposing Shiller lag restrictions, the model exhibited AR(5) after the imposition of Shiller lag restrictions.

5) After the rate increase of 1999:2, Priority Mail volume growth rate declined sharply. Only in the second quarter of 2000 did Priority Mail

volume attempt to make a comeback. But in quarters three and four of 2000, Priority Mail volume grew at 1.2% and 2.5% respectively. The first quarter of 2001 Priority Mail volume exhibited negative growth. In view of this recent declining pattern in Priority Mail volume, an econometric trend variable beginning in 2000:3 was added to the model. It was hoped that the addition of the econometric trend variable would correct the autocorrelation problem. The estimated coefficient of the trend variable was statistically significant. The estimated own-price elasticity was -0.732. However, the autocorrelation of the errors persisted.

6) Second quarter's volume has been increasing rapidly (over first quarter's volume) in the recent past. Recent growth rates of second quarter over first quarter Priority Mail volume per adult, per Accounting Period, are listed below:

Period	Growth Rate (%)
1990:1 - 1990:2	-4.17%
1991:1 - 1991:2	-3.65%
1992:1 - 1992:2	2.80%
1993:1 - 1993:2	-4.27%
1994:1 - 1994:2	-4.52%
1995:1 - 1995:2	3.38%
1996:1 - 1996:2	0.39%
1997:1 - 1997:2	2.76%
1998:1 - 1998:2	3.31%
1999:1 - 1999:2	2.84%
2000:1 - 2000:2	11.92%
2001:1 - 2001:2	10.23%

This increase in the second quarter's volume, over the first quarter's

volume, is due to pre-Christmas days in December shifting from the first quarter to the second quarter. About twenty percent of the business days in the second quarter were pre Christmas days in 1997. We modeled the moving seasonality of Christmas Day by allowing the coefficient of the seasonal variable, DEC1_23, to change from 1997 onwards. This was accomplished by adding DDEC1_23 to the model. DDEC1_23 is defined as being equal to DEC1_23 from 1997 onwards and is set to zero for periods before 1997. Thus DDEC1_23 is defined as the proportion of business days in a Postal quarter that fall in the period from December 1st to December 23rd inclusive, beginning in 1997. The estimated coefficient of DDEC1_23 was statistically significant. The estimated own-price elasticity increased slightly in absolute magnitude to -0.750. The errors no longer exhibited autocorrelation.

7) Finally, the Priority Mail model was estimated through 2001:3. The estimated own-price elasticity increased slightly in absolute magnitude to -0.754. The coefficients of the additional Christmas Day seasonal variable, as well as the trend variable, remained statistically significant. There was no autocorrelation of the errors. This is the final model used.

B. Express Mail

1) The R2000-1 model was constructed using 1992 based economic data. The Bureau of Commerce rebased and redefined the economic data

using 1996 as the base period. The Express Mail model was reestimated using the 1996 rebased economic data. The estimated own-price elasticity increased in absolute magnitude to -1.595 compared to -1.565 in R2000-1. The estimated Priority Mail cross-price elasticity decreased to 0.483 compared to 0.542 in R2000-1. The estimated Federal Express cross-price elasticity increased to 0.416 compared to 0.306 in R2000-1. The estimated permanent income elasticity decreased to 1.985 compared to 2.450 in R2000-1. The impacts of the change in the base period for the economic data from 1992 to 1996 were fairly large on the estimated coefficients of the Express Mail model mainly due to the redefinition of some of the economic data used in the Express Mail model.

2) In the R2000-1 Express Mail model, the permanent income variable was based on real per adult chain-weighted personal consumption expenditures on nondurable goods. The permanent income variable 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. As there were substantial revisions to personal consumption expenditures on nondurable goods, we used the sum of personal consumption expenditures on nondurable goods and durable goods in constructing the permanent income variable. A short run variable, the industrial

production index - office and computing machines (JQIND357) per adult, was added to the model. Also the Express Mail and Priority Mail price indices were updated using the 1999:3 - 2000:2 billing determinants. The estimated own-price elasticity was -1.583. The estimated Priority Mail cross-price elasticity was 0.248. The estimated Federal Express cross-price elasticity was 0.384. The estimated permanent income elasticity was 0.599, and the estimated short-term economic activity elasticity was 0.070. All of these estimated elasticities were statistically significant.

3) Billing determinants for GFY 2000 became available for Priority Mail. The Priority Mail fixed-weight price index was constructed using the GFY 2000 billing determinants. The Express Mail model was estimated extending the estimation period to 2001:1. The estimated own-price elasticity declined in absolute magnitude to -1.557. The estimated Priority Mail cross-price elasticity declined to 0.196. The estimated Federal Express cross-price elasticity was stable at 0.379. The estimated permanent income elasticity declined slightly to 0.521, and the estimated short-term income elasticity increased slightly to 0.077.

4) The Express Mail model was extended to 2001:2. The estimated own-price elasticity declined in absolute magnitude to -1.504. The estimated Priority Mail cross-price elasticity declined to 0.024 and was statistically insignificant. The estimated permanent income elasticity

declined to 0.236 and the estimated short-term income elasticity increased to 0.099. The model exhibited disturbances with fifth order autocorrelation.

5) As the Priority Mail cross-price was insignificant we excluded Priority Mail cross price from the Express Mail model. The estimated own-price elasticity declined in absolute magnitude to -1.493. The other estimated coefficients remained fairly stable. However, the model continued to exhibit disturbances with fifth order autocorrelation.

6) As in the case of the Priority Mail model, a trend variable beginning in 2000:3 was added to the model in the hope that the addition of the trend variable would correct the autocorrelation problem. The estimated coefficient of the trend variable was not statistically significant. The estimated own-price elasticity was -1.470. However, the autocorrelation of the errors persisted. The RBar squared declined.

7) We also tried adding DDEC1_23, as defined in the Priority Mail model, to the Express Mail model again to remove fifth order autocorrelation of the errors. This attempt was not successful. The RBar square remained below the model without the trend and DDEC1_23 seasonal variables. So we excluded both the trend and the DDEC1_23 variables from the Express Mail model.

8) With revised economic data the Express Mail model was estimated without the trend and without the DDEC1_23 seasonal variables. The

estimated own-price elasticity was -1.493. The estimated Federal Express cross-price elasticity was 0.37. The estimated permanent income elasticity was 0.213, and the estimated short-term income elasticity was 0.101. There was no autocorrelation of the errors.

9) Finally, the Express Mail model was estimated through 2001:3. The estimated own-price elasticity was stable at -1.492. The estimated Federal Express cross-price elasticity was 0.374. Permanent income elasticity decreased slightly to 0.197 and the short-run income elasticity was stable at 0.103. There was no autocorrelation of the errors. This is the final model used.