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POSTAL RATE AND FEE CHANGES, 1997

Docket No. R97-1

DIRECT TESTIMONY
OF
PETER BERNSTEIN
ON BEHALF OF
UNITED STATES POSTAL SERVICE

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DIRECT TESTIMONY
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AUTOBIOGRAPHICAL SKETCH

My name is Peter Bernstein. I am vice-president of RCF Economic and Financial Consulting, Inc., where I have been employed since 1992. As vice-president, I have major responsibilities in RCF's forecasting, econometrics, and quantitative analysis activities. I submitted testimony in the MC97-2 parcel classification reform case and have assisted Dr. George Tolley, President of RCF, in the development of his testimony for Docket Nos. R94-1, MC95-1, and MC96-2.

In addition to my responsibilities at RCF, I have been a faculty member of the department of economics at DePaul University of Chicago since 1992 where I have taught courses in economics, finance, and econometrics. I was a faculty member of the department of economics at Loyola University of Chicago from 1987 to 1991, and also taught classes at the University of Chicago, Graduate School of Business in 1987.

In 1985, I earned a Master's Degree in Finance and Economics from the University of Chicago Graduate School of Business and I have completed all course work and examinations toward a Ph.D. from the University of Chicago. I received a B.A. in Economics from the University of Chicago in 1981.

PURPOSE AND SCOPE OF TESTIMONY

The purpose of this testimony is to present prices for postal subclasses and special services that achieve two goals: i) the prices will satisfy the Postal Service's break-even requirement for a 1998 Test Year and ii) the prices will minimize the burden on mailers resulting from the break-even requirement based on the Ramsey pricing formula. My testimony will explain the rationale behind Ramsey pricing, document the calculation of Ramsey prices for those postal products that have estimated price elasticities of demand, project the resulting postal volumes, revenues, and costs for Government Fiscal Year 1998, and calculate the gain to mailers from break-even Ramsey prices as opposed to illustrative break-even prices based on the Postal Rate Commission's recommended mark-ups in R94-1.

Another purpose of this testimony is to provide a guideline for postal pricing based on the principle of economic efficiency. To the extent that other considerations beyond economic efficiency are important to the establishment of postal rates, the cost -- in terms of lost economic efficiency -- of those considerations can be measured.

SUMMARY OF TESTIMONY AND SUPPORTING DOCUMENTS

The present testimony calculates Ramsey prices for a 1998 Test Year based on projected Postal Service Test Year costs. The Ramsey prices are after-rates prices, satisfying the Postal Service break-even requirement. The Ramsey after-rates prices are compared to illustrative after-rates prices based on the Postal Rate Commission's R94-1 recommended mark-ups. Gains to mailers from Ramsey pricing are calculated.

Summary Table 1 presents a comparison of the before-rates prices, non-Ramsey after-rates prices based on the R94-1 mark-ups, and after-rates Ramsey prices for the 1998 Test Year. Prices are calculated for the 22 mail subclasses and special services for which elasticities of demand have been estimated. All prices are expressed as fixed weight index prices. The non-Ramsey and Ramsey prices satisfy the Postal Service's break-even requirement for the 1998 Test Year. It is estimated that mailers would collectively gain $1,023 million dollars in the Test Year from Ramsey pricing as opposed to the price schedule based on the R94-1 mark-ups.

Total forecasted Test Year volume under Ramsey pricing (not shown in the Summary Table) is 202,117 million pieces, not including the special services. This is approximately 4.5 percent more than total forecasted Test Year volume under the non-Ramsey pricing schedule.

Another comparison of the Ramsey and R94-based prices is presented in Summary Table 2. Summary Table 2 presents the mark-up of price over marginal cost for each mail product and a mark-up index. The mark-up index is equal to the product mark-up divided by the overall mark-up of the 22 mail products considered in this testimony. Summary Table 2 shows that the overall mark-up under the rate schedule based on R94-1 prices is 80.07 percent. The overall mark-up under Ramsey pricing is 77.80 percent, further evidence of the gain to mailers from Ramsey pricing.

SUMMARY TABLE 1
Price Comparison

Mail Product	Before-Rates Price	After-Rates Price (based on R94-1)	After-Rates Price (Ramsey Pricing)
First-Class Letters	$0.3420	$0.3488	$0.3551
First-Class Cards	$0.1864	$0.1612	$0.1420
Priority Mail	$3.5416	$4.4053	$2.4124
Express Mail	$12.7534	$14.0132	$11.2947
Periodicals In-County	$0.0886	$0.1001	$0.1416
Periodicals Nonprofit	$0.1511	$0.1704	$0.2409
Periodicals Classroom	$0.2046	$0.2991	$0.4229
Periodicals Regular	$0.2256	$0.2694	$0.4724
Standard Single Piece	$0.9740	$1.4731	$1.6402
Standard Regular	$0.2096	$0.1903	$0.2575
Standard ECR	$0.1469	$0.1630	$0.0802
Standard Nonprofit	$0.1125	$0.1248	$0.1498
Standard NP ECR	$0.0811	$0.0866	$0.0554
Parcel Post	$3.1694	$3.6199	$4.1123
Bound Printed Matter	$0.8702	$0.8816	$0.8435
Special Rate	$1.7635	$1.3657	$1.7775
Library Rate	$1.6041	$1.7643	$2.0383
Registry	$6.5539	$8.2301	$8.3269
Insurance	$1.6799	$2.0851	$2.9067
Certified	$2.2980	$2.1812	$1.7266
COD	$3.9392	$4.5288	$9.3372
Money Orders	$0.8588	$0.7171	$0.8368

SUMMARY TABLE 2
Mark-Up Comparison

Mail Product	Non-Ramsey Mark-up	Non-Ramsey Mark-up Index	Ramsey Mark-up	Ramsey Mark-up Index
First-Class Letters	99.65	1.244	103.29	1.328
First-Class Cards	49.09	0.613	31.34	0.403
Priority Mail	130.01	1.624	25.96	0.334
Express Mail	113.03	1.412	71.70	0.922
Periodicals In-County	10.90	0.136	56.81	0.730
Periodicals Nonprofit	10.90	0.136	56.81	0.730
Periodicals Classroom	10.90	0.136	56.81	0.730
Periodicals Regular	21.80	0.272	113.62	1.460
Standard Single Piece	6.02	0.075	18.04	0.232
Standard Regular	31.97	0.399	78.56	1.010
Standard ECR	144.12	1.800	20.12	0.259
Standard Nonprofit	15.98	0.200	39.28	0.505
Standard NP ECR	72.03	0.900	10.05	0.129
Parcel Post	10.03	0.125	25.00	0.321
Bound Printed Matter	48.96	0.611	42.52	0.547
Special Rate	6.15	0.077	38.16	0.491
Library Rate	3.08	0.038	19.08	0.245
Registry	59.52	0.743	61.40	0.789
Insurance	53.24	0.665	113.62	1.460
Certified	93.91	1.173	53.49	0.688
COD	3.61	0.045	113.62	1.460
Money Orders	15.11	0.189	34.32	0.441
Overall	80.07	1.000	77.80	1.000

My testimony is organized as follows: Chapter 1 explains why Ramsey pricing applies to the Postal Service and shows how to properly measure the burden imposed on mailers by the need to set product prices above product costs. Chapter 2 presents the theory of Ramsey pricing and the simplified version of Ramsey pricing known as the Inverse Elasticity Rule. Chapter 2 explains the intuition of these pricing strategies and illustrates how Ramsey pricing minimizes the burden on mailers. Chapter 3 presents the 22 products included in the Ramsey pricing model and discusses the data needed to calculate the Ramsey prices. In Chapter 4, a non-Ramsey after-rates price schedule is developed based on the Postal Rate Commission's (PRC) recommended mark-ups in the R94-1 case. The non-Ramsey after-rates schedule is used as a comparison to the Ramsey prices. Chapter 5 presents the Ramsey prices, compares them to the non-Ramsey rate schedule, and discusses reasons why the Ramsey prices are higher or lower than the prices based on the PRC's R94-1 mark-ups. In Chapter 6, the gain to mailers from Ramsey prices is calculated. Chapter 7 discusses the optimal discount for workshared First-Class letters, given the Ramsey price of total First-Class letters and taking into consideration the impact that changes in worksharing discounts have on the mix of mail between single-piece and workshared letters.

In addition to the main testimony, two library references provide supporting documentation.

LR-H-164: Derivation of Ramsey Pricing Formula presents the mathematical derivation of Ramsey prices and shows how Ramsey prices maximize the total benefit to mailers subject to a break-even constraint.

LR-H-165: Computer Program used in Ramsey Price Calculations presents the computer algorithm for calculating the Ramsey prices. Included with this library reference is a computer disk of the data used in a LOTUS spreadsheet and the

computer program written in MATLAB. The library reference also presents the computer program used for calculating prices for single-piece and workshared letters.

Chapter 1: Why Ramsey Pricing Applies to the Postal Service

A. Introduction

The Postal Service is a firm characterized by a significant amount of common costs that cannot be allocated to the costs of individual mail products. If the Postal Service were to set the price of each of its mail products at the level necessary to cover the costs allocated to each product, revenues would not be high enough to also cover the common costs of operations. The Postal Reorganization Act requires that postal rates be set in a manner that provides forecasted revenues equal to forecasted total costs (including common costs). In rate cases, this requirement has been applied to a particular year, called a Test Year. Therefore, postal rates must be set so that the revenues earned by the Postal Service exceed the costs allocated to all its individual products, with the excess revenues (called net revenues) being equal to the agency's common costs.

Economic theory argues that product price should equal product marginal cost, defined as the additional cost associated with a one unit increase in production. If the Postal Service were to set product price equal to marginal cost (which is essentially equal to per piece volume variable cost), product revenues would be less than total costs, equal to total volume variable costs plus common costs. Consequently, product price must be set above marginal cost for at least one, if not all, Postal Service products.

A price above marginal cost imposes a burden on consumers. Given that there are any number of postal rate schedules that could yield total revenues equal to total costs, consideration of the burden imposed on consumers by any particular set of rates is important. The remainder of this chapter defines the burden on consumers from

above marginal cost pricing and relates that burden to the net revenue that must be earned for total revenues to match total costs.

B. The Burden on Consumers

1. Burden Defined

The burden on consumers from a price greater than marginal cost is composed of two interrelated costs. The first component of the burden is equal to the additional expenditures consumers make to purchase goods at price P instead of at some lower price, M, equal to marginal cost. This burden can be expressed as $[P - M]\cdot V(P)$ where $V(P)$ is the quantity of goods purchased at price P. For example, if marginal cost is $10 and at a price of $15 consumers purchase 900 units of the good, then consumers paid ($15 -$10)·900, or $4,500 more for those 900 units than they would have had to pay if price were equal to marginal cost of $10.

There is a second cost imposed on consumers from a price greater than marginal cost. If price is P instead of M, the quantity of goods consumers purchase, $V(P)$, is less than $V(M)$. As a result consumers lose the net value of those goods not consumed $[V(M) - V(P)]$ due to the higher price.

Before defining the net value of goods not consumed, it is important to understand that the full burden on consumers cannot be measured only by the additional expenditures to purchase $V(P)$ goods, expressed as $[P - M]\cdot V(P)$. To see this, suppose that price P were so high that $V(P) = 0$. That is, at some sufficiently high price, consumers would choose not to buy any of the good. In this case, $[P - M]\cdot V(P)$ equals zero because $V(P) = 0$. Considering only this component of the burden on consumers would imply that there is no harm to consumers from a price so high that consumption is zero. Clearly this is not true. The harm to consumers is the net value

of those units not consumed at the very high price P that would have been consumed at a much lower price such as M.

2. Value of Consumption

A demand curve measures the value to consumers of a unit of output. Consumers will purchase a good as long as its value is greater than or equal to its price. For example, if consumers purchase 900 units of a good at a price of $15, it means that 900, and only 900 units of that good have a value to consumers of at least $15. The fact that consumers do not purchase 901 units of the good implies that the 901st unit of output has a value less than $15.

That the 901st unit of output has a lower value to consumers than the 900th unit of output is central to the concept of diminishing marginal value of consumption. Diminishing marginal value means that each additional unit of consumption has less value than the previous unit. Diminishing marginal value explains why consumers purchase more when price declines. If price were to fall from $15 to $10 consumption would increase from 900 units to, say, 1,000 units. The fact that consumers purchase 100 more units of the good when the price falls to $10 implies that those 100 additional units have a value at least equal to $10 but less than $15.

A demand curve shows the quantity consumed at different prices, holding constant other factors such as income and the prices of related goods. Demand curves slope downward because lower prices are necessary to induce consumers to purchase additional units, reflecting the concept of diminishing marginal value discussed above. At any given price, the total quantity demanded reflects the number of units of the good with a value greater than or equal to that price. Thus, a demand curve measures the value of goods to consumers.

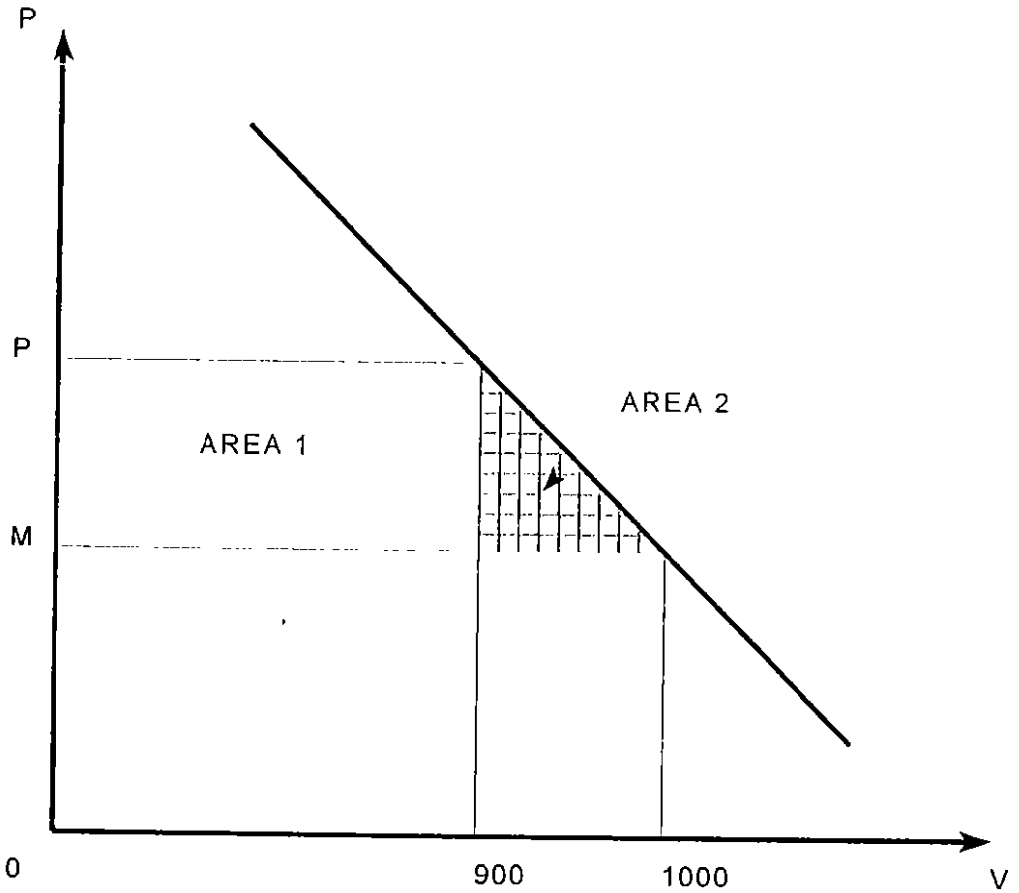
The net value of a unit of output is the difference between the value of that unit, as measured by the demand curve, and the price of that unit. Suppose the 901st unit of a good has a value of $14.95, meaning that at a price of $14.95, but no higher, consumers would purchase 901 units of that good. If the price of the good is $10, then the net value to the consumer from consuming the 901st unit of output is equal to $14.95 - $10, or $4.95.

Exhibit 1 shows a demand curve consistent with the data in the previous discussion. At a price of $10, 1,000 units of the good are consumed. At a price of $15, 900 units are consumed. The burden on consumers resulting from an increase in price from $10 to $15 is represented by the two shaded areas in Exhibit 1. Area 1 is equal to the added expenditures for the 900 goods consumed at the higher price, or ($15 - $10)·900 = $4,500. Area 2 represents the lost net value of the 100 units that are not consumed at the higher price. With a linear demand curve, that area is calculated as ½[$15 - $10]·[1,000 - 900], or $250. Thus, the total harm to consumers from the rise in price from $10 to $15 is $4,750, equal to the $4,500 in additional expenditures for the 900 units that consumers purchase at the higher price of $15 plus the $250 of lost net value of those units consumers do not purchase as a result of the increase in price from $10 to $15.

Economists refer to the shared areas in Exhibit 1 as the loss in consumer surplus resulting from the rise in price. Lost consumer surplus is another expression for the burden on consumers from a rise in price. It reflects the combined impact of the rise in price and the decline in consumption, as shown by the two shaded areas in Exhibit 1.

EXHIBIT 1

Loss of Consumer Surplus from Above Marginal Cost Pricing



3. Burden on Consumers is Not Measured by Mark-up

Suppose two products, A and B, each have marginal cost equal to $10. The price of product A is $15 and 900 units are purchased. The price of product B is $14.50 and 1,000 units are purchased. At first glance, it would appear that the burden imposed on consumers of good A is greater than the burden imposed on consumers of good B. Good A is priced 50 percent above its marginal cost, while good B is priced 45 percent above its marginal cost. But markup, the percentage by which price exceeds marginal cost, is not the proper measure of the burden from above marginal cost pricing. The proper measure of the burden on consumers is the loss of consumer surplus. As noted earlier, the loss of consumer surplus has two components. The first is the additional expenditures due to the higher price measured as $[P - M] \cdot V(P)$. In market A, this is equal to [$15 - $10]·900, or $4,500. In market B, this is equal to [$14.50 - $10]·1,000, also equal to $4,500. Considering only this component of the burden from above marginal cost pricing, it now appears that the burdens in the two markets are equal. But the second component of the burden, the lost net value of units not consumed has not yet been included.

In order to calculate the lost net value of units not consumed, the volume of consumption at marginal cost is needed. Suppose that at a price equal to marginal cost of $10, 1,000 units of good A would be purchased, while 1,400 units of good B would be purchased. In other words, the demand curve for good A would include a point with price equal to $10 and volume equal to 1,000, while the demand curve for good B would include a point with price equal to $10 and volume equal to 1,400. Assuming for simplicity that the demand curves for goods A and B are linear, the net value of the lost consumption in market A is equal to ½·[$15 - $10]·[1,000 - 900] or $250. The net value of lost consumption in market B is equal to ½·[$14.50 - $10]·[1,400 - 1,000] or $900.

Consequently, the loss of consumer surplus (the burden on consumers) in the market for good A is $4,750 ($4,500 plus $250) while the loss of consumer surplus in the market for good B is $5400 ($4,500 plus $900). The higher burden in the market for good B occurs despite its lower markup because the rise in price above marginal cost causes the consumption of good B to fall more than the consumption of good A.

Table 1 summarizes the results of the previous discussion.

Table 1
Calculation of the Burden on Consumers when Price exceeds Marginal Cost

	Good A	Good B
Price: (P)	$15.00	$14.50
Marginal Cost: (M)	$10.00	$10.00
Percentage Markup: [P - M]/M	50.0%	45.0%
Volume at Price: V(P)	900 units	1,000 units
Additional Expenditures at P: Area 1 of Burden	[$15 - $10]·900 = $4,500	[$14.50 - $10]·1000] = $4,500
Volume at Marginal Cost: V(M)	1,000 units	1,400 units
Lost Units of Consumption	100 units	400 units
Lost Net Value of Consumption (Area 2 of Burden)	½·[$15 $10]·[100] = $250	½·[$14.50 - $10]·[400] = $900
Total Burden on Consumers (Area 1 + Area 2)	**$4,750**	**$5,400**

C. The Burden on Consumers and Net Revenue

Net revenue is equal to total revenue (measured, for simplicity, as price times volume) minus total marginal costs (measured, for simplicity, as marginal cost times volume). Thus, net revenue can be expressed as [P - M]·V(P). Raising net revenue requires that price be set above marginal cost. Regarding the Postal Service, net revenue must be raised to offset the agency's common costs to satisfy the break-even

requirement. Specifically, the total net revenue that must be raised (the net revenue requirement) from all Postal Service products must equal total non-marginal costs.

The above expression for net revenue is identical to the first of the two components of the burden on consumers from setting price above marginal cost. In other words, [P - M]·V(P) represents an unavoidable burden on consumers, necessary to satisfy the break-even requirement of the firm. The second component of the burden on consumers -- the lost net value of goods not consumed -- does not provide net revenue to the firm. Goods not consumed represent revenues that are not earned. Thus, while the first component of the burden on consumers is captured by the firm and serves to satisfy the break-even requirement, the second component of the burden on consumers is an unmitigated loss -- called a dead-weight loss by economists.

Suppose the Postal Service has common costs of $9,000 that must be recovered through the pricing of goods A and B. In this case, net revenues -- the excess of revenues over marginal costs -- must equal $9,000 for the Postal Service to break even. Product price(s) must be set above marginal cost to raise the required net revenue. If consumption did not decline when price is raised above marginal cost, the net revenue requirement could be satisfied without any dead-weight loss. For example, if consumers would purchase 1,000 units of good A regardless of price, the price of good A could be set at $9 above its marginal cost and net revenues would equal the required $9,000. The burden on consumers would be ($19 -$10)·100, or $9,000 exactly equal to the net revenues raised by the firm. There is no loss in consumer surplus from the lost net value of units not consumed at the higher price because, by assumption, consumption of good A does not decline when its price is raised. Moreover, with all net revenues raised from good A, the price of good B could be set equal to the marginal cost of good B and there would be no burden on consumers of

good B from above marginal cost pricing. In this case, the total burden on consumers is only the unavoidable burden resulting from the need to raise $9,000 in net revenues.

In reality, consumption does decline when price rises making it impossible to raise net revenues without some dead-weight loss and without some additional burden on consumers. Recalling the example discussed earlier, good A was priced at $15 and consumption was 9000 units; good B was priced at $14.50 and consumption was 1,000 units. Net revenues were $4,500 from each good, or $9,000 in total thereby satisfying a $9,000 net revenue requirement. The total burden on consumers was $10,150 comprised of $4,750 of lost consumer surplus in the market for good A and $5,400 of lost consumer surplus in the market for good B (see Table 1).

In the example considered, consumers bear a burden of $10,150 in order to satisfy a $9,000 net revenue requirement. An important question is: can prices be set in a way that satisfy the net revenue requirement and impose the smallest possible burden on consumers? Yes, by applying the theory of Ramsey pricing.

Chapter 2: The Theory of Ramsey Pricing

A. The Ramsey Pricing Formula

Ramsey pricing is used to establish product prices of a multi-product firm that accomplish two goals: the prices minimize the burden imposed on consumers and the prices yield total revenues for the firm equal to the firm's total costs of production. The Ramsey pricing formula, presented below as equation (1) is derived in LR-H-164 accompanying this testimony.

$$\sum_{j=1}^{N} \frac{P_j - M_j}{P_j} E_{ji} \frac{V_j}{V_i} = -k, \quad \text{for all } i. \tag{1}$$

In the case of only two products, i and j, the above equation can be re-written as:

$$\begin{aligned} \frac{P_i - M_i}{P_i} E_{ii} + \frac{P_j - M_j}{P_i} E_{ji} \frac{V_j}{V_i} &= -k \\ \frac{P_j - M_j}{P_j} E_{jj} + \frac{P_i - M_i}{P_j} E_{ij} \frac{V_i}{V_j} &= -k \end{aligned} \tag{2}$$

The prices of products i and j, P_i and P_j, respectively, must both satisfy the above equation.

1. Definitions of Ramsey Formula Variables

a. Marginal Cost (M)

The marginal cost of a product is defined as the change in product cost associated with a one unit increase in product volume. With respect to the Postal Service, the marginal cost of a product is derived from knowledge of the product's

volume variable costs. By the methodology of Postal Service costing, product volume variable cost is equal to product marginal cost multiplied by product volume. Therefore, marginal cost is equal to volume variable cost per piece, obtained by dividing product volume variable costs by product volume.

b. Own-Price Elasticity (E_{ii})

The own-price elasticity of a product is defined as the percentage change in volume that results from a one percent change in product price, holding all other relevant factors unchanged. For example, if a one percent increase in price causes the volume of product i to decline 0.5 percent, the own-price elasticity of product i is -0.5. Own-price elasticities are negative because of the inverse relation between product price and product volume -- an increase in own-price is associated with a decrease in volume and a decrease in own-price is associated with an increase in volume, holding other factors unchanged.

The greater in magnitude is the own-price elasticity, the more sensitive is product volume to a change in its price. If the own-price elasticity of product i were -1.0 instead of -0.5, it would mean that a one percent increase in price would produce a one percent decline in volume instead of only a 0.5 percent decline in volume. A product with an own-price elasticity greater (more negative) than -1.0 is said to have elastic demand. A product with an own-price elasticity smaller (less negative) than -1.0 is said to have inelastic demand. Most mail products have inelastic demands though some are more inelastic (less price sensitive) than others. Formally, the own-price elasticity, E_{ii}, is equal to:

E_{ii} = %change in volume/% change in price

$E_{ii} = [\Delta V_i/V_i]/[\Delta P_i/P_i]$

c. Cross-Price Elasticity (E_{ji})

Cross-price elasticity, E_{ji}, measures the percentage change in the volume of product j in response to a one percent change in the price of product i, holding all other factors constant. Formally, the cross-price elasticity E_{ji} is equal to:

E_{ji} = %change in volume of product j/% change in price of product i

$E_{ji} = [\Delta V_j/V_j]/[\Delta P_i/P_i]$

Two products that are substitutes for one another will have a positive cross-price elasticity because an increase in the price of product i will lead to an increase in the volume of product j as consumers substitute product j for the now more expensive product i. Two products that are complements to one another will have a negative cross-price elasticity because an increase in the price of product i will reduce both the consumption of product i and its complementary product j. To the extent that cross-price elasticities exist between some postal products, those products are substitutes for one another and have positive cross-price elasticities. For example, a positive cross-price elasticity exists between First-Class cards and First-Class letters because an increase in the price of letters (holding the price of cards unchanged) would cause some mailers to substitute cards for letters. Following the same logic, a positive cross-price elasticity also exists between the volume of First-Class letters and the price of First-Class cards.

d. Volume (V)

The Ramsey pricing equation states that when a cross-price elasticity exists between two products, the Ramsey prices of these products are also affected by the product volumes. Product volume affects the Ramsey prices because with cross-price elasticities, a change in the price of one product affects the volume of the other product.

As will be more fully discussed later, the change in volumes resulting from cross-price effects has an effect on the revenues generated by the Ramsey prices. Since the Ramsey prices must yield revenues equal to total costs, the inter-relation between product prices and product volumes becomes an important consideration in establishing break-even Ramsey prices.

Another consideration regarding product volumes is that the volumes referred to in equation (1) are the volumes that occur at the Ramsey prices. That is, the Ramsey price of product i depends on the volume of product j which depends on the Ramsey price of product j which, in turn, depends on the volume of product i. This inter-relation between product prices and product volumes must be included in the calculation of the Ramsey prices.

e. The Ramsey Leakage Factor (k)

A final term in the Ramsey pricing equation is "k", known as the Ramsey leakage factor. Section B of this chapter provides a detailed description of the intuition and mathematics of the Ramsey leakage factor. Less formally, the leakage factor is a measure of how efficiently each product's price satisfies the break-even requirement. The Ramsey equation states that prices should be established so that the k value is the same for every product. This means that each product should be equally efficient in its contribution toward satisfaction of the break-even requirement. This concept will be explored more fully later in this chapter.

2. Inverse Elasticity Rule (IER)

A simplified version of Ramsey pricing is the Inverse Elasticity Rule (IER). IER pricing is identical to Ramsey pricing when the demands for the products that are to be priced are independent of one another, i.e., there are no cross-price elasticities between postal products. In this case, both E_{ij} and E_{ji} are equal to 0 in equation (2).

Although the conditions for IER pricing do not hold empirically for all postal products, a review of the Inverse Elasticity Rule provides the framework for an intuitive understanding of Ramsey pricing.

With cross-elasticities E_{ij} and E_{ji} equal to zero, the Ramsey pricing equation reduces to the Inverse Elasticity Rule (IER) formula, which states that the price each subclass of mail should satisfy the following equation.

$$-k = \frac{(P_i - M_i) E_{ii}}{P_i} \qquad (5)$$

$(P_i - M_i)/P_i$ will be hereafter referred to as the Ramsey mark-up, which differs from the mark-up measured described in Chapter 1 which was equal to $(P_i - M_i)/M_i$. However, in both cases, if price is equal to marginal cost, the mark-up is equal to zero and as price increases above marginal cost both mark-up measures increase above zero.

3. Intuition of IER and Ramsey Pricing

The basic principle of IER pricing can be demonstrated by considering the pricing of two products with the same marginal costs but different own-price elasticities of demand. According to the IER formula the prices of the two products must be set to satisfy equation (1), specifically that the Ramsey markup times the own-price elasticity must be equal for both products. To ensure this equality, the product with the greater own-price elasticity must have a smaller Ramsey markup. Given that the marginal costs are the same in this case, it follows that the more elastic product will have a lower price than the less elastic product. Thus, the optimal Ramsey or IER price is inversely related to the own-price elasticity of the product. Elastic products should have lower

prices (lower Ramsey markups) and inelastic products should have higher prices (higher Ramsey markups) in order to satisfy the IER equation.

B. Understanding the Leakage Factor k

1. An Illustration of Leakage

Exhibit 2 presents the demand curves for two postal products, i and j, assumed for simplicity as linear demand curves. Both products have constant marginal costs of $1 and the demand equations for postal product i (D_i) and product j (D_j) are:

$$V_i = 150 - 25 \cdot P_i$$

$$V_j = 120 - 10 \cdot P_j$$

where P is price of the product in dollars and V is volume demanded at price P. At a price of $2, as shown in Exhibit 2, 100 units are demanded of each product.

According to the above equations, a one dollar increase in the price of product i causes quantity demanded to decline by 25 units, whereas a one dollar increase in the price of product j causes quantity demanded to decline by only 10 units. Therefore, the demand for product i is more price elastic than the demand for postal product j. This result can also be seen by calculating the elasticities of demand for products i and j. Recalling the formula for own-price elasticity and noting that in a linear demand equation the coefficient on price equals $\Delta V/\Delta P$, the own-price elasticities of demand for products i and j are equal to

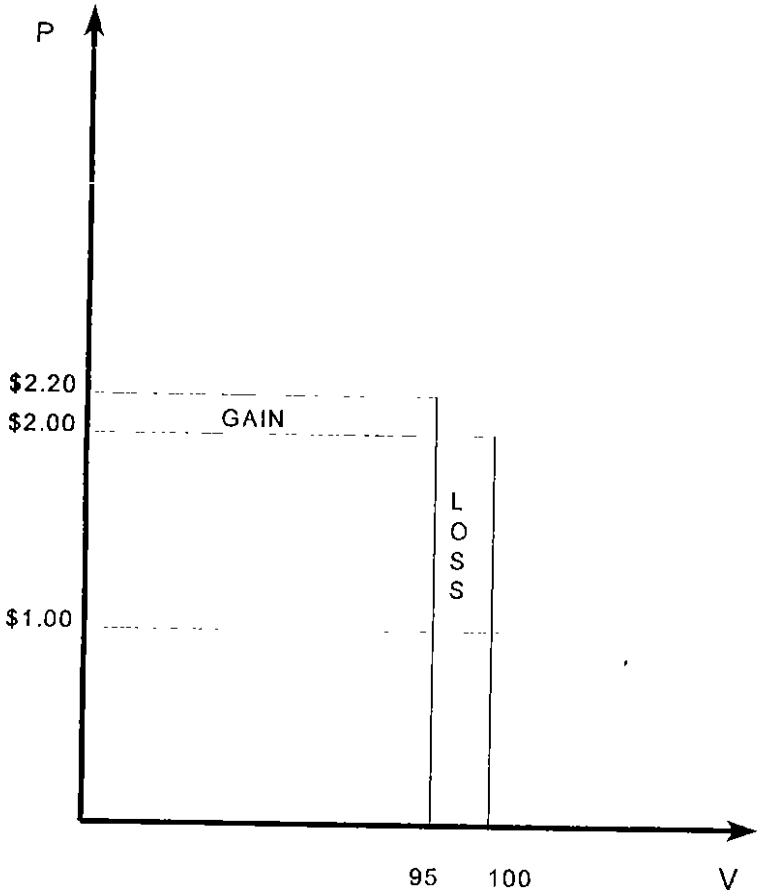
$$E_{ii} = [\Delta V_i/V_i]/[\Delta P_i/P_i] = -25 \cdot P_i/V_i = -25 \cdot 2/100 = -0.5$$

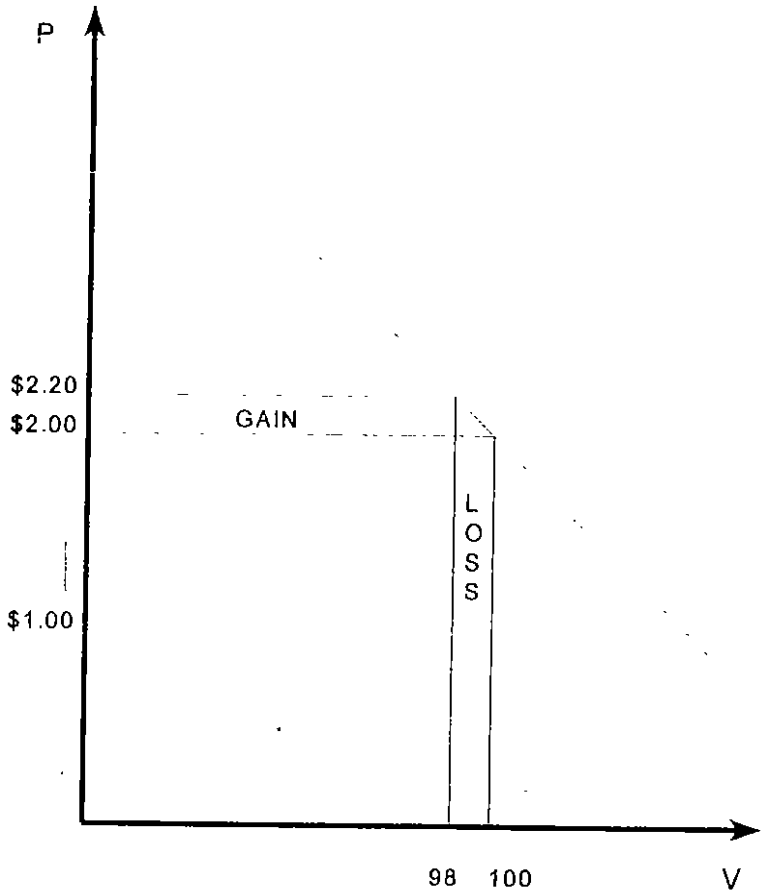
$$E_{jj} = [\Delta V_j/V_j]/[\Delta P_j/P_j] = -10 \cdot P_j/V_j = -10 \cdot 2/100 = -0.2$$

Exhibit 2 also shows the net revenues earned by the firm from products i and j, where net revenue is equal to $[P - M] \cdot V$. With both products having a constant marginal cost of $1, net revenues from each product are equal to $100 and total net revenues are equal to $200.

EXHIBIT 2

Comparing Leakage for Two Different Products





Suppose that the combined net revenues from products i and j are insufficient to cover the common costs of the Postal Service. To raise the required net revenue, the price of each product is increased from $2 to $2.20. The increase in price causes a decline in quantity consumed, with volume falling 5 units to 95 units for product i and falling 2 units to 98 units for product j. The smaller decline in product j volume reflects its lower own-price elasticity.

The increase in price from $2 to $2.20 yields an increase in net revenues from the units still consumed at the higher price, indicated by the areas labeled GAIN in Exhibit 2. At the same time, the increase in price causes a partially offsetting decline in net revenues that were previously earned at the lower price of $2, but are no longer earned on those units that are not consumed at the higher price of $2.20. This loss of net revenues is indicated by the areas labeled LOSS in Exhibit 2. The overall change in net revenues is the difference between GAIN and LOSS. Table 2 mathematically presents the same information shown in Exhibit 2.

Table 2
GAIN and LOSS Resulting from a Price Increase

Product i					
Price (P)	Cost (M)	Volume (V) 100 - 25•P	Net Revenue (P - M)•V	GAIN V•ΔP	LOSS (P - M)•ΔV
$2.00	$1.00	100	$100.00		
$2.20	$1.00	95	$114.00	+$19.00	-$5.00
Product j					
$2.00	$1.00	100	$100.00		
$2.20	$1.00	98	$117.60	$19.60	-$2.00

Table 2 shows that at a price of $2.20, the net revenue from product i is $114.00, equal to ($2.20 - $1.00) •95, representing a $14.00 increase in the net revenue that was

earned at a price of $2.00. The source of the $14.00 increase is shown as the difference between a $19.00 GAIN (equal to an additional $0.20 on each of 95 units consumers) and a $5.00 LOSS (equal to the $1 of net revenue previously earned on each of 5 units no longer consumed at the higher price).

Table 2 also shows that for product j, net revenue at a price of $2.20 is $117.60. The $17.60 increase in net revenue is equal to the difference between a $19.60 GAIN and a $2.00 LOSS.

Note that although the price increases were identical in the two markets, the increase in net revenues in market i ($GAIN_i$) is much less than the increase in net revenues in market j ($GAIN_j$). The smaller increase in net revenues in market i is a direct result of the greater own-price elasticity of product i, which causes a much larger decline in volume when the price of good i is increased. Exhibit 2, therefore, illustrates one important aspect of the Ramsey or IER pricing. Raising the price of elastic products is a less effective method for raising net revenue because the volume of elastic products declines more as a result of a price increase.

2. GAIN, LOSS and the Leakage Factor k

A measure of the efficiency of raising net revenues is the ratio of the net revenues lost due to the decline in consumption to the net revenues gained due to the increase in price. From Table 2, the ratio of LOSS to GAIN is equal to:

$$\frac{LOSS}{GAIN} = \frac{(P - M)\bullet\Delta V}{V\bullet\Delta P} \qquad (6A)$$

Multiplying both the numerator and denominator by P and recalling that the own-price elasticity is equal to $[\Delta V/V]/[\Delta P/P]$ yields,

$$\frac{LOSS}{GAIN} = \frac{(P - M)\bullet\Delta V}{V\bullet\Delta P}\frac{P}{P} = \frac{E^*(P-M)}{P} = -k \qquad (6B)$$

which is exactly the expression for the leakage factor k in the IER formula. Thus, the k value of a product measures the effectiveness of raising additional net revenue from that product.

3. Leakage and the Burden on Consumers

Another way of expressing the efficiency of raising net revenues is to think of the overall gain in net revenues compared to the burden imposed on consumers. Recall from Exhibit 1 and Table 1 in Chapter 1 that the burden on consumers from an increase in price consisted of two areas. The first aspect of the burden consumers (labeled AREA 1 in Exhibit 1) is the additional expenditures by consumers at the higher price, identical to the area GAIN in Exhibit 2. The second aspect of the burden on consumers is the loss net value of those goods not consumers, represented by the triangular AREA 2 in Exhibit 1. Although this second aspect of the burden on consumers is important, AREA 2 will tend to be much smaller than AREA 1, and the loss net value of consumption is a second-order effect on consumers. Therefore, ignoring this consideration, the burden on consumers is equal to the additional expenditures for those goods consumed at the higher price, identical to the GAIN in net revenues shown in Exhibit 2 and Table 2.

Consequently, one can measure the efficiency of raising net revenues as it relates to the burden, or the primary aspect of the burden, imposed on consumers. Recalling that the overall increase in net revenues is equal to GAIN minus LOSS, then a measure of the overall increase in net revenues per dollar of burden on consumers is:

$$\frac{\text{GAIN - LOSS}}{\text{GAIN}} = 1 - \text{LOSS/GAIN} = 1 - k$$

Thus, every dollar of burden imposed on consumers yields an overall increase in net revenues of 1 - k dollars. In turn, k dollars of net revenue "leak away" from the firm.

4. Desirability of a Constant k Across All Products

Exhibit 2 and Table 2 show that the increase in price from $2.00 to $2.20 imposes more leakage from the more elastic product i than the less elastic product j. The leakage value for product i, equal to the ratio of LOSS to GAIN is $5.00/$19.00 or 0.26. This means that for each dollar of additional burden imposed on consumers of product i from the increase in price, 74 cents of additional net revenue is earned, while 26 cents of leakage occurs. In contrast, the leakage value for product j is about 0.10, equal to $2.00/$19.60, meaning that for each dollar of additional burden on consumers of product j, about 90 cents of additional net revenue is earned, with only ten cents of leakage. Note that for both products leakage exists because increases in price lead to decreases in consumption. But the greater leakage for product i shows that raising the price of product i is a less efficient (more harmful to consumers) way of capturing an additional dollar of net revenue for the firm.

Another way of looking at the impact of different levels of leakage is to consider the change in the burden imposed on consumers associated with raising $1 of additional net revenues from product j and $1 less of net revenues from product i, so that total net revenues are unaffected. This change in consumer burden is given by the difference between the k values for products i and j. Since the k value for product i is 0.26 and the k value of product j increase is 0.10, transferring $1 of net revenues from product i to product k reduces the burden on consumers by $0.16 (0.26 minus 0.10). As long as the leakage values for any two products are not equal, the firm could raise the same total net revenue and lower the burden on consumers by raising the price of the low leakage product and lowering the price of the high leakage product.

Does this mean that the firm should continue to raise the price in market j and lower it in market i ad infinitum? No. As the price in market j is raised, additional price

increases produce more leakage. The reduction in consumption caused by additional price increases become more costly because the net revenue $(P - M)\cdot\Delta V$ that is lost gets larger as P gets larger. Similarly, lowering the price in market i recaptures less and less net revenues because $(P - M)\cdot\Delta V$ declines as P declines. Thus, as P_j is raised, the leakage (k) in market j increases and as P_i is lowered, the leakage (k) in market i decreases. At some price combination, the leakages in the two markets will be equal (constant k).

How large a value this constant k must have depends on the total amount of net revenues that must be raised. The greater the required net revenues (the greater the common costs that must be covered), the greater is the constant k and the higher are the IER (or Ramsey) prices. But any increase in the net revenue requirement forces prices upward. IER (or Ramsey) prices raise the needed revenues in a method that imposes the smallest burden on consumers.

5. Leakage and Cross-Price Elasticities

If cross-elasticities of demand are not zero, then the full Ramsey formula is used. The important difference between IER pricing and Ramsey pricing is that Ramsey pricing takes into consideration the impact of a change in the price of one product on the demand for a substitute or complement product. That change in demand has effects on consumers of the substitute or complement good, as well as an effect on the net revenues earned by the producer.

Assume there is a product i with a given own-price elasticity, E_{ii}. The impact of cross-elasticities on leakage can be seen by comparing the IER and the full Ramsey formula, where the Ramsey formula includes a cross-price elasticity (E_{ji}) between another product j and the price of product i.

$$\frac{P_i - M_i}{P_i} E_{ii} + \frac{P_j - M_j}{P_i} E_{ji} \frac{V_j}{V_i} \qquad (7A)$$

The first term in the Ramsey formula is identical to the IER formula and equals the leakage that results from an increase in the price of product i. The second term in the Ramsey formula can be re-written as shown below by substituting the formula for the cross-price elasticity of product j with respect to the price of product i.

$$\frac{P_j - M_j}{P_i} E_{ji} \frac{V_j}{V_i} = \frac{P_j - M_j}{P_i} \frac{\Delta V_j}{V_j} \frac{P_i}{\Delta P_i} \frac{V_j}{V_i} = \frac{(P_j - M_j)\ \Delta V_j}{V_i\ \Delta P_i} \qquad (7B)$$

The denominator of the second part of the Ramsey formula ($V_i \bullet \Delta P_i$) is the same as the denominator in the first part of the formula and in the IER formula. It is the GAIN in revenues resulting from the increase in price of product i. The numerator of the second part of the Ramsey formula $(P_j - M_j) \bullet \Delta V_j$ is the change in net revenues of product j that results from the increase in the price of product i. It is equal to the net revenues earned per unit of product j (price of j minus its marginal cost) multiplied by the change in volume of product j that results from the increase in the price of product i. If i and j are substitutes, then the increase in the price of product i causes an increase in the volume of product j and an increase in net revenues earned from product j. Therefore, the leakage of net revenue that occurs from the decline in the volume of product i (the first term of the Ramsey formula) is partially offset by an increase in net revenue from the substitute product j. Thus, holding the own-price elasticity of product i constant, the presence of a substitute product j reduces the leakage caused by an

increase in the price of i. Under Ramsey pricing, products with substitutes within the set of products to be priced will have higher mark-ups than products without such substitutes, *assuming the two products have the same own-price elasticity.*

6. Leakage in Competitive and Unregulated Monopoly Markets

Further understanding of the concept of leakage can be gained by examining the pricing conditions faced by competitive firms and by an unregulated monopolist. As part of the analysis, the basic IER pricing equation is re-written in terms of the ratio of price to marginal cost for each product to be priced.

$$P/M = E/(E + k)$$

a. Leakage Under Pure Competition

Under pure competition, price equals marginal cost where marginal cost includes a normal profit margin for the firm. A mark-up of price above marginal cost is not sustainable under pure competition because other firms could set price at marginal cost and the firm charging the above marginal cost price would see its quantity sold go to zero. In terms of the above equation, price equals marginal cost when the leakage factor k is equal to 0. Thus, under perfect competition, there is no leakage.

b. Leakage for an Unregulated Monopoly

Consider now, the pricing strategy for an unregulated profit-maximizing monopolist. The monopolist will raise prices above marginal costs until the point in which profits, analogous to net revenues, are maximized. The pricing formula for a profit maximizing monopolist, not derived here but commonly found in any micro-economics text book is:

$$P/M = E/(E + 1)$$

The above formula is identical to the IER pricing formula when the leakage factor k is equal to 1. Recalling that leakage equals the ratio of net revenues lost to net

revenues gained from a price increase, a leakage value of 1 states that a profit-maximizing monopolist will continue to raise price as long as the price increase loses less net revenues (or profits) than it gains.

Thus, as prices are increased above marginal cost (the pure competitive solution), the leakage factor k increases from 0 until (in the unregulated monopoly solution) it reaches 1. Additional price increases would push the leakage factor above 1, meaning that the price increase would lose more net revenues (profits) than it gains. Leakage factors of 0 and 1, therefore, form the bounds between the purely competitive market and the unregulated profit-maximizing monopolist.

Chapter 3: Data Required for the Calculation of Ramsey Prices

A. Mail Products Included in Ramsey Price Calculations

The present testimony calculates Ramsey prices for the mail subclasses and special services presented in Table 3 below.

Table 3
Mail Products Included in the Ramsey Pricing Model

First-Class Letters, Flats, and Parcels
First-Class Cards
Priority Mail
Express Mail
Periodicals In-County Mail
Periodicals Nonprofit Mail
Periodicals Classroom Mail
Periodicals Regular Rate Mail
Standard A Single-Piece Mail
Standard A Regular Mail
Standard A Enhanced Carrier Route
Standard A Nonprofit Mail
Standard A Enhanced Carrier Route Nonprofit Mail
Standard B Parcel Post
Standard B Bound Printed Matter
Standard B Special Rate Mail
Standard B Library Rate Mail
Registry
Insurance
Certified
C.O.D.
Money Orders

Table 3 includes all domestic mail subclasses and special services for which demand elasticities have been estimated. Included in Table 3 are six preferred subclasses: Periodicals In-county, Periodicals Nonprofit, Periodicals Classroom, Standard A Nonprofit, Standard A ECR Nonprofit, and Library mail. Ramsey prices are not calculated for these mail subclasses. Instead, each of the preferred subclasses is assigned a mark-up over marginal cost equal to one-half the Ramsey mark-up for the corresponding regular subclass, following the requirements for the pricing of nonprofit subclasses set forth in the Revenue Forgone Reform Act. However, because the nonprofit subclasses yield net revenues and help satisfy the break-even requirement, they are included in the Ramsey pricing model even though their prices are constrained.

The Ramsey pricing formula, reprinted below, shows that in order to calculate Ramsey prices, information is needed on marginal costs (M_j), price elasticities (E_{ji}), and volumes (V_j and V_i) of each subclass or special service. In addition, a break-even revenue requirement, which determines the value of the leakage factor k, must be satisfied. The present chapter discusses each of these necessary inputs as they relate to the calculation of Ramsey prices of postal products.

$$\sum_{j=1}^{N} \frac{P_j - M_j}{P_i} E_{ji} \frac{V_j}{V_i} = -k, \quad \text{for all } i. \qquad (1)$$

B. Own-Price and Cross-Price Elasticities

1. Elasticities Used in Ramsey Price Calculations

Ramsey prices depend on own- and cross-price elasticities of demand. The price elasticities used in the Ramsey price calculations are the long-run price elasticities

presented in this case by Mr. Thress (USPS-T-7), and Dr. Musgrave (USPS-T- 8) for Priority and Express Mail. These elasticities are obtained from volume demand equations estimated using quarterly data. Included in the set of explanatory variables are the real price paid by the mailer in the current quarter and three lagged postal quarters. The inclusion of price lags in the demand equation reflects the fact that mailer response to a change in postal rates occurs over a period of time. The price elasticities used in the Ramsey price formula are the long-run price elasticities equal to the sum of the current and three lagged elasticities.

In the econometric estimation of the price elasticities of First-Class letters and cards, and Standard A Regular and Nonprofit mail, price is measured as postage price plus user costs. User costs are costs borne by the mailer to satisfy worksharing requirements. The estimated price elasticity is the percentage change in volume associated with a one percent change in price including user cost. To be consistent with the demand elasticities estimated for these subclasses, the Ramsey price is the Ramsey postage price plus user costs. The Ramsey price reported in this testimony, however, is the Ramsey postage price obtained by subtracting the user cost from the Ramsey price including user costs.

LR-H-164 shows that measuring the Ramsey price with user costs is necessary to maintain consistency with the demand elasticities of mail products that include user costs. LR-H-164 presents the Ramsey price calculation for Standard A Regular mail and shows how the Ramsey postage price is obtained from the Ramsey price. It is worth noting that the impact of user costs on the Ramsey postage prices is quite small.

2. Subclass Elasticities for First-Class Letters and Cards

Ramsey prices are calculated for mail subclasses and special services. The Postal Service demand equations include two subclasses in which separate elasticities

are estimated for categories within the subclass. Separate demand equations are estimated for single-piece and workshared (presorted or automated) letters within the First-Class letter subclass and for stamped postal cards and private postal cards within the First-Class cards subclass. In order to calculate Ramsey prices for the First-Class letter and First-Class card subclasses, elasticities for each subclass are estimated by taking a volume weighted average of the separate elasticities of the two components of the subclass. The volumes used in calculating the weights are the before-rates Test Year volumes. Tables 4 and 5 shows estimated subclass elasticities for First-Class letters and cards, respectively. The calculations are presented as part of LR-H-165.

Table 4
Estimated Price Elasticities for the First-Class Letter Subclass

Category	Test Year Volume	Volume Weight	Own-Price Elasticity	Cross-Price Elasticity 1	Cross-Price Elasticity 2
single-piece	54,394.309	0.5672	-0.189240	0.005402	0.019000
workshared	41,506.989	0.4328	-0.289173	0.005679	0.035000
total letters	95,901.297	1.0000	-0.232492	0.005522	0.025925

Cross-price elasticity 1 is the estimated elasticity with respect to the price of the First-Class card subclass. Cross-price elasticity 2 is the estimated cross-elasticity with respect to the price of Standard A Regular mail.

Table 5
Estimated Price Elasticities for the First-Class Cards Subclass

Category	Test Year Volume	Volume Weight	Own-Price Elasticity	Cross-Price Elasticity 1
stamped	594.894	0.1045	-0.168128	0.000000
private	5,098.223	0.8955	-0.943718	0.196545
total cards	5,693.117	1.0000	-0.862674	0.176007

Cross-Elasticity 1 is the estimated cross-elasticity with respect to First-Class letters.

Table 4 shows that based on the estimated elasticities and the forecasted before-rates Test Year volumes, the own-price elasticity of the First-Class letter subclass is estimated to be -0.232492, the cross-price elasticity between letters and the price of First-Class cards is estimated to be 0.005522 and the cross-price elasticity between letters and the price of Standard A Regular mail is estimated to be 0.025925. Table 5 shows that the own-price elasticity of the First-Class cards subclass is estimated to be -0.862674 and the cross-price elasticity between cards and the price of First-Class letters is estimated to be 0.176007.

Note an estimated discount elasticity exists between the single-piece and workshared letters to measure shifts of mail between these two categories in response to a change in worksharing discounts. Ramsey prices are calculated as a subclass level and worksharing discounts are subsumed in the overall price of the subclass. Thus, the estimated discount elasticity is not needed here.

Table 6 presents a complete list of the own- and cross-price elasticities used in the calculation of the Ramsey prices presented in this testimony.

Table 6
Estimated Price Elasticities

Mail Product	Own-Price Elasticity	Cross-Price Elasticity	Cross-Price Elasticity
First-Class Letters	-0.232492	0.005522 (First-Class cards)	0.025925 (Standard Regular)
First-Class Cards	-0.862674	0.176007 (First-Class letters)	
Priority Mail	-0.770488	0.091524 (parcel post)	
Express Mail	-1.533788	0.460544 (Priority Mail)	
Periodicals In-County	-0.529948		
Periodicals Nonprofit	-0.227917		
Periodicals Classroom	-1.178481		
Periodicals Regular Mail	-0.143253		
Standard A Single-Piece	-0.654259		
Standard A Regular Mail	-0.381623	0.130 (First-Class Letters)	
Standard A ECR	-0.597746		
Standard A Nonprofit Mail	-0.135814		
Standard A ECR Nonprofit	-0.135814		
Standard B Parcel Post	-0.964629	0.446591 (Priority Mail)	
Standard B Bound Printed	-0.335170		
Standard B Special Rate	-0.362037		
Standard B Library Rate	-0.634333		
Registry	-0.413445		
Insurance	-0.104734		
Certified	-0.286961		
C.O.D.	-0.182012		
Money Orders	-0.391377		

C. Marginal Costs

The Ramsey pricing formula requires product marginal costs. Ramsey prices are calculated for a 1998 Test Year and use forecasts of Test Year cost, including the one percent contingency. The marginal cost of a product, as it is strictly defined in economics, is the additional cost associated with a one unit increase in output of that product. The Postal Service costing methodology provides a cost estimate that is similar to marginal cost, known as volume variable cost. Volume variable cost is defined as those costs of a mail product that vary with volume. Product marginal costs for 1998 are taken as equal to per piece volume variable costs, calculated by dividing Test Year before-rates volume variable cost by Test Year before-rates volume, as presented in Mr. Patelunas's testimony (USPS-T-15). It is assumed that in the range of volumes being considered, volume variable cost per piece, and therefore marginal cost, is constant for every mail product.

As noted in the previous section, the prices of First-Class letters and cards, and Standard A Regular and Nonprofit mail are measured including user costs. To be consistent with this price measure, the marginal costs of these mail products is measured as the sum of the volume variable cost per piece and the mailer user cost, or the total (Postal Service plus mailer) cost per piece.

Another cost measure that should be considered in rate-making is incremental cost. The incremental cost of a product is the cost that the Postal Service would save if the product were eliminated entirely. In addition to covering the product's volume variable costs, postal prices (Ramsey or otherwise) should generate sufficient revenues to cover the product's incremental cost. If not, the Postal Service and mailers would be better off if the product were discontinued.

Accordingly, Ramsey prices are calculated as a mark-up over marginal cost. The total revenues from the product at the Ramsey prices are then compared to the product's incremental cost. If these total revenues are less than incremental cost, the price must be marked up above the Ramsey price until revenues cover incremental costs. As it turns out, Express Mail and Registry mail have Ramsey prices that generate revenues below incremental costs. Consequently, the prices of these two products are constrained above their Ramsey prices so that revenues cover incremental costs.

Table 7 shows 1998 Test Year forecasted before-rates volume, volume variable costs, volume variable costs per piece (taken to be marginal cost excluding user costs), and incremental costs for the 22 products included in the Ramsey price model. Costs include the one percent contingency.

Table 7
Cost Data for 1998 Test Year
(All data in millions except marginal cost)

Mail Product	Before-Rates Volume	Volume Variable Cost	Marginal Cost	Incremental Cost
First-Class Letters	95,901.297	$16,753.647	$0.1747	$18,228.0
First-Class Cards	5,693.117	$615.603	$0.1081	$636.1
Priority Mail	1,123.760	$2,152.263	$1.9152	$2,548.3
Express Mail	64.377	$423.481	$6.5781	$727.1
Periodicals In-County	911.204	$82.273	$0.0903	$84.1
Periodicals Nonprofit	2,186.677	$335.896	$0.1536	$340.6
Periodicals Classroom	51.194	$13.806	$0.2697	$13.9
Periodicals Regular Mail	7,172.571	$1,586.274	$0.2212	$1,608.5
Standard A Single-Piece	165.695	$230.228	$1.3895	$230.5
Standard A Regular Mail	34,359.008	$4,954.656	$0.1442	$5,,063.7
Standard A ECR	32,424.240	$2,165.716	$0.0668	$2,263.2
Standard A Nonprofit Mail	10,123.229	$1,088.999	$0.1076	$1,104.2
Standard A ECR Nonprofit	3,131.995	$157.659	$0.0503	$158.8
Standard B Parcel Post	241.598	$794.829	$3.2899	$802.8
Standard B Bound Printed	567.896	$336.114	$0.5919	$337.5
Standard B Special Rate	200.562	$258.023	$1.2865	$259.3
Standard B Library Rate	30.245	$51.770	$1.7117	$51.8
Registry	16.195	$83.553	$5.1592	$134.9
Insurance	31.438	$42.778	$1.3607	$42.1
Certified	304.153	$342.141	$1.1249	$312.7
C.O.D.	3.936	$17.204	$4.3709	$17.0
Money Orders	236.661	$147.432	$0 6230	$199.6

D. Volume Forecasts

Forecasted volumes are needed in the calculation of the Ramsey prices, as the Ramsey price of a mail subclass depends on its volume and on the volumes of any other subclass with which it has a cross-price elasticity. Forecasted volumes are also needed to calculate total revenues and total costs and determine if the break-even requirement is satisfied.

1. Volume Forecast Methodology

The starting point of the forecasted Test Year volumes at the Ramsey prices are the forecasted Test Year volumes at current postal prices, known as the before-rates volume forecast. The before-rates forecast of mail volumes is presented in the testimony of Dr. Tolley (USPS-T-6), and include the before-rates forecasts of Priority and Express Mail also presented in the testimony of Dr. Musgrave (USPS-T-8). Both Dr. Tolley and Dr. Musgrave use the same forecasting approach, which involves projecting the Test Year volume from the volume in a Base Year through the use of a series of projection factor multipliers. Each projection factor considers the impact of a particular variable (e.g., price, income, or population) on volume from the Base Year to the Test Year.

The same basic approach is used to project volumes in the Test Year at the Ramsey prices. The Test Year Ramsey volume is projected from the Test Year before-rates volume through the use of a projection factors. Because the Test Year for the Ramsey volumes is the same as the Test Year for the before-rates volumes, the only variable which differs between the two forecasts is the postal price. Therefore, the Ramsey Test Year volume of a mail product is obtained by multiplying the before-rates Test Year volume of the product by a projection factor which accounts for the change in the price of the mail product. If the volume of the product depends on the price of other

postal products, a cross-price projection factor multiplier is also included in the volume forecast at the Ramsey prices.

The price projection factor multiplier is equal to the ratio of the Ramsey price to the before-rates price raised to the estimated price elasticity. In a simplified form and without cross-price elasticities, the Ramsey volume forecast can be presented as:

Ramsey Volume = Before-Rates Volume • $(P_R/P_{br})^E$

where P_R is the Ramsey price of the subclass, P_{br} is the before-rates price of the subclass, and E is the estimated own-price elasticity of the subclass. $(P_R/P_{br})^E$ is known as the rate projection factor multiplier. Prices include user costs, where appropriate.

2. Elasticities Used in the Test Year Volume Forecasts

The simplified form of the rate projection factor multiplier differs from the rate projection factor multipliers used is the forecasts of Drs. Tolley and Musgrave. In particular, the forecasts of Drs. Tolley and Musgrave are made on a quarterly basis, using the current and three lagged price elasticities and including terms that convert the annual Base Year volume into a quarterly volume. Moreover, forecasted quarterly volumes are converted into an annual volume for the Test Year, which does not begin at the beginning of a postal quarter. This exact approach differs from the approach described above for the Ramsey volume forecasts in which a single rate projection multiplier is used to convert the before-rates Test Year volume into a Ramsey Test Year volume while the full volume forecasting approach uses four rate projection factor multipliers, one for each of the current and three lagged estimated elasticities. Current and lagged elasticities are included in the volume forecasts because the econometric evidence shows that mailers response to a change in postal rates does not all occur in the quarter in which rates were changed. The lagged elasticities reflect the period of

adjustment by mailers to the new rates. In the long-run, the volume response is given by the sum of the current and lagged price elasticities.

For the present rate case, the new rates are assumed to be put in effect on the first day of the Test Year. The volume impact in the first quarter following the rate increase will be smaller than the impact in the fourth quarter following the rate increase, owing to the lagged response of mailers to changes in rates as measured by the current and lagged price elasticities. Consequently, the volume response in the Test Year is not the long-run response and using the long-run elasticity to forecast the Ramsey Test Year volumes would overstate the volume impact of the change from the before-rates price to the Ramsey prices.

One solution to this problem would be to use the full volume forecasting approach including current and lagged elasticities and seasonal coefficients to make the Ramsey volume forecasts on a quarterly basis instead of making Test Year forecasts using a single elasticity. However, the Ramsey price computer calculations require an iterative approach, necessitating frequent calculations of volume, revenues, and costs, and use of the full forecast methodology employed by Drs. Tolley and Musgrave was considered impractical. Instead, effective Test Year elasticities are used where the effective Test Year elasticity is a weighted average of the estimated current and lagged elasticities. For example, in the first quarter of the Test Year, only the current elasticity affects mail volume. In the second quarter, the current and first lagged elasticity affect mail volume, in the third quarter the current and first two lagged elasticities affect mail volume, and in the fourth quarter of the Test Year, the current and all three lagged elasticities affect mail volume. The effective elasticity for the Test Year, bearing in mind that the first three postal quarters are 12 weeks long while the fourth postal quarter is 16 weeks long is calculated as:

(12/52)•(current elasticity) +
(12/52)•(current elasticity + lag 1 elasticity) +
(12/52)•(current elasticity + lag 1 elasticity + lag 2 elasticity) +
(16/52)•(current elasticity + lag 1 elasticity + lag 2 elasticity + lag 3 elasticity)

As an example, the effective Test Year own-price elasticity of Standard A Enhanced Carrier Route mail is calculated below. LR-H-165 presents the entire set of effective Test Year price elasticities used in making the Ramsey volume forecasts.

Effective Test Year elasticity for Standard A ECR Mail =

(12/52)•(-0.223143) +

(12/52)•(-0.223143 - 0.154656) +

(12/52)•(-0.223143 - 0.154656 - 0.114297) +

(16/52)•(-0.223143 - 0.154656 - 0.114297 - 0.105650) =

-0.436161

Thus, the effective own-price elasticity for Standard A ECR Mail in the Test Year, assuming that after-rates prices take effect on the first day of the Test Year, is -0.436. This elasticity is less than the long-run own-price elasticity of Standard A ECR mail of -0.598 because the full impact of the new rates is not entirely realized in the Test Year.

As a check, the Ramsey volume forecasts presented in this testimony were compared to full volume forecasts (using the Ramsey prices and complete lag structure of price elasticities) for the 1998 Test Year. The Ramsey volume forecasts for every subclass were always within one-half of one percent from the forecasts obtained using the full volume forecasting methodology. For many mail products, the difference in volume forecasts was on the order of one-tenth of one percent. The impact on forecasted revenues and costs was of the same order of magnitude and the impact on net revenues was even smaller.

E. Ramsey Net Revenue Requirement

1. Defining the Ramsey Net Revenue Requirement

The Ramsey prices must generate projected Test Year revenues equal to projected Test Year costs. Test Year revenues and costs include revenues and costs generated from the products included in the Ramsey pricing model as well as revenues and costs generated from other Postal Service operations.

Some revenues and costs are unaffected by the Ramsey prices presented in this testimony. Product specific fixed costs and other non-volume variable costs are not affected by the Ramsey prices or volumes. In addition, the revenues and costs of products not included in the Ramsey pricing model, as well as revenues from investment income and a small congressional appropriation for such things as free-for-the-blind mail are not affected by the Ramsey prices. The Ramsey net revenue requirement is defined as the excess of total revenues over total volume variable costs of the products included in the Ramsey pricing model that is necessary to yield total Postal Service revenues equal to total Postal Service costs in the Test Year.

Table 8 shows the various components of Test Year revenues and costs that are unaffected by the Ramsey prices of the products considered in this testimony.

Table 8
Revenues and Costs Not Affected by Ramsey Pricing

Non-Ramsey Revenue or Cost Source	Test Year Projected Revenues (in $millions)	Test Year Projected Costs (in $millions)
Non-Volume Variable Costs		26,719.265
Products not included in Ramsey pricing model	2,659.786	2,045.061
Other Income	254.311	
Total	2,914.097	28,764.326

Among the products not included in the Ramsey priing model are Mailgrams, Free-for-the-Blind mail, International Mail, Stamped Envelopes, Special Handling, and P.O. Boxes.

Table 8 shows that the Postal Service has projected Test Year revenues of 2,914 million dollars and projected Test Year costs of 28,764 million that are unaffected by the Ramsey prices presented in this testimony. The difference between these projected revenues and costs is 25,850 million dollars. Therefore, the products included in the Ramsey pricing model will need to generate 25,850 million dollars of net revenue (total revenue less total volume variable costs) to yield total Postal Service revenues equal to total Postal Service costs.

It should be recognized that this revenue requirement is estimated for hte purposes of establishing a target for this Ramsey pricing exercise and does not necessarily match the revenue requirement used by the Postal Service in their proposed rates.

2. Calculating Ramsey Net Revenues

For each mail product subject to Ramsey pricing, product net revenue is defined as the difference between product revenues and product volume variable costs. Product revenue at the Ramsey price is calculated as the Ramsey price multiplied by the Ramsey volume. In other words, the Ramsey price is taken as a measure of average revenue per piece. Similarly, product cost is calculated as volume variable cost per piece (or marginal cost) multiplied by product volume at the Ramsey price.

Thus, the Ramsey prices satisfy the break-even condition if:

$$\text{Ramsey Net Revenues} = \sum[(P_R \cdot V_R) - (MC_R \cdot V_R)] = \$25{,}850 \text{ million}$$

$$= \sum[(P_R - MC_R) \cdot V_R] = \$25{,}850 \text{ million}$$

It is important to note that the forecasted volume is based on the ratio of the Ramsey to the before-rates price of the mail product, where both the Ramsey and the before-rates prices include estimated user costs for First-Class and Standard A mail subclasses. User costs, however, do not provide revenue to the Postal Service. However, since user costs are included in both the price and marginal cost measures for these mail products, the difference between price and marginal cost is the same whether both are measured with user costs or both are measured without user costs.

F. Price Constraints

1. Incremental Cost Coverage

In addition to covering the product's volume variable costs, postal prices should generate sufficient revenues to cover the product's incremental cost. If not, the Postal Service and mailers would be better off if the product were discontinued. The Ramsey price of Express Mail and of Registry mail, while above the product's marginal cost, are not sufficiently above marginal cost to also cover the product's incremental costs. Therefore, the prices presented for these products are not the Ramsey prices but a higher price that provides sufficient revenue above volume variable cost to also cover incremental cost.

2. Preferred Subclasses

As a requirement of Revenue Forgone Reform Act, the mark-up for preferred subclasses of mail is set at one-half the mark-up of the corresponding regular subclass. The six preferred subclasses are Periodicals In-county, Nonprofit, and Classroom mail, Standard A Nonprofit and Nonprofit Enhanced Carrier Route, and Standard B Library rate. The three preferred subclasses of Periodicals mail are assigned a mark-up equal to one-half the mark-up on Periodicals Regular mail; Standard A Nonprofit and Nonprofit Enhanced Carrier Route are assigned mark-ups equal to one-half the mark-

ups for Standard A Regular and Enhanced Carrier Route mail, respectively; and Library Rate is assigned a mark-up equal to one-half the mark-up on special rate.

Chapter 4: Non-Ramsey After-Rates Prices for R97-1

A. Why Non-Ramsey Prices are Needed

The benefits from Ramsey pricing can be measured in comparison to some other rate schedule that also satisfies the Postal Service's break-even requirement. In this testimony, the Ramsey prices are compared to an illustrative break-even rate schedule based on the Postal Rate Commission's (PRC) recommended mark-ups in R94-1, applied to 1998 Test Year costs and adjusted to satisfy the Ramsey net revenue requirement of $25,850 million. In this way, the Postal Service's net financial position is unaffected by whether the Ramsey or non-Ramsey rate schedule is employed. The benefit to mailers from the move to Ramsey pricing from the non-Ramsey rate schedule represents a pure gains to mailers that does not come at the expense of the Postal Service.

B. Non-Ramsey Rates Based on Commission's R94-1 Rates

1. R94-1 Mark-Ups

The starting point for the calculation of the non-Ramsey prices for the 1998 Test Year is the R94-1 rate schedule. Table 9 below presents the R94-1 recommended mark-ups, defined as the excess of product revenue over product attributable cost, for the products included in the Ramsey price model, obtained from Appendix G, Schedule 3 of the Postal Rate Commission's R94-1 Opinion and Recommended Decision and Appendix J. Table 9 shows the system-wide mark-up, equal to total revenues from mail and special services less total attributable costs, divided by total attributable costs.

Table 9 also shows the mark-up index of each mail subclass, calculated as the ratio of subclass mark-up to system wide mark-up. For example, the R94-1 recommended mark-up of First-Class letters is 74.5, meaning that at recommend rates, projected revenues from First-Class letters are 74.5 percent greater than projected

attributable costs. The system wide mark-up is equal to 56.8. Therefore, the relative mark-up of First-Class letters is equal to 74.5/56.8 or 1.31. Similar, calculations yield the relative cost coverages of the other products included in the Ramsey price model.

2. R94-1 Mark-ups Applied to Test Year Marginal Costs

The R94-1 mark-ups are applied to 1998 Test Year marginal (volume variable per piece) costs to yield a set of prices. Some modifications are required. First, the R94-1 mark-ups are mark-ups over attributable cost which for most mail products is virtually identical to volume variable costs. For some products, Express Mail of particular importance, attributable costs exceed volume variable costs significantly because of a substantial level of specific fixed costs. Therefore, the R94-1 mark-up, which measures the mark-up over attributable costs, is adjusted to measure the mark-up over volume variable costs. Second, for the six preferred subclasses, the mark-up over marginal cost is set equal to one-half the mark-up of the corresponding regular subclass.

After including the above modifications, the volumes of each mail subclass and special service are forecasted using the effective Test Year price elasticities presented earlier. From the volume forecasts, total revenues and total costs are calculated. Applying the R94-1 mark-ups to 1998 Test Year costs yields net revenues less than the net revenue requirement of $25,850 million.

Table 9
R94-1 Mark-Ups of Mail Products Included in the Ramsey Pricing Model

Subclass or Special Service	R94-1 Recommended Mark-up	R94-1 Recommended Mark-Up Index
First-Class Letters, Flats, and Parcels	74.5	1.311
First-Class Cards	36.7	0.645
Priority Mail	97.2	1.710
Express Mail	18.9	0.332
Second-Class In-County Mail	2.7	0.048
Second-Class Nonprofit Mail	4.1	0.071
Second-Class Classroom Mail	6.8	0.119
Second-Class Regular Rate Mail	16.3	0.286
Third-Class Single-Piece Mail	4.5	0.079
Third-Class Bulk Regular Noncarrier-Route Mail	23.9	0.421
Third-Class Bulk Regular Carrier-Route Mail	107.7	1.895
Third-Class Bulk Nonprofit Noncarrier-Route Mail	1.8	0.032
Third-Class Bulk Nonprofit Carrier-Route Mail	52.6	0.926
Fourth-Class Parcel Post	7.5	0.131
Fourth-Class Bound Printed Matter	36.6	0.644
Fourth-Class Special Rate Mail	4.6	0.080
Fourth-Class Library Rate Mail	0.8	0.013
Registry	44.5	0.783
Insurance	39.8	0.701
Certified	70.2	1.236
COD	2.7	0.048
Money Orders	11.3	0.199
All Mail and Special Services	56.8	1.000

One reason why the net revenues obtained from the R94-1 mark-ups are less than the Ramsey net revenue requirement of 25,850 million dollars is that the costing methodology for the current case results in more non-volume variable costs and less volume variable cost than the methodology used in R94-1. Therefore, the mark-up of price over volume variable cost per piece will have to be greater for the current case than in R94-1. To maintain the relative levels of the R94-1 mark-ups, the R94-1 mark-ups of each postal product are increased proportionally until total net revenues are 25,850 million dollars. The net revenue requirement is satisfied when the mark-up of each product is increased 33.7 percent. Note that this does not imply that prices are increased 33.7 percent because the higher mark-up is applied to generally lower costs per piece.

3. Presentation of Non-Ramsey Test Year Mark-ups

Table 10 presents the break-even non-Ramsey mark-ups for a 1998 Test Year. Table 10 shows the mark-up indexes of each product are approximately equal to the mark-up indexes in R94-1. The indexes are not exactly equal because the R94-1 mark-up index was relative to all mail and special services and the index presented in Table 10 is a mark-up relative to the overall mark-up of the products included in the Ramsey model. Moreover, the nonprofit subclasses have been assigned relatively higher mark-ups than in the R94-1 case, which causes their mark-up index to be higher and the mark-up indexes of the other mail products to be lower than in R94-1. Still, the relative mark-ups between any two products is the same as in R94-1. For example, in R94-1, the mark-up for First-Class letters was 74.5 or 2.03 times the mark-up on First-Class cards of 36.7. For R97-1, the mark-up for First-Class letters is 99.65, also equal to 2.03 times the R97-1 mark-up for First-Class cards of 49.09.

Table 10
R97-1 Mark-Ups for the Non-Ramsey Rate Schedule

Subclass or Special Service	R97-1 Mark-up	R97-1 Mark-Up Index
First-Class Letters, Flats, and Parcels	99.65	1.244
First-Class Cards	49.09	0.613
Priority Mail	130.01	1.624
Express Mail	113.03	1.412
Second-Class In-County Mail	10 90	0.136
Second-Class Nonprofit Mail	10.90	0.136
Second-Class Classroom Mail	10.90	0.136
Second-Class Regular Rate Mail	21.80	0.272
Third-Class Single-Piece Mail	6.02	0.075
Third-Class Bulk Regular NCR Mail	31.97	0.399
Third-Class Bulk Regular CR Mail	144.12	1.800
Third-Class Bulk Nonprofit NCR Mail	15.98	0.200
Third-Class Bulk Nonprofit CR Mail	72.03	0.900
Fourth-Class Parcel Post	10.03	0.125
Fourth-Class Bound Printed Matter	48.96	0.611
Fourth-Class Special Rate Mail	6.15	0.077
Fourth-Class Library Rate Mail	3.08	0.038
Registry Mail	59.52	0.743
Insurance	53.24	0.665
Certified	93.91	1.173
COD	3.61	0.045
Money Orders	15.11	0.189
Overall Mark-up on Above Products	80.07	1.000

Note that the mark-up on Express Mail is a mark-up over marginal (volume variable) cost and is not directly comparable to the R94-1 mark-up of price over attributable cost per piece.

Chapter 5: Ramsey Prices for R97-1

A. Aggregate Results

1. Description of Table

Table 11 presents a comparison of Ramsey and the non-Ramsey rate schedule presented above. The first section of Table 11 presents three columns of general information about each of the 22 subclasses and special services that comprise the model: name, R97-1 estimated elasticity and marginal costs, equal to volume variable cost per piece. The 22 mail products are grouped by class: First-Class letters and cards, the two expedited mail subclasses, Priority Mail and Express Mail, the four Periodicals subclasses, the five subclasses of Standard A mail, the four subclasses of Standard B mail, and five special services.

The middle section of Table 11 presents the non-Ramsey after-rates price based on the mark-ups presented in Table 10, the mark-up of price over marginal cost, after-rates volume (in millions of pieces), product revenues, volume variable costs and net revenues. For example, First-Class letters has a non-Ramsey after-rates postage price of $0.3488, measured as a fixed weight index price, yielding a mark-up of 99.65 percent over Test Year volume variable cost per piece of $0.1747. Forecasted after-rates volume is 95,369 million pieces, generating revenues of $33,263 million, volume variable costs of $16,661 million, and net revenues of $16,603 million.

The bottom row of the middle section of Table 11 presents total volumes, revenues, volume variable costs, and net revenues for the non-Ramsey rate schedule. Total volume (not including the special services) is 193,400 million pieces. Total revenue from the 22 mail products is $58,133, with total volume variable costs of $32,283 million, yielding net revenues of 25,850 million, thereby satisfying the break-even requirement for these mail products. The overall mark-up for the non-Ramsey

TABLE 11

MAIL PRODUCT	Own-Price Elasticity	Marginal Cost	R97-1 After-Rates Prices Based on R94-1 Mark-up Index						R97-1 After-Rates Ramsey Prices					
			PRICE (FWI)	MARK-UP	VOLUME (millions)	REVENUE ($millions)	COST ($millions)	NET REVENUE ($millions)	PRICE (FWI)	MARK-UP	VOLUME (millions)	REVENUE ($millions)	COST ($millions)	NET REVENUE ($millions)
First-Class Letters	-0 232	0.1747	0.3488	99.65%	95,369.481	33,263.368	16,660.740	16,602 628	0.3551	103.29%	95,525 657	33,925 275	16,688 024	17,237.251
First-Class Cards	-0.854	0.1081	0 1612	49.09%	6,217.561	1,002 349	672 312	330.037	0.1420	31.34%	6,711 937	953.237	725 769	227.468
Priority Mail	-0.770	1.9152	4 4053	130.01%	997 928	4,396.190	1,911.265	2,484 925	2.4124	25.96%	1,444.393	3,484.447	2,766 350	718 097
Express Mail	-1 534	6.5781	14 0132	113 03%	62.093	870 129	408.459	461.670	11.2947	71.70%	65.222	736 662	429 040	307 622
Periodical In-County	-0.530	0.0903	0.1001	10.90%	864.543	86.570	78.060	8.510	0 1416	56.81%	745 225	105.512	67.287	38.225
Periodical Nonprofit	-0.228	0.1536	0.1704	10.90%	2,140.348	364.621	328 779	35 842	0 2409	56.81%	2,011 876	484 612	309.045	175 567
Periodical Classroom	-1.178	0 2697	0.2991	10.90%	36.510	10.919	9.846	1.073	0.4229	56 81%	26 825	11.344	7 234	4.110
Periodical Regular	-0 143	0.2212	0 2694	21 80%	7,055 124	1,900 490	1,560 300	340.190	0.4724	113.62%	6,695.991	3,163 441	1,480.874	1,682 567
Standard Single Piece	-0.654	1.3895	1.4731	6.02%	134.125	197.580	186.363	11.218	1.6402	18.04%	126.962	208.237	176.410	31.828
Standard Regular	-0 382	0 1442	0.1903	31 97%	35,366 849	6,730.387	5,099.979	1,630 408	0 2575	78.58%	32,477 211	8,362 277	4,683.287	3,678 991
Standard ECR	-0.598	0.0668	0 1630	144.12%	30,986.342	5,051.237	2,069.143	2,982.094	0.0802	20 12%	42,218 486	3,386 430	2,819 180	567 250
Standard Nonprofit	-0.136	0 1076	0.1248	15.98%	10,016 107	1,249.703	1,077.475	172 227	0.1498	39 28%	9,827 207	1,472.379	1,057.155	415 224
Standard Nonprofit ECR	-0.136	0.0503	0 0866	72.03%	3,109.062	269.234	156.505	112.730	0 0554	10.05%	3,268.778	181.073	164 544	16 529
Standard Parcel Post	-0.965	3 2899	3.6199	10 03%	231.151	836 749	760 460	76 289	4 1123	25.00%	171.990	707 281	565 828	141.454
Standard Bound Printed	-0.335	0.5919	0 8816	48 96%	566.284	499.241	335.160	164.081	0.8435	42 52%	571 768	482 302	338 406	143.896
Standard Special Rate	-0.362	1.2865	1.3657	6 15%	217.605	297.174	279.949	17.225	1.7775	38.16%	200 057	355 592	257.374	98.219
Standard Library Rate	-0.634	1.7117	1.7643	3.08%	29 012	51.188	49.660	1 528	2 0383	19.08%	27.239	55.520	46.624	8 896
Registry	-0.413	5.1592	8 2301	59.52%	15.066	123 997	77.730	46.267	8 3269	61 40%	15 010	124 991	77 442	47.549
Insurance	-0.105	1.3607	2.0851	53.24%	30.978	64.592	42.152	22.440	2.9067	113.62%	30.283	88 026	41 207	46 819
Certified	-0.287	1.1246	2 1812	93.91%	307.273	670.215	345.630	324.584	1.7266	53 49%	321.643	555.336	361.794	193 542
COD	-0.182	4.3709	4 5288	3.61%	3 871	17.533	16.922	0.611	9.3372	113.62%	3 553	33.176	15.531	17 646
Money Orders	-0.391	0 6230	0.7171	15.11%	250.378	179.553	155.977	23.576	0.8368	34 32%	238 591	199 645	148.634	51.010
Totals				80.07%	193,400.128	58,133 019	32,282.865	25,850 154		77.80%	202,116.827	59,076.795	33,227 038	25,849 757

Estimated Gain to Mailers from Ramsey Pricing = $1,023 Million

prices, equal to total revenues less total volume variable costs, divided by total volume variable costs, is 80.07 percent.

The third section of Table 11 presents Ramsey price information following the same organization as the non-Ramsey section. The Ramsey price, mark-up, volume, revenue, and volume variable cost of each product are given. The bottom of the section shows total forecasted Test Year mail volume under Ramsey pricing of 202,117 million pieces or 4.5 percent more than the non-Ramsey volume. Total revenue under Ramsey pricing is equal to $59,077 million and total volume variable cost is 33,227 million. Net revenues under Ramsey pricing are $25,850 million which satisfies the Ramsey net revenue requirement. The average mark-up under Ramsey pricing is 77.80 percent.

The increase in total mail volume and the decrease in average mark-up are a reflection of the benefit to mailers from Ramsey pricing. A more formal presentation of this benefit is the increase in consumer surplus under Ramsey pricing as opposed to the non-Ramsey rate schedule. Table 11 shows that the increase in consumer surplus from Ramsey pricing is $1,023 million in the Test Year. Chapter 6 discusses the increase in consumer surplus from Ramsey pricing in more detail.

2. Summary of Key Differences in Prices

In general, products that have a relatively low own-price elasticity have a higher Ramsey mark-up than non-Ramsey mark-up. This is the case for First-Class letters, Periodicals Regular rate, and Standard A Regular mail. Conversely, products that have a relatively high own-price elasticity have lower Ramsey mark-ups than non-Ramsey mark-ups, e.g., First-Class cards, Priority and Express Mail, and Standard A ECR Mail.

Of particular interest, is the relative mark-ups for Standard A Regular and Standard A ECR mail. Under the rates based on the R94-1 rates, Standard A Regular

mail has a mark-up of 32 percent and Standard A ECR has a mark-up of 144 percent. Under Ramsey pricing, the relatively less elastic Regular mail has a mark-up of 79 percent while the relatively more elastic ECR mail has a mark-up of 20 percent. Overall, the five subclasses of Standard A mail (including single-piece and Nonprofit mail) generate $4,710 million of net revenue under Ramsey pricing and $4,909 million under the non-Ramsey rate schedule. The net revenues are about four percent less under Ramsey pricing, showing that the main effect is to change the relative pricing and relative contributions to net revenue from Regular and ECR mail.

3. Non-Ramsey and Ramsey Mark-up Indexes

Table 12 compares the mark-up index of each mail product under the non-Ramsey and Ramsey rate schedules. The mark-up index is equal to the product mark-up divided by the overall mark-up of the 22 mail products included in the Ramsey model. For example, the non-Ramsey mark-up of First-Class letters is 99.65 percent as compared with a overall mark-up of 80.07 percent. Thus, the mark-up index for letters is 1.244 (99.65/80.07) meaning that the mark-up on letters is 1.244 times the average mark-up. The Ramsey mark-up of First-Class letters is 103.29 percent as compared to an overall Ramsey mark-up of 77.80 percent. The mark-up index for letters under Ramsey pricing is 1.328 (103.29/77.80). This result shows that although the mark-up of letters under Ramsey pricing is only slightly more than the mark-up under non-Ramsey pricing (103.29 percent vs. 99.65 percent), the relative mark-up of letters is meaningfully greater under Ramsey pricing (1.328 vs. 1.244). This occurs because by raising net revenue more efficiently, Ramsey pricing produces a lower overall mark-up for the 22 products included in the model.

TABLE 12
Mark-Up Comparison

Mail Product	Non-Ramsey Mark-up	Non-Ramsey Mark-up Index	Ramsey Mark-up	Ramsey Mark-up Index
First-Class Letters	99.65	1.244	103.29	1.328
First-Class Cards	49.09	0.613	31.34	0.403
Priority Mail	130.01	1.624	25.96	0.334
Express Mail	113.03	1.412	71.7	0.922
Periodicals In-County	10.90	0.136	56.81	0.73
Periodicals Nonprofit	10.90	0.136	56.81	0.73
Periodicals Classroom	10.90	0.136	56.81	0.73
Periodicals Regular	21.80	0.272	113.62	1.46
Standard Single Piece	6.02	0.075	18.04	0.232
Standard Regular	31.97	0.399	78.56	1.01
Standard ECR	144.12	1.800	20.12	0.259
Standard Nonprofit	15.98	0.200	39.28	0.505
Standard NP ECR	72.03	0.900	10.05	0.129
Parcel Post	10.03	0.125	25	0.321
Bound Printed Matter	48.96	0.611	42.52	0.547
Special Rate	6.15	0.077	38.16	0.491
Library Rate	3.08	0.038	19.08	0.245
Registry	59.52	0.743	61.4	0.789
Insurance	53.24	0.665	113.62	1.46
Certified	93.91	1.173	53.49	0.688
COD	3.61	0.045	113.62	1.46
Money Orders	15.11	0.189	34.32	0.441
Overall	80.07	1.000	77.8	1.000

B. Individual Subclass Results

1. First-Class Letters

The Ramsey price of First-Class letters is $0.3551, 0.63 cents more than the non-Ramsey price of $0.3488, and 1.31 cents more than the before-rates price of $0.3420. Recall that this price is a fixed-weight index price and does not refer to the price of the basic one ounce letter, currently priced at 32 cents. The higher Ramsey price is a direct result of the relatively low own-price elasticity of First-Class letters and the fact that letters are a substitute for two other postal products, First-Class cards and Standard Regular mail. Thus, raising the price of letters is a relatively efficient way to raise net revenue, first because the higher price causes a small decline in volume due to the low own-price elasticity and because the higher letters price causes increases in net revenues earned from an increase in the volume of its two substitute postal products.

The Ramsey volume of First-Class letters is 95,526 million pieces, actually somewhat greater than the non-Ramsey volume of 95,369 million pieces. The higher volume occurs despite the higher price because the higher price of Standard Regular mail under Ramsey pricing causes an increase in the volume of letters. Again this shows that raising the price of First-Class letters (and Standard Regular mail) is an effective way to raise net revenue because little overall volume is lost. Total net revenues under Ramsey pricing is $17,237 million, about $634 million more than under the non-Ramsey rate schedule.

2. First-Class Cards

The Ramsey First-Class cards price is $0.1420, about two cents or twelve percent less than the non-Ramsey price of $0.1612. The lower Ramsey price is due to the relatively high own-price elasticity of First-Class cards. The impact of the own-price

elasticity is only partially offset by the presence of a cross-elasticity between cards and letters, although empirically the effect of changes in the price of cards on letters volume is quite small.

The Ramsey volume of First-Class cards is 6,712 million pieces, almost 500 million pieces more than the non-Ramsey volume of 6,218 million pieces. Test Year net revenue from First-Class cards is $227 million, about $100 million less than under the non-Ramsey rate schedule.

3. Priority Mail

The Ramsey price for Priority Mail is quite different from the price based on the R94-1 relative mark-ups. Under the R94-1 rate schedule, Priority Mail was assigned a mark-up greater than the system-wide average which converts into an R97-1 after-rates mark-up of 130.01 percent. From a perspective of economic efficiency, this mark-up is too high as it results in a fairly substantial loss of volume. The Ramsey mark-up is 25.96 percent. As a result of this lower mark-up, volume of Priority Mail under Ramsey pricing is 1,444 million pieces, or 45 percent more than the 998 million pieces that would occur at the non-Ramsey price.

4. Express Mail

Express Mail is the most price sensitive postal product considered, with an estimated own-price elasticity of -1.534. Under Ramsey pricing, the mark-up on Express Mail would be quite small. However, to avoid cross-subsidization, the price of Express Mail is constrained to ensure that product revenues cover product incremental costs (see Table 7). Therefore, the price presented in Table 11 is not the Ramsey price but the lowest price that ensures that incremental costs are covered. Still, this price is less than the price based on the R94-1 mark-up. The constrained mark-up under Ramsey pricing is 71.70 percent, yielding a price of $11.2947, as compared to a non-

Ramsey mark-up over marginal cost of 113.03 percent and price of $14.0132.

5. Periodicals In-County

The Ramsey and non-Ramsey mark-up price of Periodicals in-county mail is set at one-half the mark-up for Periodicals Regular mail. The non-Ramsey mark-up of Regular mail (based on the R94-1 mark-up index) is 21.80 percent, yielding a mark-up on in-county mail of 10.90 percent. The Ramsey mark-up on Regular mail is 113.62 percent (due to its low own-price elasticity) yielding a Nonprofit mark-up of 56.81 percent.

6. Periodicals Nonprofit

For both the Ramsey and non-Ramsey rate schedules, the mark-up of Periodicals nonprofit mail was set at one-half the mark-up of Periodicals Regular mail. Since the Ramsey price of Periodicals Regular mail is higher than the non-Ramsey price, the Ramsey price of Nonprofit mail is also higher than the non-Ramsey price.

7. Periodicals Classroom

The estimated own-price elasticity of -1.178 for classroom mail would give this product a low Ramsey mark-up. However, by the constraints of the Revenue Forgone Reform Act, the mark-up is set at one-half the mark-up of Periodicals Regular mail.

8. Periodicals Regular Mail

Periodicals Regular Mail is the least price sensitive of any regular mail subclass, with an own-price elasticity of -0.143. This would call for a very high mark-up under Ramsey pricing. However, the mark-up of Periodicals Regular mail was constrained to be ten percent more than the mark-up on First-Class letters, or 114.00 percent. The reasoning behind this decision can be understood if one considers the impact on Ramsey pricing of a product with a zero own-price elasticity. If a mail product had a completely inelastic demand, increases in price would have no effect on volume. In

theory, the entire net revenues of the firm could be raised from this product alone, with no decline in volume and *no dead-weight loss to society.* The prices of every other product, no matter how elastic or inelastic the demand, would be set equal to marginal costs as no additional net revenue is required. Ironically, the presence of one completely inelastic product would render the relative elasticities of the other products meaningless in determining their Ramsey prices.

Periodicals Regular mail is not completely inelastic, but its own-price elasticity of only -0.143 suggests that large amounts of net revenue could be raised from this product with very little social loss. However, the mark-up of the three preferred subclasses of Periodicals mail is tied to the mark-up of Regular Mail. Therefore, while there would be little social loss in Regular mail from a large increase in Regular mail price, there would be a potentially large social loss from the corresponding higher prices for the three preferred subclasses of Periodicals mail. Therefore, the price of Periodicals Regular mail is constrained below its "true" Ramsey price. Since Periodicals mail is less elastic than First-Class letters, it should have a higher mark-up. To maintain the relative mark-ups called for by Ramsey pricing, Periodicals Regular mail is assigned a mark-up of 113.62 percent, or 1.1 times the 103.29 percent Ramsey mark-up for First-Class letters. The resulting price of Periodicals Regular mail is $0.4724, or 76 percent more than the Non-Ramsey price of $0.2694.

Note that while the price of Periodicals Regular mail is constrained below its Ramsey price, the prices of Periodicals in-county and Periodicals classroom mail are constrained above their Ramsey price and the price of Periodicals nonprofit mail is approximately equal to its Ramsey price (based on these products' own-price elasticities).

9. Standard A Single Piece

The Ramsey price of third-class single piece mail is $1.6402, somewhat greater than the non-Ramsey price of $1.4731. Both price schedules assign a relatively low mark-up on this product.

10. Standard A Regular

Based on the R94-1 mark-up index for noncarrier-route third-class bulk regular mail, the non-Ramsey price of Standard Regular mail is $0.1903, yielding a mark-up of 31.97 percent above product marginal cost. The Ramsey price of Standard Regular mail is $0.2575, more than six cents greater and the mark-up is 78.56 percent. The Ramsey price of Standard Regular is higher for two reasons. First, the product's own-price elasticity is a relatively low -0.382 and second, the cross-price elasticity with First-Class letters volume makes raising Standard Regular price an effective way of raising net revenue. Recall that the Ramsey volume of letters was greater than the non-Ramsey volume because the higher price for Standard Regular would cause some advertising mailers to switch from Standard to First-Class.

11. Standard A Enhanced Carrier Route

In R94-1, carrier-route third-class bulk regular mail was assigned a mark-up that was much higher than the system-wide mark-up. This higher R94-1 mark-up translates to an R97-1 mark-up for Standard A Enhanced Carrier Route mail of 144.12 percent, the largest mark-up of any of the 22 mail products considered in this testimony. The non-Ramsey mark-up on ECR mail is more than four times the mark-up on Regular mail. This rate relation runs counter to the principle of Ramsey pricing which assigns a lower mark-up to the more elastic ECR mail. Under Ramsey pricing, the mark-up for Standard ECR mail is 20.12 percent, far less than the non-Ramsey mark-up.

12. Standard A Nonprofit

For both the Ramsey and non-Ramsey rate schedules, the mark-up for Standard A Nonprofit mail is set at one-half the mark-up for Standard A Regular mail. Consequently, the Ramsey mark-up of Nonprofit mail is greater than the non-Ramsey mark-up, following the rate relation established for Standard A Regular mail.

13. Standard A Nonprofit Enhanced Carrier Route

For both the Ramsey and non-Ramsey rate schedules, the mark-up for Standard A Nonprofit ECR mail is set at one-half the mark-up for Standard A ECR mail. Consequently, the Ramsey mark-up of Nonprofit mail is much less than the non-Ramsey mark-up, following the rate relation established for Standard A ECR mail.

14. Standard B Parcel Post

The Ramsey price for parcel post depends not only on the own-price elasticity of parcel post, but also on the demand for its substitute, Priority Mail. The relatively high own-price elasticity would, in itself, product a low Ramsey mark-up for this product since parcel post price increases would result in relatively large volume declines. Partially offsetting this effect is the increase in Priority Mail volume that would result from an increase in parcel post prices. This offsetting effect on net revenues allows for a higher Ramsey price than would result from consideration of the own-price elasticity along.

Under Ramsey pricing, parcel post price (measured like all the prices as a fixed weight index price) is $4.1123, about thirteen percent more than the non-Ramsey price of $3.6199. The volume of parcel post is much lower under Ramsey pricing due not only to the increase in own-price but to also to the decline in the price of Priority Mail which would cause some mailers to shift from parcel post to Priority.

Under Ramsey pricing, the parcel post price is more than the Priority Mail price, which would appear to be an anomalous result. However, as noted above, these prices

are fixed weight index prices. Parcel post could have a higher average price because parcel post mailings are heavier than the typical Priority Mail piece, while at the same time remaining lower priced for packages of the same weight and traveling the same distance.

15. Standard B Bound Printed Matter

The Ramsey price for bound printed matter is $0.8435, or four percent less than the non-Ramsey price of $0.8816. Forecasted volume under Ramsey pricing is slightly higher due to its lower price.

16. Standard B Special Rate

Based on the R94-1 mark-up index, the non-Ramsey mark-up for Standard B Special Rate mail is only 6.15 percent. This mark-up is considerably less than the non-Ramsey mark-up for Bound Printed Matter of 48.96 percent. Under Ramsey pricing, these two products, which have similar own-price elasticities, have similar mark-ups. The mark-up for Special Rate mail under Ramsey pricing is 38.16 percent, slightly less than the mark-up on Bound Printed Matter due to its somewhat greater own-price elasticity.

17. Standard B Library Rate

For both the Ramsey and the non-Ramsey price schedules, the mark-up for Library Rate mail is set at one-half the mark-up of special rate. Since the Ramsey mark-up of special rate is somewhat higher than the non-Ramsey mark-up, Library rate mail has a higher mark-up under Ramsey pricing. The difference is rather small, with the Ramsey price being $2.0383 per piece and the non-Ramsey pricing being $1.7643 per piece. In both cases, the mark-up on Library rate mail is the lowest of the four subclasses of Standard B mail.

18. Registry Mail

The Ramsey mark-up of Registry mail was constrained to 61.40 percent to ensure that this special service would generate enough revenues to cover its incremental costs. The pure Ramsey mark-up of Registered mail would be something on the order of 30 percent above product marginal cost. The non-Ramsey price of Registry mail is $8.2301, somewhat less than the Ramsey price.

19. Insurance

Insurance has a low own-price elasticity of -0.105 and would have a high Ramsey mark-up. However, following the logic put forth for Periodicals Regular mail, the Ramsey mark-up on Insurance was constrained to 113.62 percent. Even given this constraint, the Ramsey price for insurance is $2.9067, forty percent greater than the non-Ramsey price of $2.0851.

20. Certified Mail

The Ramsey price for Certified Mail is $1.7266, about twenty percent less than the non-Ramsey price of $2.1812. The lower results in an increase in volume and an increase in net revenues from Certified Mail under Ramsey pricing.

21. COD

The Ramsey mark-up for COD, like the Ramsey price for Insurance, was constrained to 113.62 percent, yielding a Ramsey price of $9.3372. This price is more than twice the non-Ramsey price for COD of $4.5288, reflecting the principle that products with inelastic demands should have a higher mark-up.

22. Money Orders

The Ramsey price for money orders is $0.8368, yielding a mark-up of 34.32 percent. This is higher than the non-Ramsey price of money orders of $0.7171.

Chapter 6. Gains to Mailers from Ramsey Pricing

A. Gain to Mailers is Measured by Change in Consumer Surplus

The present chapter provides a quantitative measure of the gains to mailers from a move to Ramsey pricing from the non-Ramsey alternative pricing schedule. Consumers benefit because Ramsey pricing is designed to minimize the burden imposed on consumers by the requirement that Postal Service total revenues equal Postal Service total costs of operations. One way to see this benefit to consumers is that the overall mark-up under Ramsey pricing is 77.80 percent as compared to 80.07 percent under the non-Ramsey rate schedule. Another reflection of the benefit to mailers is that total volume of mail under Ramsey prices is 4.5 percent greater than under the non-Ramsey rate schedule. Thus, under Ramsey pricing, mailers face a lower average mark-up and send a larger volume of mail.

As discussed in Chapter 1, the proper measure of the gain to mailer's from Ramsey pricing is the change in total consumer surplus across the 22 products considered. A product with a Ramsey price lower than its non-Ramsey price will generate an increase in consumer surplus. A product with a higher Ramsey price will have the opposite effect. The overall impact on mailers is measured by the sum of the changes in consumer surplus across the 22 products included in the Ramsey model.

Recall from Chapter 1 that the change in consumer surplus from a price change has two components: the change in expenditures mailers make to send the volume of mail sent at the Ramsey price plus the net value of the change in consumption resulting from a move to the Ramsey price from the non-Ramsey price.

Considering the case where the Ramsey price is less than the non-Ramsey price, the first part of this change in consumer surplus is:

$$(V_0)\cdot(P_0 - P_R) \qquad (9A)$$

where V_0 is the volume consumed at the non-Ramsey price of P_0, and P_R is the Ramsey price.

The second part of the change in consumer surplus is the net value of the additional consumption that occurs at the lower price. Assuming a linear demand curve for simplicity, that gain is the triangular AREA 2 in Exhibit 1 and is equal to:

$$\frac{1}{2}(V_R - V_0)\cdot(P_0 - P_R) \qquad (9B)$$

where the first term is the increase in volume and the second term is the change in price and the one-half gives the formula for the area of a triangle.

Combining (9A) and (9B) yields the formula for the total change in consumer surplus:

$$\frac{1}{2}(V_R + V_0)\cdot(P_0 - P_R) \qquad (9C)$$

If the Ramsey price (P_R) is less than the non-Ramsey price (P_0), the above expression is positive, showing a gain to mailers from a decline in price. If P_R is greater than P_0, there is a loss to mailers from an increase in price. The total change in consumer surplus is the sum of the individual changes across the 22 products considered.

The above measure must be considered an estimate for two reasons. First, the demand curves used in estimating the Ramsey prices and volumes are not linear, but logarithmic demand curves. A second reason why the above measure of the change in consumer surplus is an estimated gain is that the exact measure is complicated by the interrelation between the demands of many postal products. The demand curve for a given mail product will shift in response to changes in the price of substitute mail products, as opposed to the example shown above in which the demand curve did not shift. The estimated gains to mailers presented in this chapter ignore the effect of shifts

in the demand curve resulting from changes in the prices of substitute products. However, because the cross-price elasticities between postal products are generally quite small or non-existent, the resulting shift in the demand curves are also quite small. Consequently, the actual gains to consumers will not be substantially different from the estimated gains presented in this section.

B. Postal Service is Unaffected by Ramsey Pricing

The finances of the Postal Service are unaffected by the move to Ramsey prices. That is because the Ramsey prices and, indeed, any price schedule established for the Postal Service, must satisfy the break even requirement. Net revenues under the Non-Ramsey price schedule are $25,850 million equal, aside from rounding, to the net revenues earned under Ramsey pricing. Therefore, whatever gains are realized by mailers are pure gains, not at the expense of the Postal Service's financial position.

C. Presentation of Gains to Mailers

Table 13 presents the change in consumer surplus for users of each subclass of mail resulting from a move to Ramsey pricing from the non-Ramsey alternative price schedule for the 1998 Test Year. The estimated change in consumer surplus are calculated from equation (9C) above. Note that products that have a higher Ramsey price (such as First-Class letters) impose a loss on mailers while products that have a lower Ramsey price (such as First-Class cards) provide a gain to mailers. Table 13 shows that in the aggregate Ramsey pricing provides a net gain to mailers of $1,023 million. This is equal to about 1.8 percent of total expenditures (at non-Ramsey prices) on the 22 products included in the model.

TABLE 13
Change in Consumer Surplus from Ramsey Pricing

Mail Product	Non-Ramsey Price	Ramsey Price	Change in Consumer Surplus ($ millions)
First-Class Letters	$0.3488	$0.3551	-606.9
First-Class Cards	$0.1612	$0.1420	+124.1
Priority Mail	$4.4053	$2.4124	+2,433.7
Express Mail	$14.0132	$11.2947	+173.1
Periodicals In-County	$0.1001	$0.1416	-33.4
Periodicals Nonprofit	$0.1704	$0.2409	-146.4
Periodicals Classroom	$0.2991	$0.4229	-3.9
Periodicals Regular	$0.2694	$0.4724	-1,396.2
Standard Single Piece	$1.4731	$1.6402	-21.8
Standard Regular	$0.1903	$0.2575	-2,278.9
Standard ECR	$0.1630	$0.0802	+3,030.8
Standard Nonprofit	$0.1248	$0.1498	-248.6
Standard NP ECR	$0.0866	$0.0554	+99.5
Parcel Post	$3.6199	$4.1123	- 99.3
Bound Printed Matter	$0.8816	$0.8435	+ 21.7
Special Rate	$1.3657	$1.7775	-86.0
Library Rate	$1.7643	$2.0383	-7.7
Registry	$8.2301	$8.3269	-1.5
Insurance	$2.0851	$2.9067	-25.2
Certified	$2.1812	$1.7266	+143.0
COD	$4.5288	$9.3372	-17.9
Money Orders	$0.7171	$0.8368	-29.2
Total			+1,023.0

As explained earlier, the gain to mailers presented in Table 13 is an estimated gain for two reasons. First, the estimated gain is based on a linear approximation of the log-log demand curve. Second, cross-price effects cause the demand curves for several products to shift, greatly complicating the calculation of the change in consumer surplus. To check the significance of the linear estimation of consumer surplus, the change in consumer surplus for those categories that have no cross-price effects was recalculated assuming the log-log demand curve. In these cases, the exact change in consumer surplus can be calculated by taking the integral of the demand curve between Ramsey and non-Ramsey prices. Table 13 shows that the 16 products without cross-elasticities (all products except First-Class letters and cards, Priority Mail, Express Mail, Standard A Regular, and Parcel Post) have an estimated change in consumer surplus of $1,277 million. The total change in consumer surplus of these 16 products using a log-log demand curve was found to be $1,206 million, demonstrating that the simple linear approximation is quite accurate.

It should be noted that the change in consumer surplus is the one-year gain from Ramsey pricing, an annual gain that will continue until the next postal rate case at which time new Ramsey rates could be implemented.

Chapter 7: Ramsey Pricing of Single-Piece and Workshared Letters

The Ramsey prices presented in Chapter 5 were the economically efficient prices for mail subclasses. An important remaining issue is the economically efficient prices of categories within a subclass. Of particular interest are the efficient prices of First-Class single-piece and workshared letters and, with these prices, the efficient discount for workshared mail.

The level of the workshare discount is important not only because it affects the volumes of single-piece and workshared letters but because it determines whether the mailer or the Postal Service engages in mail presortation and automation. An increase in the workshare discount provides a greater incentive for mailers to perform the activities necessary to qualify for this discount. This affects the total cost of providing mail service which has important economic implications. The present Chapter outlines the issues related to the efficient pricing of workshared First-Class letters, discusses whether Ramsey pricing is consistent with the establishment of the efficient workshare discount, and presents illustrative estimates of the efficient price for single-piece and workshared letters.

A. Principle of Efficient Component Pricing

The principle of Efficient Component Pricing (ECP) is that any activity that can be performed by more than one agent should be performed by the most efficient (least cost) agent. In the case of postal services, the principle of Efficient Component Pricing can be applied to the establishment of a discount granted to mailers for performing some task that would otherwise be performed by the Postal Service, such as mailer presorting instead of Postal Service sorting. ECP minimizes the total cost of providing mail service, where the total cost is the sum of the Postal Service's cost plus the mailer's cost of worksharing (known as a user cost) if the mailer chooses to workshare.

Under ECP, the price difference between a non-workshared mail category and its workshared component should equal the difference between the Postal Service costs of the non-workshared and workshared mail category.

Suppose, for example, the Postal Service cost for nonpresorted mail is 20 cents and its cost for presorted mail is 15 cents. If the price of nonpresorted mail is set at 35 cents, then under ECP the price of the presorted mail category should equal 30 cents, or 5 cents less than the price for nonpresorted mail to reflect the 5 cent difference in Postal Service costs.

Table 14 shows how ECP minimizes the total cost of providing mailer service including the mailer's user cost. Assume that mailer presortation costs differ across mailers so that some mailers can presort for less than 5 cents (low cost mailers) and other mailers have a cost for presortation that is more than 5 cents (high cost mailers). Table 14 shows how high cost and low cost mailers respond to efficient component pricing. Mailers face the option of presorting the mail themselves and incurring their presortation (user) cost while also receiving the presort discount, or mailers can pay the undiscounted price and allow the Postal Service to sort the mail.

For high cost and low cost mailers, the lowest cost option is marked in bold in Table 14. As the table shows, mailers with a user cost greater than five cents will choose to send nonpresorted mail and mailers with a user cost less than five cents will choose to send presorted mail.

Table 14
High Cost and Low Cost Mailers Response to Efficient Component Pricing

	High Cost Mailers User Cost > 5 cents		Low Cost Mailers User Cost < 5 cents	
Mail Category	Nonpresort	Presort	Nonpresort	Presort
Postal Price	30 cents	25 cents	30 cents	25 cents
User Cost	0 cents	> 5 cents	0 cents	< 5 cents
Total Price	**30 cents**	> 30 cents	30 cents	**< 30 cents**
Total Cost postal + mailer	**15 + 0 cents = 15 cents**	10 + > 5 cents = >15 cents	15 + 0 cents = 15 cents	**10 +< 5 cents = <15 cents**

Table 14 also shows how ECP minimizes the total cost of providing mail service. High cost mailers (mailer's whose user cost exceeds the Postal Service cost difference between nonpresorted and presorted mail) choose to send nonpresorted mail. In this case, the total cost of sending the mail is the Postal Service cost of 15 cents. This is less than would be the total cost for sending presorted mail by high cost mailers. At the same time, low cost mailers (whose user cost is less than the Postal Service cost difference) choose to send presorted mail and the total cost (Postal Service cost plus mailer user cost) is less than the 15 cent Postal Service cost for nonworkshared mail.

Suppose, however, that the workshare discount was greater than the Postal Service cost difference, as for example a discount of seven cents. With a discount of seven cents, some mailers who can presort for six cents would choose to presort their mail because their six cent presort cost is less than the seven cent discount. In this case, the mailer would be sorting mail for six cents that would only cost the Postal Service five additional cents to sort.

Similarly, suppose the discount were set less than the Postal Service discount, as for example a discount of three cents. In this case, a mailer who could presort for

four cents would choose not to presort because the three cent discount is less than the mailer's four cent user cost. The Postal Service would end up incurring an additional five cents in cost instead of the mailer incurring only four cents in cost. Thus, discounts that do not equal the Postal Service cost difference can cause the higher cost party to perform the workshare task.

It is important to understand that ECP applies when the two categories of mail differ with respect to the assignment of certain tasks between the mailer and the Postal Service. The principle of ECP does not apply when establishing prices between different subclasses, as for example, the pricing of First-Class letters and Standard A Regular mail. There is no economic principle that argues that the price difference between First-Class letters and Standard A letters should equal their cost difference.

B. Is ECP Consistent With Ramsey Pricing?

In comparing Ramsey pricing principles to Efficient Component Pricing principles, one important distinction between the two pricing rules needs to be made. Unlike Ramsey pricing, a break-even constraint is not a necessary condition for the application of ECP. In fact, without a break-even constraint, the first-best efficient pricing strategy is to set product prices equal to marginal costs. With the prices of nonworkshared and workshared mail set equal to their respective marginal costs, the price difference (or discount) is equal to the cost difference, exactly as prescribed by ECP. The relevant question for postal pricing is whether the presence of a binding break-even constraint (Ramsey pricing) yields results that differ from those obtained from Efficient Component Pricing.

1. The Apparent Conflict Between ECP and Ramsey Pricing

Ramsey pricing establishes the mark-up of price over cost that minimizes the burden on consumers (mailers) while still satisfying a break-even constraint. The

principle of Ramsey pricing is that the mark-up should be inversely related to the price elasticity of the mail product, with less elastic mail products being assigned a higher mark-up than more elastic mail products. Another implication of Ramsey pricing is that two mail products that have the same price elasticity should be assigned the same mark-up.

Suppose the nonpresorted and presorted mail category have the same own-price elasticity. Then, under Ramsey pricing, the two categories should have the same percentage mark-up of price over marginal cost. Suppose the efficient Ramsey markup is 100 percent above marginal cost. Using the example presented in Table 14, the Ramsey price of the non-workshared mail category should be 30 cents (100 percent above its 15 cent postal cost) and the Ramsey price of the workshared category would be 20 cents (100 percent above its 10 cent postal cost). But the Ramsey prices establish a price difference between the two categories of 10 cents (30 cents minus 20 cents), greater than the Postal Service cost difference of 5 cents. Consequently, high cost mailers with a user cost of less than 10 cents would have incentives to send presorted mail even though their cost of presorting exceeds the Postal Service cost difference. If this were to occur, the total costs of providing mail service would increase. Thus, Ramsey pricing appears to conflict with Efficient Component Pricing.

2. Re-thinking the Apparent Conflict

a. Movements between Workshared and Nonworkshared Mail

The apparent conflict between Ramsey Pricing and Efficient Component Pricing stems from the incomplete modeling of the demand for nonpresorted and presorted mail in the above example. Considering only own-price effects fails to model the movement of mail between nonpresort and presort as the discount changes. Suppose

the nonpresort price increases while holding constant the presort price. The volume of nonpresort mail would decline (through the own-price effect), but there would be no increase in the volume of presort. Most likely, an increase in the nonpresort price and resulting increase in the workshare discount would cause some current nonpresort mailers to send presorted mail.

Considering only own-price effects, therefore, is not consistent with the principle of worksharing which drives the application of Efficient Component Pricing. If no mail is shifting between nonpresorted and presorted letters in response to changes in the discount, then (by construction) the discount has no effect on the assignment of worksharing activities. In this case, one is essentiallly dealing with two separate demands and the Ramsey price rule should be applied. Application of ECP requires a term measuring movements between the two categories.

The Postal Service demand equations for single-piece and workshared letters provide for movements between these two letter categories. The demand model includes separate own-price elasticities for single-piece and workshared letters and a discount elasticity which moves mail between the two categories based on the level of the discount.

Put differently, the Postal Service demand equations can be thought of as modeling three types of First-Class letter mail: (A) letters that will never be workshared for any reasonable level of the discount; (B) letters that may be workshared depending on the level of the discount; and (C) letters that will always be workshared for any reasonable level of the discount. The own-price elasticity of single-piece letters can be thought of as modeling the demand for (A); the own-price elasticity of workshared letters models the demand for (C); and the discount elasticity models the demand for (B).

Suppose for example, the volume of mail in (B) [cross-over mail] was trivially small or, along the same lines, the discount elasticity was trivially small. Then (A) and (C) should be priced according to the Ramsey elasticity formula and the level of the discount would be largely immaterial since the (B) volume movements are so small. That is, if the level of the discount has only a very small impact on the volumes of mail that are workshared or not workshared, then any gains from establishing the "efficient" discount are dwarfed by the gains from establishing the efficient (Ramsey) prices necessary to satisfy the break-even constraint. On the other hand if the size and/or elasticity of B were large, the level of the discount would be an important part of the efficient pricing exercise because changes in the mix of workshared and nonworkshared mail would have important effects on revenues, costs, and net revenues.

b. Impacts on Mailer User Costs

The simple example that suggested a conflict between Ramsey and ECP pricing did not include in the Ramsey price calculations the costs borne by mailers to presort. This mailer user cost is part of the social price and social costs that are affected by the pricing of postal products. Ramsey prices are often calculated assuming that postal costs are unaffected by postal prices. In this simplified case, productive (costing) efficiency is not considered because costs are unaffected by the Ramsey prices. But if postal costs are affected by Ramsey prices -- as in the case where worksharing discounts affect the assignment of certain tasks between the mailer and the Postal Service -- then the Ramsey price equations would include the impact of postal prices and discounts on the total costs of providing mail.

Less formally, one can model Ramsey pricing consistent with ECP by establishing the efficient mark-up of *total* price over *total* marginal cost, where both total

price and total marginal cost include the mailer's user cost. Furthermore, both price and costs are prices and costs occurring at the margin.

Suppose the Postal Service establishes a presort discount equal to its cost difference between nonpresorted and presorted mail, as called for by Efficient Component Pricing. In the example considered above, the presort discount would equal five cents. Mailers with user costs less than five cents would choose to presort their mail. At the margin, a mailer with a user cost exactly equal to five cents would be indifferent to presorting and not presorting.

Table 15 shows that efficient component pricing of presorted and nonpresorted mail can establish the same percentage mark-up for the two mail categories when total price (at the margin) and total cost (at the margin) are considered.

Table 15
ECP Can Establish Ramsey Mark-Ups
When Total Price and Total Cost are Considered

	Efficient Component Pricing	
Mail Category	Nonpresort	Presort
Postage Price	30 cents	25 cents
User Cost	0 cents	5 cents
Total Price	**30 cents**	**30 cents**
USPS Cost	15 cents	10 cents
User Cost	0 cents	5 cents
Total Cost	**15 cents**	**15 cents**
% Mark-Up	100%	100%

C. Considerations Relevant to the Workshare Letter Discount

The preceding example showed that there is no necessary conflict between Ramsey pricing and Efficient Component Pricing when the total price and cost of mail are considered. ECP can be thought of as part of Ramsey pricing, in that the principle of ECP is integrated with a break-even constraint. However, the preceding example was a simplified version of the real problem of establishing the proper workshare discount for First-Class letters. The present section discusses some of the additional considerations relevant to the pricing of single-piece and workshare First-Class letters.

1. Demand Equations for Single-Piece and Workshared Letters

In the example considered in Table 15, the own-price elasticities of the nonworkshared and workshared mail categories were assumed equal. However, as noted earlier and as presented in Table 4 in Chapter 3, single-piece and workshared First-Class letters have different own-price elasticities. The impact of these different elasticities needs to be included in the pricing of single-piece and workshared letters. Moreover, as discussed above, the volume movements between the nonworkshared and workshared category in response to changes in the discount needs to be considered. These volume movements between nonworkshared and workshared letters can have important effects on Postal Service revenues, Postal Service and mailer user costs, and net revenues earned from the First-Class letter subclass.

2. Price Difference is Not the Discount

Postal prices, as measured in the econometric demand estimation, are fixed weight index prices. The impact of extra ounce charges is included as part of the price calculation for First-Class single-piece and workshared letters. As a consequence of these extra ounce charges, the before-rates price of single-piece letters is 39.34 cents, or 7.34 cents more than the 32 cent rate for a basic one ounce letters. The FWI price

of workshared letters is 26.91 cents, which also reflects a smaller impact of extra ounce charges as well as the impact of the various worksharing category discounts. Thus, the FWI price difference between single-piece and workshared letters is 12.43 cents.

However, the average workshare discount (measured as a FWI of the individual category discounts) is 6.00 cents, not 12.43 cents. Thus, unlike the simplified example, the difference between the nonworkshared and workshared category prices is not equal to the workshare discount.

3. Average versus Marginal Cost

a. Postal Service Average Cost Difference

In the simplified example shown in Tables 14 and 15, the ECP discount was set equal to the Postal Service cost difference between the nonworkshared and workshared mail. That is, if workshared mail costs the Postal Service 5 cents less, a 5 cent workshare discount will ensure that mailers with a user cost less than 5 cents will perform the worksharing task themselves. This was shown to minimize the total cost of providing mail service.

In reality, the difference between the Postal Service cost of nonworkshared and workshare mail may reflect more than simply the Postal Service's cost of performing the worksharing tasks. Single-piece mail may be more costly to process because in addition to not being presorted or automated, it is more likely to have a hand-written address, have a missing or incorrect ZIP Code, have an unusual shape or some other characteristic that makes it more costly for the Postal Service to handle. Moreover, the type of mail that is most likely to shift from single-piece to workshare mail is probably relatively low cost single-piece mail. As a result, when the workshare discount is increased, the mail that shifts from single-piece to workshare probably has a cost that is

less than the average cost of all single-piece mail, a consideration that is relevant to both Ramsey Pricing and Efficient Component Pricing.

b. Average versus Marginal User Cost

A similar problem arises in dealing with mailer user costs. In the simplified example, the marginal user cost (the user cost of the mailer who is indifferent to workshared or nonworkshared mail) is equal to the workshare discount. If the discount is increased while holding the price of the workshare product unchanged, i.e., the price of the nonworkshared product is increased, mailers with higher user costs will begin worksharing and the marginal user cost will equal the new higher discount.

A somewhat different result occurs if the discount is increased by lowering the price of the workshare product while holding the price of the nonworkshared product unchanged. As in the previous example, the increase in the discount will cause some mailers to begin worksharing. But, unlike the previous example, the decline in the price of the workshare product will lead to an increase in volume by mailers who are already worksharing. The marginal user cost is not as clearly defined as in the first example. The increase in workshare volume comes both from mailers whose user cost is above the old discount but less than or equal to the new discount, and from mailers whose user cost is below the old discount. In other words, when the discount is increased through a decline in the price of workshare mail, the additional workshare volume that results is a mix of low cost and high cost users.

D. Ramsey Prices of Single-Piece and Workshared Letters

1. Statement of the Problem

The previous section detailed some of the practical considerations that need to be taken into account in establishing the efficient prices for single-piece and workshared letters. The approach taken here is based on the principle of de-averaging

the Ramsey subclass price of First-Class letters in a fashion that leaves the Postal Service's financial position unchanged. The Ramsey price of First-Class letters yields $17,237 million in net revenues (see Table 11). The task investigated here is to find prices for single-piece and workshared letters that minimize the burden on consumers while yielding combined net revenues equal to the Ramsey subclass net revenues of $17,237 million. In this exercise, it is assumed that there is only one workshare category and only one workshare price and discount to be established.

The separate prices for single-piece and workshared letters are based on the product's different own-price elasticities and marginal costs. The workshare discount that prevails under Ramsey pricing is equal to the difference between the Ramsey FWI for single-piece letters and the Ramsey FWI for workshared letters, after adjusting for the impact of extra charges. The before-rates difference between the FWI of single-piece letters (39.34 cents) and the FWI of workshare letters (26.91 cents) is 12.43 cents. This is 6.43 cents more than the current weighted average discount of 6.0 cents. Therefore, the Ramsey workshare discount is equal to the difference between the Ramsey price of single-piece and workshared letters, less 6.43 cents. The level of the discount determines the volume of mail shifting from single-piece to workshared letters.

2. Data Used in Pricing of Single-Piece and Workshared Letters

a. Elasticities

The own-price elasticities for single-piece and workshared First-Class letters were presented in Table 4. The own-price elasticity of single-piece letters is -0.189240 while the own-price elasticity of workshared letters is -0.289173. These elasticities are used to calculate the Ramsey prices of single-piece and workshared letters.

The discount elasticity measures movements of mail between single-piece and workshared letters in response to changes in the discount. These volume shifts impact

revenues, Postal Service and mailer user costs, and Postal Service net revenues. The Ramsey prices therefore depend on the mix of mail between single-piece and workshared letters.

b. Marginal Costs

The marginal cost of single-piece letters is $0.2324 and the marginal cost of workshared letters is $0.0991, equal in both cases to Test Year forecasted volume variable cost per piece. Added to the postal marginal cost of workshared letters is the marginal user cost. As explained in Section C, when the workshare discount is increased through a decrease in the price of workshared mail (as is the case under Ramsey pricing) the resulting increase in workshare volume comes from a mix of low cost and high cost mailers. At current rates, the workshare discount in 6.0 cents which equals the highest user cost of any workshare mailer. At the higher Ramsey discount, mailers with user costs between 6.0 cents and the Ramsey discount will begin to workshare. At the same time, the decrease in the price of workshare mail leads to an increase in mail sent by mailers who are currently worksharing. The estimated average user cost of these mailers is 2.45 cents. Consequently, the additional (marginal) workshare volume consists of a mix of low user cost and high user cost mail.

Marginal cost can be defined as the change in total cost divided by the change in volume. Marginal user cost, therefore, would be equal to the change in total user cost divided by the change in workshare letter volume. However, since the marginal user cost for workshare mail affects the Ramsey price, and the Ramsey price affects the workshare volume, it is necessary to assume a reasonable value for the marginal user cost in the Ramsey price calculations. The marginal user cost is taken to equal 9.0 cents, a value that is found to be consistent with the estimated change in total user costs divided by the change in workshare volume.

A key assumption of the price calculation is that when a piece of mail shifts from single-piece to workshare, the postal marginal cost of that mail falls from the single-piece marginal cost of $0.2324 to the workshare marginal cost of $0.0991, thereby saving the Postal Service saves $0.1333 per piece. The total savings to society are equal to the postal savings minus the mailer's workshare user cost.

c. Net Revenue Requirement

The Ramsey prices of single-piece and workshared letters are set to yield the same level of net revenues as earned from the Ramsey price of the First-Class letter subclass. Accordingly, as shown in Table 11, the net revenue requirement is $17,237 milion.

d. Volume Forecast

The volume of single-piece and workshared letters is equal to their before-rates volume adjusted for the effects of changes in own-price, and on the discount between single-piece and workshared letters. In the present excercise, the prices of First-Class cards and Standard A Regular mail are set equal to their Ramsey prices. Since the Ramsey prices of these products are different from their before-rates prices, the impact of this price change is included in the volume forecast of single-piece and workshared letters. Volume forecasts are made using the Effective Test Year price and discount elasticities.

The volume forecast of workshare letters is a function of the workshare price, including user costs. At the before-rates prices, average workshare user cost is estimated to be 2.45 cents. An increase in the workshare discount will lead to an increase in the average user cost as more high user cost mailers begin worksharing. However, the new higher average user cost will be much less than the new marginal user cost. The marginal user cost reflects the user costs associated with the increase

in workshare volume, which is dominated by high user cost mailers who begin worksharing when the discount is increased. The average user cost reflects the user cost of all workshare mailers, which is dominated by the mailers who are already sending workshare mail at the before-rates discount. It is estimated that the average user cost increases from 2.45 cents to 3.45 cents, or by 1.0 cent, under Ramsey pricing. This higher average user cost is included in the volume forecast of workshare letters under Ramsey pricing.

The before-rates volume of single-piece letters is 54,394.309 million pieces and the before-rates FWI price is $0.3934. The before-rates volume of workshare letters is 41,506.989 million pieces and the before-rates FWI price is $0.2691. The before-rates weighted average discount is 6.00 cents. The before-rates price of First-Class cards and Standard A mail are $0.1864 and $0.2468 (including user costs). The Ramsey prices of First-Class cards and Standard A mail are $0.1421 and $0.2951 (including user costs).

3. Presentation of Ramsey Prices

a. Prices of Single-Piece and Workshared Letters

Based on the information presented above, Ramsey prices are calculated for single-piece and workshared letters. Table 17 presents the Ramsey prices, volumes, revenues, volume variable costs, and net revenues of single-piece and workshared letters. The data are compared to corresponding before-rates data. Note that the Ramsey net revenue exceeds the before-rates net revenue because of the need to satisfy the break-even requirement and because of the higher mark-up under Ramsey pricing on First-Class letters.

As shown in Table 17, the Ramsey FWI price of single-piece letters is $0.4504, about 5.7 cents, or 14 percent, greater than the before-rates price. This would translate

into a basic one ounce rate of between 36.6 and 37.7 cents, depending on whether the increase is applied as a percentage increase or as an absolute increase. The Ramsey FWI of workshare letters is $0.2423 compared with a current FWI price for workshare letters of $0.2691, a decrease of about nine percent.

Table 17
Before-Rates and Ramsey Prices of Single-Piece and Workshared Letters

Before-Rates	Postage Price FWI	Postal MC	Test Year Volume	Total Revenue	Total Cost	Net Revenue
Single-Piece	$0.3934	$0.2324	54,394	$21,398	$12,639	$9,329
Workshare	$0.2691	$0.0991	41,507	$11,169	$4,115	$6,977
Total Letters			95,901	$32,568	$16,754	$15,814
Ramsey	Postage Price FWI	Postal MC	Test Year Volume	Total Revenue	Total Cost	Net Revenue
Single-Piece	$0.4504	$0.2324	46,873	$21,113	$10,891	$10,222
Workshare	$0.2423	$0.0991	48,986	$11,872	$4,856	$7,016
Total Letters			95,859	$32,985	$15,747	$17,238

b. The Ramsey Workshare Discount

The Ramsey workshare discount is equal to the difference between the Ramsey FWI of single-piece letters and the Ramsey FWI of workshare letters, less 6.43 cents to account for the differing effects of extra charges on these FWI prices. The difference between the Ramsey FWI prices is 20.81 cents, which yields an efficient discount of about 14.38 cents, considerably larger than the current discount of 6.0 cents. Recognize that the large Ramsey discount stems from the assumption that mail shifting from single-piece to workshare letters has the same postal marginal cost as all other workshare mail.

An interesting result from the analysis is that the Ramsey discount is slightly greater than the per piece cost difference between single-piece and workshared letters. The Ramsey discount is 14.38 cents, somewhat larger than the Postal Service cost difference of 13.32 cents. The Ramsey discount is greater than the ECP discount because the per piece mark-up on the less elastic single-piece letters is slightly greater than the per piece mark-up on workshared letters (after consideration of the effect of extra charges on the category FWI). The intuition of the above result is that the efficiency gains obtained from raising the price of the relatively less elastic single-piece letters outweigh any efficiency losses resulting from a discount that does not equal the Postal Service's cost difference. Consider, for example, the case in which the volume of mail that shifts between single-piece and workshared is trivially small. If this were the case, the level of the discount would be largely immaterial and the efficient prices of single-piece and workshared letters would be based on their different own-price elasticities of demand.

Put differently, one can estimate the productive inefficiency associated with a discount greater than the cost difference. Some single-piece mailers with a workshare user cost between 13.32 cents and 14.38 cents would be induced to workshare even though their user cost is greater than the Postal Service cost difference. The volume of mail that is mis-sorted in equal to the change in single-piece volume that occurs when the discount is increased from 13.32 cents (the ECP discount) to 14.38 cents (the Ramsey discount). This change in volume can be estimated by applying the Test Year discount elasticity of single-piece mail (-0.146183) to the ratio of the Ramsey and ECP discounts, or $[(14.38/13.32)^{-0.146183}]$- 1, or -1.113 percent. Multiplying the before-rates Test Year volume of single-piece letters of 54,309 million pieces by 1.113 percent gives the result that 605 million pieces of mail are mis-sorted.

Mis-sorting occurs by former single-piece mailers who have a user cost between 13.32 cents and 14.38 cents. Assuming for simplicity that user costs are uniformly distributed in this range, the average user cost is 13.85 cents, or 0.53 cents more than the Postal Service's cost difference. Therefore, the increase in total costs that occurs from mis-sorting is 0.53 cents multiplied by 605 million pieces or about $3.2 million. The extra cost associated with this mis-sorting appears to be quite small.

This $3.2 million of extra sorting cost could be eliminated by establishing a discount equal to the cost difference. To do this would require lowering the price of single-piece letters and raising the price of workshared letters in a way that leaves net revenues unaffected. Doing this however, would result in a net loss of consumer surplus (an increase in leakage) as the price of the more elastic product is raised and the price of the less-elastic product is lowered. The resulting loss of consumer surplus would outweigh the $3.2 million in saved sorting costs.

4. Gains from Efficient Pricing

a. Effect on Volumes, Costs, and Net Revenues

Table 17 shows the benefits from efficient pricing of single-piece and workshared letters. By raising the price of the relatively less elastic single-piece letters and lowering the price of the relatively more elastic workshare letters, total letter volume increases to 95,859 million pieces from the Ramsey letter volume of 95,526 million pieces obtained when pricing was done as the subclass level (see Table 11). Total volume under Ramsey pricing is almost as large as the before-rates volume of 95,901 million pieces. In addition, efficient pricing reduces the total Postal Service cost of providing First-Class letter mail. On a per piece basis, First-Class letter costs fall from $0.1747 at the before-rates volumes to $0.1644 at the Ramsey volumes, more than a

cent per piece less. Yet, net revenues under Ramsey pricing are $17,238 million, $1,424 million more than the estimated net revenues earned at the before-rates prices.

b. Effect on Total Mailer User Costs

A measure of the gain from efficient pricing is provided by comparing the total expenditures by mailers (postage plus user cost) under the two rate schedules, bearing in mind that the Ramsey prices yield a considerable increase in net revenues. This calculation requires an estimate of total user costs at the Ramsey prices. Total user costs are higher under Ramsey pricing for two reasons: there is more workshare mail and, due to the increase in the discount, worksharing is performed by higher user cost mailers. As noted earlier, the increase in workshare mail volume is a mix of old low user cost mailers and new higher user cost mailers.

Under Ramsey pricing, single-piece volume decreases from 54,394 million pieces to 46,873 million pieces, or by 7,521 million pieces. Much of this decrease in volume is due to the increase in the workshare discount which causes some single-piece mailers to begin worksharing. The workshare discount increases from 6.0 cents to 14.38 cents. Applying the Test Year workshare elasticity of -0.146183 to the ratio of the new and old discounts yields the result that the increase in the discount caused 12.00 percent of single-piece volume to become workshare volume. This implies that 6,524 million pieces of mail (12.00 percent of the before-rates workshare volume of 54,394 million pieces) switched from single-piece to workshare in response to the increase in the discount.

The average user cost of this mail is something between the old discount of 6.0 cents and the new discount of 14.38 cents. The midpoint of these two discounts is 10.19 cents, which can be taken as average user cost for the mailers who switched

from single-piece to workshare letters. Thus, the total user costs of these new workshare mailers is estimated to $0.1019 times 6,524 million pieces, or $665 million.

Added to this level of user costs are the user costs of mailers who were already worksharing at the before-rates discount of 6.0 cents. Total workshare volume under Ramsey pricing is equal to 48,986 million pieces and volume of mail switching from single-piece is estimated to equal 6,524 million, yielding 42,462 million pieces of mail sent by mailers with low user costs. The estimated average user cost of these mailers is 0.0245 cents, yielding total user costs (from this group) of $1,040 million. Combining the two groups of workshare mailers, total user costs under Ramsey pricing are estimated to be $1,705 million.

c. Effect on Total Expenditures by Mailers

Table 18 summarizes the above analysis and presents estimates of total expenditures for First-Class letters under Ramsey pricing. Workshare 1 is workshare mail sent by mailers who were worksharing at the before-rates discount. Workshare 2 is mail that switched from single-piece to workshare in response to the increase in the discount under Ramsey pricing.

Table 18
Total Mailer Expenditures for First-Class Letters

Ramsey	Test Year Volume	Postage Price FWI	Postage Expense	Average User Cost	User Cost Expense	Total Expense
Single-Piece	46,873	$0.4504	$21,113	$0.0000	$0	$21,113
Workshare 1	42,462	$0.2423	$10,291	$0.0245	$1,040	$11,331
Workshare 2	6,524	$0.2423	$1,581	$0.1019	$665	$2,246
Total Letters	95,859		$32,985		$1,705	$34,690

Table 18 shows that under Ramsey pricing of single-piece and workshare letters, mailers would pay $34,690 million to send 95,859 million pieces of mail. The average expenditure per piece is $0.3619. At the before-rates prices, mailers sent 95,901 million pieces at an average expenditure per piece of $0.3521, equal to the before-rates price including user costs. At the R97-1 non-Ramsey rates based on the R94-1 mark-ups, mailers sent 95,370 million pieces of First-Class letters at an average expenditure per piece for First-Class letters is $0.3589, equal to the non-Ramsey postage price plus the average user cost. Average expenditures under Ramsey pricing are higher because net revenues under Ramsey pricing are greater than under the before-rates pricing schedule or the non-Ramsey rate schedule.

d. Net Gain from Efficient Pricing of Letter Categories

The total gain from Ramsey pricing of single-piece and workshare letters is given by the change in consumer and producer surplus, where the change in producer surplus is the change in net revenues earned by the Postal Service. Realize that the increase in net revenues earned by the Postal Service from First-Class letters is used to satisfy the break-even constraint and provide lower prices for more elastic subclasses.

Table 19 presents the total change in social welfare, where the change in consumer surplus is estimated using the simple approximation presented earlier in this testimony. The change in producer surplus is the change in net revenues. Changes in consumer and producer surplus from the Ramsey pricing of single-piece and workshared letters are measured relative to the before-rates price of letters and the non-Ramsey price of letters.

Net revenues from First-Class letters are estimated to be $15,814 million (see Table 17) before-rates. Net revenues from First-Class letters under the non-Ramsey rate schedule are $16,603 (see Table 11). Net revenues from First-Class letters under

Ramsey pricing are $17,238 million. Total net gain is the sum of the change in consumer surplus and net revenues.

Table 19
Total Gains from Ramsey Pricing of Single-Piece and Workshared Letters

Before-Rates Expenditures per Piece	Ramsey Expenditures per Piece	Change in Consumer Surplus	Change in Net Revenues	Total Net Gain
$0.3521	$0.3619	-$940 million	$1,424 million	$484 million
Non-Ramsey Expenditures per Piece	**Ramsey Expenditures per Piece**	**Change in Consumer Surplus**	**Change in Net Revenues**	**Total Net Gain**
$0.3589	$0.3619	-$287 million	$635 million	$348 million

Thus, efficient pricing of single-piece and workshared letters leads to a net gain of between $348 million and $484 million, depending on whether the comparison is with the before-rates price schedule or the non-Ramsey price schedule. With respect to the non-Ramsey rate schedule, the $348 million net gain shown in Table 19 is in addition to the $1,023 million gain in consumer surplus realized under Ramsey pricing of mail subclasses.

E. Conclusions

Ramsey pricing is shown to be consistent with Efficient Component Pricing when the demands for single-piece and workshared letters are the same. When these demands differ, the Ramsey efficient discount will differ from the ECP discount, with the less elastic of the two First-Class letter categories assigned a higher per piece mark-up. While this will lead to some inefficiency in mail sorting, the loss is less than the gain in consumer surplus achieved through equalization of leakage across the two products.

The extent to which the Ramsey discount departs from the ECP discount depends largely on two considerations. First, the greater is the difference between the own-price elasticities of the two categories of mail, the greater will be the difference in the per piece mark-up of each category. Second, the smaller is the volume of mail that shifts from single-piece to workshared (or vice versa), the less important is the discount to overall efficiency. The empirical finding is that the difference between the ECP and Ramsey discounts is small, owing to the fact that the own-price elasticities of single-piece and workshared letters are not substantially different and to the fact that the discount does have a meaningful effect on the distribution of mail between single-piece and workshared letters.

Although the empirical results were illustrative, two points stand out. It seems reasonable to conclude that efficient pricing of the First-Class letter subclass would involve an increase in the price of single-piece letters. A second finding is that the discount for workshare mail should be increased to encourage greater mailer worksharing, given the assumption that the resulting cost difference between single-piece and workshared letters reflects the Postal Service's savings.

Overall, it is found that efficient pricing of single-piece and workshared letters produces a net gain of between $348 million and $484 million, above and beyond the gains realized by Ramsey pricing of mail subclasses. The exact calculation of the net gain depends on estimates of the user costs of mailers who switch from sending single-piece to workshare letters. This is an important consideration, not just from Ramsey or Efficient Component Pricing, but for any pricing schedule that affects the assignment of worksharing activities.